The influence of primary care clinic characteristics on the quality of care for depression in patients with different comorbidity profiles

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Résumé

Dans les services de première ligne, la majorité des personnes atteintes de dépression souffrent également d’autres maladies chroniques comorbides. Offrir des soins de haute qualité à ces patients représente un défi important pour les intervenants en première ligne ainsi que pour le système de santé. Il y a des raisons de croire que les contextes organisationnels dans lesquels les intervenants pratiquent ont une influence importante sur les soins. Cependant, peu d’études ont examiné directement la façon dont les caractéristiques des cliniques facilitent ou entravent les soins offerts aux patients atteints de dépression et de différents types de maladies chroniques comorbides. L’objectif général de ce projet de recherche était donc de mieux comprendre comment différentes caractéristiques des cliniques de première ligne influencent la qualité des soins pour la dépression chez des patients ayant différents profils de comorbidité.

La thèse comporte deux études. Tout d’abord, nous avons effectué une revue systématique examinant les relations entre la comorbidité physique chronique et la qualité des soins pour la dépression dans les services de première ligne afin de clarifier la nature de ces relations et d’identifier les facteurs qui pourraient influer sur ces relations. Ensuite, nous avons effectué une étude aux méthodes mixtes ayant deux volets : (a) un volet quantitatif examinant les relations entre la qualité des soins pour la dépression, les profils de comorbidité des patients, et les caractéristiques des cliniques de première ligne par le biais d’analyses de régression multiniveaux de données issues de deux enquêtes, et (b) un volet qualitatif basé sur une étude de cas explorant les perceptions des professionnels des services de première ligne sur les facteurs organisationnels pouvant influencer la qualité des soins offerts aux patients souffrant de dépression et d’autres maladies chroniques comorbides.

Les résultats de ces études ont montré que, bien que la qualité des soins de la dépression en soins primaires soit sous-optimale, certains sous-groupes de patients dépressifs sont plus à risque que d’autres de recevoir des soins pour la dépression inadéquats, notamment des
patients ayant uniquement des comorbidités chroniques physiques. Cependant, plusieurs caractéristiques des cliniques de première ligne semblent faciliter l’offre de soins de qualité aux patients atteints de dépression et de maladies chroniques comorbides : les normes et les valeurs liées au travail d’équipe et le soutien mutuel, l’accès au soutien des professionnels ayant une expertise en santé mentale, l’utilisation des algorithmes de traitement et d’autres outils d’aide à la décision pour la dépression, et l’absence d’obstacles liés aux modèles de rémunération inadéquats. Une des façons dont ces caractéristiques favorisent la qualité est en facilitant la circulation des connaissances dans les cliniques de première ligne.

Nos résultats suggèrent que des interventions organisationnelles ciblées sont nécessaires pour améliorer la qualité des soins pour la dépression que reçoivent les patients ayant des maladies chroniques comorbides. Ces interventions peuvent viser différents domaines organisationnels (ex : caractéristiques structurelles/stratégiques, sociales, technologies et épistémiques) mais doivent aussi prendre en compte comment les éléments de chaque domaine interagissent et comment ils pourraient influencer les soins pour des patients ayant des profils de comorbidity différents.

**Mots clés**
Hypothèse, Santé mentale, Comorbidité, Multimorbidité, Qualité des soins, Soins de première ligne, Facteurs organisationnels, Gestion des connaissances, Revue systématique, Méthodes mixtes
Abstract

In primary care settings, most patients presenting with major depression also suffer from comorbid chronic mental and/or physical conditions. Delivering high quality depression care to these patients represents an important challenge for primary care providers and for health care systems. There are reasons to believe that the organizational contexts in which providers practice have an important influence on the care they provide to patients with depression and comorbid chronic conditions. However, few studies have directly examined how primary care organizational characteristics facilitate or impede care for these patients. The main objective of this thesis was to better understand how different primary care organizational characteristics influence the quality of depression care provided to patients with different profiles of comorbid chronic conditions.

The thesis has two components. First, we conducted a systematic review examining relationships between chronic physical comorbidity and the quality of depression recognition and treatment in primary care in order to clarify the nature of these relationships and identify factors associated with observed differences in these relationships across studies. Next, we carried out a mixed-methods study conducted in two sequential phases: (a) a quantitative phase examining relationships between depression care quality, patients’ comorbidity profiles, and primary care clinic characteristics using multilevel regression analyses of data collected from two inter-related surveys, and (b) a qualitative phase relying on a case study approach that examines primary care professionals’ perceptions of the organizational factors that influence the quality of care they provide to patients living with depression and other comorbid chronic diseases.

Results of these studies revealed that while the quality of depression care in primary care is suboptimal, some patient subgroups are more at risk of receiving low quality of care than others. Specifically, depressed patients with chronic physical comorbidity only were more at risk of receiving suboptimal care than patients presenting only with psychiatric comorbidity.
However, several characteristics of primary care organizations facilitated the delivery of high quality care to patients with depression and comorbid chronic conditions. These included norms and values related to teamwork and mutual support, access to supports from professionals with expertise in mental health, use of decision support tools for depression treatment, and a lack of barriers due to inadequate payment models. One of the ways these characteristics support quality is by facilitating the flow of knowledge in primary care organizations.

Our findings suggest that targeted organizational interventions are needed to improve the quality of depression care delivered to patients with depression and comorbid chronic conditions. Interventions could target multiple organizational domains (e.g. structural/strategic, social, informational and epistemic characteristics) and should consider how elements in each domain interact and how they might impact patients with different comorbidity profiles.

**Key words**
Depression, Mental health, Comorbidity, Multimorbidity, Quality of health care, Primary care, Organizational factors, Knowledge management, Systematic review, Mixed-methods
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List of abbreviations

CANMAT  Canadian Network for Mood and Anxiety Treatments
CCHS  Canadian Community Health Survey
CERES  Comité éthique de la recherche en santé
CES-D  Center for Epidemiological Studies Depression scale
CDS  Chronic Disease Score
CI  Confidence interval
CIDI  Composite International Diagnostic Interview
CIDIS  Composite International Diagnostic Interview Simplified version
CIDI-SF  Composite International Diagnostic Interview – Short Form
CLSC  Centre local de services communautaires
CMC  Chronic medical condition
CMPs  Care management processes
COPD  Chronic obstructive pulmonary disease
CSSS  Centre de santé et de services sociaux
DIS  Diagnostic Interview Schedule
DSM-IV  Diagnostic and Statistical Manual of Mental Disorders – 4th Edition
ECA  Epidemiologic Catchment Area study
EMR  Electronic medical record
GDS  Geriatric Depression Scale
GMF  Groupe de médecine familiale
GP  General practitioner
HADS  Hospital Anxiety and Depression Scale
HADS-A  Hospital Anxiety and Depression Scale – Anxiety subscale
HADS-D  Hospital Anxiety and Depression Scale – Depression subscale
HEDIS  Healthcare Effectiveness Data and Information Set
HIV/AIDS  Human immunodeficiency virus / Acquired immunodeficiency syndrome
HMOs  Health Maintenance Organization
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>HSSC</td>
<td>Health and Social Service Centre</td>
</tr>
<tr>
<td>ICD</td>
<td>International Classification of Diseases</td>
</tr>
<tr>
<td>ICPC</td>
<td>International Classification for Primary Care</td>
</tr>
<tr>
<td>IDD</td>
<td>Inventory to Diagnose Depression</td>
</tr>
<tr>
<td>IOM</td>
<td>Institute of Medicine</td>
</tr>
<tr>
<td>KM</td>
<td>Knowledge management</td>
</tr>
<tr>
<td>MDE</td>
<td>Major depressive episode</td>
</tr>
<tr>
<td>MSSS</td>
<td>Ministère de la Santé et des Services sociaux</td>
</tr>
<tr>
<td>NCS</td>
<td>National Comorbidity Survey</td>
</tr>
<tr>
<td>NCS-R</td>
<td>National Comorbidity Survey Replication</td>
</tr>
<tr>
<td>OR</td>
<td>Odds ratio</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-Operation and Development</td>
</tr>
<tr>
<td>PHQ-9</td>
<td>Patient Health Questionnaire-9</td>
</tr>
<tr>
<td>PRIME-MD</td>
<td>Primary Care Evaluation of Mental Disorders</td>
</tr>
<tr>
<td>PRISMA</td>
<td>Preferred Reporting Items for Systematic reviews and Meta-Analyses</td>
</tr>
<tr>
<td>QOF</td>
<td>Quality and Outcomes Framework</td>
</tr>
<tr>
<td>RAMQ</td>
<td>Régie de l’Assurance maladie du Québec</td>
</tr>
<tr>
<td>SCID</td>
<td>Structured Clinical Interview for DSM Disorders</td>
</tr>
<tr>
<td>UMF</td>
<td>Unité de médecine familiale</td>
</tr>
<tr>
<td>VHA</td>
<td>Veterans Health Administration</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>WHODAS</td>
<td>WHO Disability Assessment Schedule</td>
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Introduction

Jacques Tremblay shuffled into his family physician’s office and pulled up his sleeve as the nurse fastened the blood pressure cuff around his oversized upper arm. A bulky 56-year-old man with a heavy shock of gray hair teetering on the edge of his forehead, his problem list included type 2 diabetes mellitus, chronic obstructive pulmonary disease, hypertension, obesity, and hyperlipidemia. He suffered from bouts of major depression that responded to sertraline but never fully remitted. As the nurse inflated the cuff, Mr. Tremblay smiled weakly and maintained a cheerful façade even after she informed him that his blood pressure was 164/88 mm Hg and his glucose was 267 mg/dL (14.82 mmol/L)—both well above goal. Later, after more careful questioning by his physician Dr. Roger, Tremblay admitted that he was feeling “more down than usual” and that he sometimes neglected to take his diabetes medicine and blood pressure pills. Thinking back over the years she had cared for this patient, Dr. Roger recalled that December tended to be a particularly bad month. Social isolation, tolerable for most of the year, became painful around the holidays.

The clock was running, the waiting room was full, and Dr. Roger realized she was already falling behind...

(Extracted and adapted from Kravitz and Ford [1]. Patient name is fictitious)

In any given year, one in five Canadians will experience a mental health problem or illness [2]. Major depression is one of the most common mental illnesses in the general population and places a substantial burden on affected individuals, their families, and all of society [3, 4]. In 2012, approximately 1.3 million Canadians, or 4.7% of the population aged 15 and older, experienced a major depressive episode [5]. Episodes of depression are disabling and can significantly disrupt educational attainment, occupational functioning, and personal relationships [3]. Once thought to be a time-limited disorder with episodes lasting on average four to six months, depression is increasingly recognized to be a chronic condition
(i.e. a condition requiring ongoing management for years or decades [6]) given growing
evidence that relapse and incomplete recovery are common [4, 7].

Depression is also known to commonly coexist with other long-term mental and physical
conditions [8-11]. Indeed, large population surveys indicate that depression is strongly
associated with other mental disorders and that approximately two thirds of depressed
individuals concurrently suffer from disorders such as anxiety or substance use disorders [8,
9]. Similarly, research has shown that the pathways causing comorbidity of depression and
chronic physical disease are complex and bi-directional, with depression being an important
risk factor for the development and progression of numerous diseases (e.g. heart disease,
diabetes, stroke, cancer) and chronic physical diseases increasing the risk for developing
depression and worsening its course [12, 13]. When depression and chronic conditions
coexist, their combined impact on affected individuals is often profound [14]. Personal
accounts of individuals living with depression and chronic diseases suggest that they can feel
overwhelmed and helpless as a result of their health problems, as well as unable to fulfill
important family and life roles [15, 16]. Epidemiological studies also show that such
individuals suffer from greater levels of disability than those living with depression or chronic
conditions alone and that some combinations of conditions can have synergistic effects
resulting in even poorer health outcomes [17-21].

In Canada as in many other jurisdictions, the majority of people seeking care for depression
will receive care for their disorder from a general practitioner (GP) in primary care [22].
Depression affects approximately 10% of primary care patients [23, 24]. However, as was the
case with Mr. Tremblay in the scenario above, patients will rarely present with “pure” cases
of depression [25]. Instead, their depression will often be accompanied by a range of mental
and/or chronic physical conditions [25]. Patients such as Mr. Tremblay are thus commonly
encountered in primary care settings and yet it can be very challenging for providers to
recognize, treat, and manage these patients’ depression when it presents alongside a host of
other health problems [1, 26].
Much attention has been paid to the quality of care provided to people living with depression in primary care settings. A vast literature spanning several decades suggests that half of depression cases go unrecognized in these settings and that an even smaller proportion of patients receive care that can be considered minimally in line with accepted standards of quality [27-29]. Do patients’ other comorbid chronic conditions contribute to the suboptimal care they receive for their depression? This is what several authors have suggested [30, 31] and such a view has gained acceptance in the scientific community [15, 32]. However, empirical evidence on this topic has produced conflicting results to date and many questions remain about the precise relationship that exists between chronic disease comorbidity and depression care quality.

Concerns about the quality of care provided to people with depression have given rise to a plethora of clinical practice guidelines and other quality improvement efforts designed to enhance the prevention and management of depression in primary care [33-35]. However, most guidelines developed to date do not address the impacts of comorbidity in detail [36, 37] and most interventions have been designed within a single-disease perspective that has limited their impact in patients with comorbid mental or chronic physical conditions [35]. Given the prevalence and impacts associated with depression and comorbid chronic conditions, there is a clear and urgent need to identify strategies that can support better care and health outcomes for patients with depression and comorbid chronic conditions.

Over the past 15 years there has been growing interest in understanding how organizational or system-level factors influence the quality of care provided to people with depression or other chronic conditions [38-41], in part due to the recognition that many barriers to effective care exist at these levels [42, 43]. Studies suggest that chronic conditions may be managed differently depending on the organizational contexts in which care is provided [44-46] and that some interventions involving organizational changes can lead to improved depression care and outcomes [34, 35, 41, 47]. However, very little is known about how
organizational contexts influence care for people with comorbid depression and chronic conditions and there are important knowledge gaps around the organization-level strategies that can be targeted in quality improvement initiatives for this vulnerable population.

The overarching aim of this thesis is thus to examine and better understand how the organizational characteristics of primary care settings influence care provided to people like Mr. Tremblay, that is people who live with depression and comorbid chronic conditions. This thesis will present a literature review on the influence of comorbid chronic physical conditions on the recognition, treatment and follow-up of depression in primary care (articles 1 and 2). It also features a quantitative, cross-sectional study examining relationships between depression care quality, patients’ comorbidity profiles, and organizational characteristics of primary care clinics in the province of Quebec (article 3). Finally, it includes a qualitative, multiple case study exploring primary care providers’ perspectives of the organizational characteristics of their practice settings that influence the care they provide to patients with comorbid mental and chronic physical conditions (article 4).

The topic and findings of this thesis have implications of great relevance to public health. Primary care services are the foundation of the Quebec and Canadian health systems and have undergone massive transformations in recent years in response to pressures such as the rise of chronic diseases in populations and escalating costs of care [48, 49]. Beyond the effects that depression and comorbid chronic diseases have on individuals and families, these conditions have important social impacts and affected patients are also heavy and costly users of primary care and other health services [13, 17]. Indeed, current systems of care seem ill equipped to support the delivery of high quality care to these patients [50, 51]. While recent interventions targeting changes to organizational structures and practices have shown some promise in improving health outcomes, these interventions have limitations and have not been widely implemented in health systems. Taken together, these realities suggest that organization of care is an important determinant of health for this population.
and that improvements to primary care service organization could positively impact the quality of service delivery and ultimately population health. This is the rationale that underpins this thesis.

This thesis is organized as follows: Chapter 1 of the thesis consists of a literature review examining the relationship between depression and chronic disease, the challenges of providing care to patients with depression and comorbid chronic diseases in primary care, and the role of organizational contexts in care for these patients. In chapters 2 through 4, the objectives and conceptual framework for the thesis are presented, as are the methods for each study comprising the thesis. In chapter 5, four articles are presented, which represent the results of this thesis. Finally, the discussion section can be found in chapter 6, followed by a conclusion summarizing main findings of the thesis.
Chapter 1: Literature review

1.1. Definition, prevalence and impacts of depression

Defining depression

Depression refers to a heterogeneous group of related disorders characterized primarily by low mood, loss of interest or enjoyment in ordinary experiences, and other emotional, cognitive and physical symptoms [4]. While most people experience struggles in life and occasional sadness, these normal experiences should not be confused with a serious illness like depression [52]. An episode of depression causes significant distress and feelings of sadness, guilt, worthlessness and hopelessness that persist over time and impair daily functioning considerably [4].

Major depressive disorder is diagnosed by the presence of one or more depressive episodes in which depressive symptoms persist for at least two weeks and represent a change from the person’s previous functioning [3]. The most common diagnostic criteria used to diagnose major depression are those developed by the American Psychiatric Association and presented within their Diagnostic and Statistical Manual of Mental Disorders (DSM) [53], and the International Classification of Diseases (ICD) criteria developed by the World Health Organization (WHO) [54]. These criteria are presented below in Table I.

Use of DSM criteria is common in North America whereas ICD criteria are used more widely in Europe and other parts of the world. The two sets of diagnostic criteria for major depression largely overlap but it can happen that a person is diagnosed with depressive episode under one set of criteria but not the other [55]. However, it is important to recognize that depression is likely best understood as a continuously distributed syndrome rather than a discrete diagnostic entity [56]; studies show that the relationship between number of depressive symptoms and impairment is linear [56] and for providers the line between “normal” depression and “clinically significant” depression is sometimes thin and difficult to discern [4].
<table>
<thead>
<tr>
<th></th>
<th>DSM-V Major Depression</th>
<th>ICD-10 Major depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>**Clinical</td>
<td>Symptoms cause clinically significant stress or impairment in social, occupational or</td>
<td>Some difficulty in continuing with ordinary work and social activities, but will probably not cease to function completely in mild depressive episode; considerably difficulty in continuing with social, work or domestic activities in moderate depressive episode; considerable distress or agitation, and unlikely to continue with social, work or domestic activities, except to a very limited extent in severe depressive episode.</td>
</tr>
<tr>
<td>significance</td>
<td>other areas of functioning.</td>
<td></td>
</tr>
<tr>
<td>**Duration of</td>
<td>Most of the day, nearly every day, for at least two weeks.</td>
<td>A duration of at least 2 weeks is usually required for diagnosis for depressive episode of all three grades of severity.</td>
</tr>
<tr>
<td>symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Severity</strong></td>
<td>Five or more of the following symptoms; at least one symptom is either depressed mood or</td>
<td>Depressed mood, loss of interest and enjoyment and reduced energy leading to increased fatigability and diminished activity in typical depressive episodes; other common symptoms are:</td>
</tr>
<tr>
<td></td>
<td>loss of interest</td>
<td>(1) Reduced concentration and attention</td>
</tr>
<tr>
<td></td>
<td>(2) Loss of interest</td>
<td>(2) Reduced self-esteem/self-confidence</td>
</tr>
<tr>
<td></td>
<td>(3) Significant weight loss or gain or decrease in appetite</td>
<td>(3) Ideas of guilt and unworthiness</td>
</tr>
<tr>
<td></td>
<td>(4) Insomnia or hypersomnia</td>
<td>(4) Bleak and pessimistic views of the future</td>
</tr>
<tr>
<td></td>
<td>(5) Psychomotor agitation/retardation</td>
<td>(5) Ideas or acts of self-harm and suicide</td>
</tr>
<tr>
<td></td>
<td>(6) Fatigue or loss of energy</td>
<td>(6) Disturbed sleep</td>
</tr>
<tr>
<td></td>
<td>(7) Feelings of worthlessness or excessive or inappropriate guilt</td>
<td>(7) Diminished appetite</td>
</tr>
<tr>
<td></td>
<td>(8) Diminished ability to think or concentrate, or indecisiveness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(9) Recurrent thoughts of death, recurrent suicidal ideation without a specific plan,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>or suicide attempt or a specific plan.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Mild episode</strong>: few symptoms beyond what is needed to make a diagnosis, person can</td>
<td></td>
</tr>
<tr>
<td></td>
<td>function with extra effort.</td>
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<tr>
<td></td>
<td><strong>Moderate episode</strong>: symptoms between mild and severe.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Severe episode</strong>: symptoms in excess of what is needed to make a diagnosis,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>symptoms markedly interfere with functioning or relationships.</td>
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</tbody>
</table>
Dysthymic disorder (or dysthymia) is another common and related condition in the family of depressive disorders [3]. The essential feature of dysthymia is a chronically depressed mood that occurs most of the day, almost every day, for at least two years [3]. Individuals with dysthymia are often less severely depressed at initial examination but their symptoms persist and are often more severe when assessed after a period of 6 months or several years [57].

**Prevalence of depression in the general population**

Depression occurs throughout the lifespan but its prevalence peaks between the ages of 15 and 45 years, with median age of onset in the early- to mid-twenties [9, 58, 59]. The disorder appears more frequently in woman than men, in unmarried individuals than married ones, and in people with lower as opposed to higher socioeconomic status (e.g. people with a low income) [9, 58, 59].

Major depression is one of the most common mental disorders in populations. The WHO estimates that at any given moment more than 150 million people worldwide suffer from unipolar depressive disorders (i.e. major depression and dysthymia) [60]. In Canada, the 2002 nationally representative Canadian Community Health Survey (CCHS – cycle 1.2) estimated that 10.8% of Canadians experienced a major depressive episode in their lifetime and that 4.0% of Canadians experienced such an episode in the previous year [58]. This annual prevalence rate for depression is similar to Canadian prevalence rates for other common chronic diseases such as diabetes and heart disease [61]. These prevalence rates for depression are also slightly lower than those observed in the United States (lifetime = 16.6%, annual = 6.7%) [59] but are generally comparable to those from other developed countries [9, 62]. Using data from the CCHS (cycle 1.2), the Institut de la statistique du Québec estimated that lifetime prevalence of depression in Quebec was 13.9% whereas the annual prevalence was 4.8% [63].
**Burden of depression**

The burden of depression on individuals, families and society as a whole is enormous. The disorder causes significant suffering and can greatly interfere with functioning in many aspects of people’s lives [3, 64]. The breadth and depth of impairment is illustrated in data from the National Comorbidity Survey Replication (NCS-R), a nationally representative survey of over 9000 United States residents [8]. This survey showed that nearly all (96.9%) of respondents with current (i.e. within the previous 12 months) major depression reported at least some role impairment in work, household, relationship or social roles in the previous year, and that 87.4% of respondents reported having experienced moderate role impairment and 59.3% severe or very severe impairment [8]. Depression can be particularly difficult on families. Social and cognitive impairments caused by the disorder can lead to loss of income due to workplace underperformance and absenteeism as well as strained personal and marital relationships [64]. Family members living with someone suffering from depression may also make many adjustments and compromises that prevent them from achieving their own potential in work, social relationships, and leisure activities [65].

Episodes of major depression are distressing and typically last an average of 6 months (median of 3 months), though some episodes may last for only several weeks while others will not remit for years [56, 66, 67]. Predictors of longer episode duration include the severity of the index episode, co-occurrence of dysthymia or chronic physical illness, and lack of social support [67, 68]. Full remission from depressive episodes, defined as the absence of all but minimal symptoms for a brief (2 to 8 weeks) period, will be achieved by the majority of patients within a year of initial onset [7, 56]. However, a considerable proportion of patients (approximately 20 to 27%) will have episodes and symptoms that persist over two years [7, 68, 69]. Even when remission is achieved, it is rarely accompanied by a total disappearance of all symptoms [64, 69]. Furthermore, depression is associated with high rates of relapse (i.e. an early return of symptoms after a positive response to treatment) and recurrence (i.e. the appearance of a new episode after full remission of a previous episode) [3, 4, 7, 70]. Relapse rates as high as 50% have been reported in the literature, with short-
term relapse being strongly predicted by the presence of residual symptoms [7, 71, 72]. With respect to recurrence of depression, the risk increases with each subsequent episode; approximately 25 to 50% of patients will go on to have a second depressive episode [73, 74], with the risk of relapse rising to 70% and 90% following second and third episodes, respectively [73]. Given its relapsing, remitting, recurrent nature, the notion that depression is best conceptualized and clinically managed as a chronic and potentially lifelong condition has recently gained international acceptance [3, 4, 6, 7, 32, 70].

This chronic mental disorder has major impacts at a societal level. Recent estimates using data from the CCHS (cycle 2.1) suggest that the economic burden of mental disorders in Canada is $51 billion dollars [75]. The largest proportion of these costs have been tied to depression [76] and include costs resulting from use of health services, loss of work productivity, and loss of quality of life. Major depression is also strongly associated with death by suicide [77]. The disorder accounts for more deaths by suicide than any other mental disorder [78], with depressed individuals being 20 times more likely to commit suicide than individuals in the general population [77, 78].

The disabling nature of depression is recognized internationally. In the WHO 2010 Global Burden of Disease survey, major depressive disorder ranked as the second leading cause of years lived with disability in the world, just behind low back pain and ahead of chronic conditions such as chronic obstructive pulmonary disease (COPD), diabetes, schizophrenia, and heart disease [79]. This same survey also showed that overall worldwide burden from major depressive disorder – defined as the number of years of healthy life lost due to poor health or disability – has risen by 37% since 1990 and that the disorder ranked as the 11th leading cause of disease burden in 2010 [80, 81]. In developed regions such as North America and Europe, major depressive disorder ranks as the 5th leading cause of disease burden [81]. In its previous report on the 2004 Global Burden of Disease survey, the WHO estimated that unipolar depressive disorders would become the number one cause of disease burden in the world by the year 2030 [60].


Section summary

Depression is a highly prevalent and often chronic mental disorder that imposes a significant burden on individuals, their loved ones, and our broader society. As such, it represents an important target for intervention from a public health perspective. Effective treatments for depression exist and working to help people living with this disabling disorder receive timely and appropriate treatment constitutes an important strategy for reducing the prevalence and impact of depression in populations.

1.2. Relationships between depression and other chronic conditions

Defining comorbidity and multimorbidity

That diseases sometimes co-occur with depression has long been known. In 4th century BC, the Greek physician Hippocrates described the first cases of “melancholia” and noted how this depressive state was sometimes accompanied by anxiety or pain [82]. Yet, it was not until the 1970s when the American physician and epidemiologist Alvan Feinstein first coined the term “comorbidity” that medicine and particularly medical research began playing closer attention to the phenomenon of diseases coexisting within the same individuals [83].

Feinstein defined comorbidity as “any distinct clinical entity that has existed or that may occur during the clinical course of a patient who has the index disease under study” [84]. The question of which disease acts as the index disease is only a matter of perspective and can be identified by the clinician or researcher. Since Feinstein’s first use of the term, many different conceptualizations of the concept of comorbidity have been proposed [85]. Some of these conceptualizations have made distinctions between types of conditions that could be considered (e.g. chronic and acute versus chronic only, physical conditions versus both physical and mental conditions), the number of conditions that could be considered, or how those conditions were identified (e.g. diagnosed by a physician or reported by a patient) [85]. Other conceptualizations have made little reference to an index condition, such as the one
offered by Burke et al. [86]: “...the presence of more than one specific disorder in a person in a defined time period.” The often interchangeable use of different terms is problematic as it hampers comparability of research findings and creates conceptual confusion for clinicians, researchers, and health system planners [85, 87].

In the present thesis, the term comorbidity is understood to be “the presence of co-existing or additional diseases with reference to an initial diagnosis or with reference to an index condition that is the subject of the study” [88]. This is the definition used as a Medical Subject Heading term by the US National Library of Medicine. When referring to the presence of multiple chronic diseases within an individual without making reference to an index condition, the term “multimorbidity” will be used. Boyd and Fortin define multimorbidity as “the co-existence of two or more chronic conditions, where one is not necessarily more central than the others” [89].

**Prevalence and impacts of comorbidity of mental disorders**

People with major depression very frequently suffer from comorbid mental disorders. According to the US NCS-R population survey, nearly three quarters (72.1%) of individuals experiencing major depression in their lifetime will also meet ICD or DSM criteria for another mental disorder [8]. The survey also found that 64.0% respondents that had major depression in the previous 12 months met criteria for another 12-month disorder, with anxiety disorders (57.5%) being the most common. These findings are consistent with those of other large epidemiological surveys [9, 90]. The anxiety disorders most strongly associated with major depression are generalized anxiety disorder (odds ratios ranging from 3.0 to 20.7) and panic disorder (odds ratios ranging from 1.9 to 23.9) [9, 25, 91-93]. Lifetime history of depression can be observed in up to 73% of individuals with a history of panic and in two-thirds of individuals with a history of generalized anxiety [94]. Risk factors for comorbid depression and anxiety include early age at onset of disorders, longer duration of symptoms, higher symptom severity, exposure to childhood trauma, and personality characteristics (e.g. neuroticism) [90]. In addition to anxiety disorders, other mental disorders strongly
associated with depression are bipolar disorder, dysthymia, personality disorders, and substance use disorders, particularly drug dependence [9, 25, 92, 93].

The presence of mental disorders comorbid to depression can have serious consequences for affected individuals and has been linked to increased symptom severity, greater functional impairment and risk of suicide, decreased responsiveness to treatment, greater chronicity of disorders, and lower quality of life [90, 95-98]. These individuals are also at higher risk of hospitalization and make greater use of health services than those who do not have comorbid mental disorders [96, 99].

**Prevalence and impacts of comorbidity of chronic physical conditions**

Major depression also frequently co-occurs with chronic physical diseases [3, 12, 15]. In Canada, data on associations between major depression and chronic physical diseases are available through the CCHS survey. In a sample of over 115,000 Canadians over the age of 18, Patten et al. [11] reported that the 12-month prevalence of depression in respondents reporting one or more of 23 chronic conditions (e.g. arthritis or rheumatism, cancer, diabetes, heart disease, stroke) was 9.2% compared to 4.0% in those not reporting a chronic condition. Among respondents with the most prevalent chronic diseases, past-year major depression was reported in 12.6% of respondents with low back pain, 10.0% of respondents with arthritis, 6.9% of patients with high blood pressure, and 10.2% of respondents with migraine. Annual prevalence of major depression was lowest in respondents with eye conditions (cataracts = 5.2%, glaucoma = 6.6%) and highest for respondents with chronic fatigue syndrome (36.4%) and fibromyalgia (22.2%). Sixteen of the 23 chronic conditions showed significant positive associations with depression (odds ratios ranging from 1.2 for high blood pressure to 7.2 for chronic fatigue syndrome). These findings are similar to those of a smaller population survey conducted in Alberta in 1998 and 1999 [100]. Using data from waves 1 and 2 of the Canadian National Population Health Survey (1994/1995 and 1996/1997), Patten et al. [101] also showed that several chronic diseases were associated
with an increased incidence of depression (i.e. the number of new cases of depression over a given time), including chronic pulmonary diseases, migraine headache, back problems.

Focusing on CCHS survey (cycle 1.2) respondents over the age of 50 years, Feist et al. [102] showed that the 12-month prevalence of major depressive episode in older adults with chronic conditions was 3.7% compared to 1.0% in those without chronic conditions. The top chronic conditions affecting older adults were arthritis/rheumatism, high blood pressure, back problems and heart disease, with all showing significant associations with major depressive episode (odds ratios ranging between 1.5 and 2.4). Similar to the findings from the overall adult CCHS survey population, the chronic diseases most strongly associated with major depressive episode were chronic fatigue syndrome, fibromyalgia, ulcers, migraine headache, and stroke (odds ratios ranging between 2.9 and 6.8).

International epidemiological studies provide further evidence of strong linkages between major depression and chronic physical diseases. Table II presents prevalence rates for comorbid major depression in patients with different chronic physical diseases, as reported in large population surveys or reviews of the literature. Most studies and reviews find that major depression has high prevalence among people living with chronic diseases and that such individuals are typically two to four times more likely to suffer from a major depressive episode than individuals without chronic diseases [3, 10, 15, 17].

<table>
<thead>
<tr>
<th>Table II. Rates of comorbid major depression in select chronic physical diseases</th>
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<tbody>
<tr>
<td><strong>Comorbid chronic disease</strong></td>
</tr>
<tr>
<td>Arthritis</td>
</tr>
<tr>
<td>Cancer</td>
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<tr>
<td></td>
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<tr>
<td>Cardiovascular disease</td>
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There is a growing consensus in the scientific community that the relationship between major depression and chronic physical disease is bidirectional [10, 12, 13, 15], that is to say that chronic physical diseases can cause and exacerbate depression and that depression can cause and exacerbate chronic physical diseases. For instance, Patten et al.’s 2001 study [101] (described above) showing that several chronic conditions independently predicted onset of new major depression is but one example of many [12, 116-118] showing that chronic diseases are significant risk factors for the development of depression. These findings were further reinforced by a recent longitudinal study of depression incidence using data from waves 4 through 7 of the Canadian National Population Health Survey [119]. This study used proportional hazards models, a form of “time to event” analysis, to examine associations between various predictors and major depressive episode over the 6-year observation period, finding that respondents with one or more chronic physical conditions were at significantly higher risk of developing a depressive episode over that time period than those without chronic physical conditions (hazard ratio = 1.3, adjusted for age, sex and family history of major depressive episode). Similar longitudinal studies by Patten [120] and others
[118, 121-123] have provided strong evidence for the reverse relationship as well, where initial onset of major depression precedes the onset of chronic diseases and independently predicts the development of chronic physical disease. The evidence from research in this area has led to the development of new conceptual models highlighting the complex interactions between risk factors for major depression and chronic physical disease, such as genetic and biological vulnerability, stressful life events, childhood adversity, and biobehavioural risk factors such as smoking or sedentary lifestyle [13, 20].

While the precise etiological mechanisms linking depression and chronic disease remain to be elucidated, it is clear that co-occurrence of depression and chronic physical disease places a tremendous burden on people living with these conditions, their loved ones, and society:

**Symptom perception and amplification**

Individuals living with major depression report a greater number and severity of symptoms of physical illness than individuals without depression, after controlling for sociodemographic factors and severity of physical illness [13]. For example, Ludman et al. [124] examined relationships between depression and diabetes symptom burden in a large population of primary care patients and found that patients with comorbid major depression were two to five times more likely to report each of the 10 diabetes symptoms assessed compared to diabetic patients without depression. Similarly, Walker et al. [125] found that patients with bowel disease and comorbid major depression complain of significantly more gastrointestinal and non-gastrointestinal physical symptoms compared to patients without comorbid depression. Arnow et al. [126] examined relationships between depression and chronic pain and found that patients with both conditions reported more disabling chronic pain than patients with depression or chronic pain alone.

**Course of illness**

Chronic physical disease has been shown to exacerbate the course of depressive illness. In a recent study by Satyanarayana et al. [68] based on data from the Canadian CCHS Survey
(cycle 1.2), the authors found that several chronic physical comorbidities (e.g. intestinal ulcers, back problems, chronic fatigue syndrome, arthritis) predicted a chronic course of depression, defined as depression with episodes lasting 2 years or more. There is also strong evidence that depression impedes recovery and worsens outcomes for a wide range of chronic physical diseases, such as heart attacks, stroke, diabetes, cancer, epilepsy, and HIV/AIDS [10, 127]. These impacts can be partly attributed to the negative effects of depression on self-care and adherence to treatment for chronic conditions [13].

**Quality of life**

Both major depression and chronic physical disease have negative impacts on individuals’ quality of life [128]. There is evidence that major depression impacts quality of life more strongly than chronic physical diseases [128] and that the combination of depression and chronic physical disease leads to even greater quality of life reductions [126, 128]. In some studies [129], these reductions have been shown to be multiplicative (or synergistic) as opposed to additive, meaning that the combined effects of depression and chronic physical disease led to lower reductions than what would have been expected by summing the effects of depression and chronic physical diseases together.

**Functional impairment and disease burden**

Synergistic effects of depression and chronic disease on every-day life functioning and disability have also been reported. Fultz et al. [21] examined how relationships between several chronic conditions and depressive symptoms in older adults (70+ years) affected several domains of functioning (e.g. climbing stairs, bathing, getting out of bed, preparing meals, taking medications). They found evidence of synergistic effects on functioning stemming from comorbidity of depressive symptoms in individuals with stroke and diabetes. Results from the NCS-R Survey showed that comorbid mental disorders (including depression) were associated with more days of role impairment than the sum of pure physical conditions (e.g. hypertension, arthritis) and pure mental disorders [130]. Two survey studies with large samples (30,000 + respondents) led by Egede have similarly shown that
individuals with diabetes or other chronic physical conditions and coexisting major depression display significantly higher levels of disability than individuals with chronic physical conditions or major depression alone [17, 131]. Using data from the World Mental Health Survey Initiative, an initiative bringing together 18 general population surveys, Scott et al. [18] found that the combination of mental (depressive or anxiety disorders) and chronic physical conditions was more strongly associated with severe disability (including role impairment, self-care, and social and cognitive functioning) than what would be expected from summing the odds associated with single conditions (mental + physical conditions: odds ratios ranging from 6.1 to 9.2; mental or physical conditions: odds ratios ranging from 1.8 to 4.0). Other recent studies have provided further evidence of synergistic effects of depression and chronic disease [129, 132, 133]. As discussed by Druss [132, 134], mental disorders like depression and chronic physical conditions seem to impact different spheres of functioning – mental disorders particularly disrupt social and cognitive functioning whereas physical illnesses affect physical functioning. As such, when these conditions co-occur, multiple domains of functioning are affected and consequently disability can be severe.

**Suicide and mortality**

Rates of suicide are increased in chronic physical conditions [135] and can be increased further by the presence of comorbid depression [136, 137]. In one study, Goodwin et al. [136] showed that patients with pulmonary disease were almost twice (odds ratio of 1.7) as likely to engage in suicidal ideation than patients without this disease, but that the likelihood of suicidal ideation was almost ten times (odds ratio of 9.6) higher among patients with pulmonary disease and comorbid depression. Depression has also been identified as an independent risk factor for mortality in several chronic physical conditions, including heart disease, diabetes, stroke, and cancer [10, 13, 127].

**Use of health services and medical costs**

People with depression and comorbid chronic physical conditions are heavy users of health services. Relative to patients with depression or chronic physical conditions alone,
individuals with both depression and chronic physical disease are more likely to be hospitalized and use emergency or outpatient services [13, 138-140]. Furthermore, in a population-based study of people with diabetes, Simon et al. [140] found that comorbidity of major depression was associated with a 70% increase in overall health costs relative to costs for people without depression. Simon also found that the health services costs for an average patient with controlled diabetes and no depression in a large Health Maintenance Organization were approximately $1700 US; costs for patients with more than three diabetes complications (more than a quarter of all respondents) were close to $7000 US and rose to over $10,000 US when these individuals’ diabetes was accompanied by major depression [140]. Egede et al. [138] have also reported higher costs for prescriptions in patients with both diabetes and depression, and another Canadian study provided evidence of higher physician costs associated with post-myocardial infarction depression [141].

Section summary

Population surveys show that the majority of people with depression also suffer from a diverse range of other comorbid chronic mental or physical conditions. Such comorbidity is associated with a range of negative outcomes at individual and health system levels. However, it is increasingly clear that there is a significant bi-directional relationship between depression and chronic disease, such that interventions positively affecting depression are likely to also positively affect outcomes for other chronic conditions, as well as overall quality of life. In this thesis, we seek to identify organizational characteristics of primary care clinics associated with the quality of routine clinical interventions such as recognizing and treating depression. If such associations exist, these clinic characteristics could be specifically targeted for organization-level interventions having the potential to enhance care for depression and improve mental and physical health outcomes in primary care patients. In the next section, we discuss the pivotal role of primary care in both chronic disease and mental health care.
1.3. Role of primary care in chronic disease and mental health care

Defining primary care

In Canada, when a person is sick or requires care, they most often turn to primary care services, which are the first point of contact with the health system [142]. Renowned primary care researcher Barbara Starfield defined primary care as the “level of a health service system that provides entry into the system for all new needs and problems, provides person-focused (not disease-oriented) care over time, provides care for all but very uncommon or unusual conditions, and co-ordinates or integrates care provided elsewhere by others” [143]. In 1995, a similar definition was provided by a committee of the Institute of Medicine (IOM) on the future of primary care: “Primary care is the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing sustained partnerships with patients, and practicing in the context of family and community” [144].

The scope of primary care practice is very broad. Primary care providers collectively deliver a wide array of services, including (a) health promotion and disease prevention services, (b) patient education and counselling, (c) diagnosis, treatment and management of acute and chronic care for physical and mental health problems, (d) child and maternal care, (e) seniors and end-of-life care, (f) basic emergency care, and (g) rehabilitation services [142, 145]. In Canada, primary care services are organized primarily around family physicians and general practitioners (GPs) that work either in solo practices (approximately 25% of physicians) or in group or interprofessional practices (approximately 75% of physicians) [48]. Many other professionals can be considered primary care providers, including internal medicine physicians, nurses, dieticians, physiotherapists, psychologists, social workers, occupational therapists, etc. [145]. Clinicians will also practice in a variety of settings (e.g. an office, community health centres, a long-term care centre, a patient’s home, etc.) [146].

Health services can also be obtained in secondary and tertiary care, levels of care typically reserved for more severe or uncommon illnesses, as well as more specialized emergency care
(e.g. serious trauma care) and the voluntary sector (e.g. non-profit community-based organizations) [147, 148]. Primary care clinicians have a distinctive role in coordinating care across different service providers and helping patients navigate the different levels of the health care system so that they can access the services they need when they need them [145, 149].

The term primary care is sometimes used interchangeably with the term “primary health care”, but distinctions can be made between these concepts. While primary care refers to the level or sector of care distinguished by its focus on person-focused, comprehensive, and continuous care across the lifespan, the term primary health care expands upon this to include public health and health policy actions addressing the broader social, environmental, and economic determinants of health [150]. For instance, beyond being the “first level of contact of individuals, the family and community”, the WHO views primary health care as including the promotion of food supply and proper nutrition, adequate supply of safe water and basic sanitation, immunization against major infectious diseases, prevention and control against endemic diseases, and coordinated actions in a wide range of public sectors to further health and well-being [151].

Thus, primary care should be understood to be a distinct but integral component of a larger primary health care strategy. In Canada and across the world, primary health care is widely regarded as the cornerstone of health care systems and fundamental to achieving greater health, well-being, and equity in populations [149, 152].

**Chronic disease care in primary care**

Over the past 30 years, health care systems worldwide have come under pressure due to trends such as aging populations and rising prevalence and burden of chronic diseases [152]. Evidence suggests however that systems characterized by a strong primary care sector are associated with better access to care and population health outcomes (e.g. all-cause mortality and mortality from chronic diseases), lower rates of potentially avoidable
hospitalizations, and fewer health and socioeconomic inequalities, though impacts on quality of care and health care spending are more mixed [149, 153-156]. Such evidence has contributed to a significant interest in strengthening primary care as a strategy for managing evolving health system pressures, including those exerted by chronic diseases [152].

In theory, primary care is well positioned to assume much of the burden of care for people with chronic diseases. Most people with chronic diseases have at least some contact with primary care clinicians and the defining features of primary care – that is, person-focused, continuous, comprehensive and coordinated care – match the care needs of the chronically ill [157]. In reality, however, primary care systems in Canada and much of the world have struggled to achieve optimal chronic disease care, though progress has been made in this area over the past 15 years (see Chapter section 1.4).

**Mental health care in primary care**

There is now widespread recognition that primary care also has a fundamental role to play in the care of people with mental health problems [158-161]. This has not always been the case, however, as psychiatric and general medical services largely evolved along separate tracks for much of the past century and it was not until the pioneering work of Shepherd [162] and others [23, 163-168] that clinicians, researchers and policymakers began to appreciate the extent of the prevalence and burden of mental disorders in primary care. In the 1960s, Shepherd and colleagues assessed point prevalence rates of psychiatric illnesses in 12 general medical practices in the Greater London area, discovering that 14% of patients consulted for such illnesses and that only 10% of cases were referred to psychiatrists, the rest receiving care exclusively from GPs [162]. Estimates from studies conducted in the United States and Europe in the 1970s and 1980s revealed even higher point prevalence rates for mental disorders in primary care ranging from 19% to 52% [164, 169-171]. A similar range of prevalence rates was reported in the WHO Collaborative Study on Psychological Problems in General Health Care conducted in over 20,000 primary care patients in 15 different sites around the world [172]. The late 1980s and early 1990s also saw the first results of the
Medical Outcomes Study, a large observational study (n = 22,462) examining variations in outcomes for (mostly) primary care patients with several “tracer” conditions (e.g. hypertension, diabetes, coronary artery disease, depression) in the health systems of three US cities [173]. This study showed that depression was more disabling in several spheres of functioning than most other chronic physical conditions [166]. Surprisingly, even subthreshold depression (elevated depressive symptoms) was associated with greater impairments in functioning than almost all other chronic diseases investigated.

Between 1990 and the early 2000s, more people in the population began receiving treatment for mental disorders and care shifted even more towards primary care. Clear evidence of this has been provided by the US NCS-R survey, which found that mental health treatment rose by approximately 65% across sectors over this time period, with a greater increase in treatment in the general medical sector (over 150%) than in any other care sector [174]. Factors that contributed to this trend include the introduction of better classification systems for mental disorders and more effective treatments, as well as feelings that receiving mental health care in primary care was less stigmatizing than care received in specialty settings [159, 175]. Today, studies show that 10% of Canadians seek care for mental health problems yearly, with 56% of these patients consulting either a GP alone or a GP and other health care professionals [22]. Considering this evidence together, it is perhaps not surprising that primary care has been referred to by some as the “de facto” mental health system within the health care system [167, 176].

That so many people receive mental health care in primary care does not mean however that they are receiving high-quality care from their primary care providers. Deficiencies in the education and training of GPs in mental health care have been documented extensively for decades and an expansive literature highlights shortcomings in the recognition and treatment of mental disorders in primary care as well as the delivery of person-centred, continuous, and comprehensive mental health care [159, 175, 177-180]. However, as is the case with chronic disease care in primary care, many efforts to strengthen ties between
mental health and primary care services and improve the quality of mental health care in primary care (or primary mental health care) are currently underway in countries around the world, including Canada [159, 181].

**Prevalence and presentation of depression in primary care**

Among the various mental disorders recognized and treated in primary care, depression is the most common [32, 159]. The annual prevalence rate for major depression in North American primary care systems is approximately 10% (range of 5% to 13%) [23, 182, 183], though rates approaching 20% have been observed in some socioeconomically disadvantaged communities [184]. In Europe and other parts of the world, similar or higher prevalence rates have been reported [168, 185, 186], including rates of 15% to 19% in countries such as the Netherlands, Spain, and the United Kingdom [168, 186].

In Canada, GPs are the clinicians most often consulted by people suffering from depression [22]. Social workers and psychotherapists are the second most consulted professional group, followed by psychologists and psychiatrists tied for third place [22]. In Quebec, the pattern is somewhat different, as psychologists represent the second most consulted professional group and psychiatrists are consulted less often than in other provinces [22].

Rarely will patients present to these primary care clinicians with a “pure” and easily recognizable depressive disorder [25]. More often than not, patients will describe a vague constellation of symptoms and concerns to their providers that could indicate any of several diagnoses, including depression [187]. This reality can be partly attributed to true heterogeneity in the presentation of depression during the early stages of onset. For instance, the prodromal stage for some individuals can be characterized by mild depressive symptoms accompanied by anxious symptoms such as general anxiety, panic attacks or phobias; in others, a severe depressive illness may develop very rapidly [4]. Still others may experience an onset of depression predominated by physical symptoms, with changes in mood occurring only gradually over time [4]. However, it is also not uncommon that
depressed individuals ignore or deny their emotional symptoms and instead emphasize their physical symptoms in discussions with providers [175, 188]. This tendency can complicate and potentially delay primary care providers’ ability to recognize their patients’ depression, especially when patients present with other actual mental or physical illness [188].

Indeed, patients with depression that present with comorbid mental and/or chronic physical are more the norm than the exception [24, 25, 97, 189]. With respect to comorbidity of mental disorders, results from the WHO Collaborative Study on Psychological Problems in General Health Care revealed that comorbidity of depression with other mental disorders was frequent and that respondents with current major depression were more than 9 times more likely to have a current anxiety disorder (generalized anxiety disorder, panic disorder or agoraphobia) than not have an anxiety disorder [25]. Primary care providers will often encounter patients with various presentations of these mental disorders, including symptomatic but sub-syndromal patients, patients with full-fledged diagnosable comorbid disorders, or some combination of these [97].

With respect to comorbidity of chronic physical conditions, a study by Duhoux et al. [190] conducted in Quebec with 915 primary care patients with past-year major depressive episode found that almost 80% of patients suffered from at least one of 17 common chronic physical diseases. These findings are consistent with those of a large retrospective cohort study of 41,375 adults with new episode of depression living in Montreal, Quebec [191]. Relying on medical-administrative data from the Régie de l’Assurance maladie du Québec (RAMQ), Houle and colleagues showed that only 11.8% of mostly primary care-using residents newly diagnosed with depression were considered physically “healthy” (i.e. no physical disease burden) in the year before their visit, based on the Johns Hopkins adjusted medical group case-mix system [192]. In contrast, 18.3% of these residents had a mild physical disease burden and 69.9% had moderate to very high physical disease burden in the year leading up to their visit. The findings of Duhoux and Houle resemble those observed in other Canadian studies, such as the study by Wang et al. who found that 82.5% of primary
care patients with major depression had at least one comorbid long-term medical illness (e.g. 
asthma, heart disease, hypertension) [193]. Canadian findings are also consistent with 
literature from the United States and abroad showing strong relationships between major 
depression and a broad range of chronic physical diseases in primary care settings [136, 164, 
194-199].

Furthermore, recent research has led to the growing recognition that people sometimes 
present not only with two chronic conditions but three, four or more conditions that also 
contribute to morbidity burden and which often require attention from the health system. In 
Canada, nearly 9 million people aged 12 and over are estimated to live with a chronic mental 
or physical disease but more than a third of these people and half of seniors (aged 65 + 
years) live with two or more chronic diseases, i.e. multimorbidity [61]. In the United States 
the numbers are more staggering, as over 80 million Americans have more than one chronic 
disease and close to a quarter of Medicare beneficiaries suffer from five or more conditions 
[200, 201]. Multimorbidity is also a particularly salient phenomenon in primary care. Studies 
have shown prevalence rates of multimorbidity that were several times higher when data 
was collected in primary care settings than in the general population [202-205].

Many primary care patients with depression also live with multiple comorbid conditions. In a 
recent cross-sectional study examining 314 Scottish medical practices and more than 
1,750,000 patients, Barnett et al. [206] revealed that while 23% of patients had major 
depression alone, 22% had one other mental or chronic physical condition, 18% had two 
other conditions, and 36% had three or more conditions. Such proportions are very similar 
to those found in a Canadian primary care study [190]. Barnett also found that patients with 
multiple physical conditions were significantly more likely to suffer from additional mental 
disorders relative to patients without physical illness, a finding consistent with previous 
studies in other countries [197].
Growing awareness in the number of health conditions affecting individuals has led to several efforts to detect combinations (or “clusters”) of conditions that occur in the general population or in primary care settings more frequently than others [207]. In the only Canadian study of this kind, data from over 5000 adult residents of Alberta revealed that the most common combination of three conditions was depression/anxiety + arthritis + chronic pain, affecting a total of 9.4% of the sample [208]. This combination appeared more frequently than any pairing of conditions involving depression or anxiety. Larger studies conducted abroad have reported diverse and inconsistent results [207], though some evidence supports links between depression, musculoskeletal diseases, and cardio-metabolic diseases [203, 209, 210].

Primary care patients with depression and multiple mental and/or chronic physical comorbidities are a vulnerable patient population who have high burden of illness and who are frequent and costly users of primary care and other health services [211-213]. Though interventions for these patients have recently begun to emerge [214, 215], there are still many unknowns as to the interventions and models of care that are most effective and appropriate for them.

Section summary
The evidence clearly shows that most care for depression is delivered in primary care, mostly by family physicians or GPs. It is also increasingly clear that most patients encountered by primary care providers will present with additional comorbid chronic diseases. What is less understood is how the presence of these comorbid conditions influences the quality of depression care that patients receive from their primary care providers. In the following sections, we will define quality of care and present evidence on relationships between several factors – including comorbid chronic conditions – and the recognition and treatment of depression in primary care.
1.4. Quality of chronic disease and depression care in primary care

Defining quality of care

Over the years, the concept of ‘quality of care’ has been defined and conceptualized in a multitude of ways [216-218]. Throughout the 19th and early 20th century, the prevailing conceptualization of care quality was highly physician-centric [219]. Physicians practiced at the bedside of patients and quality doctors were those that were knowledgeable, respectful, and empathetic. Delivering high-quality care was thought to depend on proper training in medical schools and further learning of the craft through apprenticeships. During this time period, however, medical schools often existed with no formal accreditation and physicians graduated with widely inconsistent knowledge and skills [219]. As medical practice became more science-based, hospital-centric and technology-driven later in the 20th century [219, 220], new ways of viewing quality emerged. For instance, the American surgeon Ernest Codman challenged the view that professional competence was the sole determinant of care quality, advocating for greater attention to hospital systems and standards and especially to the outcomes of treatment experienced by patients as a measure of quality [221].

In the eyes of Avedis Donabedian, distinguished physician and scholar, inferences about the quality of health care could be drawn based on three main dimensions of care: structures, processes and outcomes [222, 223]. Donabedian defined structures as “the attributes of the settings in which care occurs” and included aspects such as the way organizations were structured and how human and material resources were distributed within them. Processes were defined as “what is actually done in giving and receiving care.” This included clinical activities such as diagnosing health problems or educating and treating patients, as well as activities carried out by patients and the interactions between patients and clinicians. Finally, outcomes were broadly defined as “the effects of care on the health status of patients and populations” and included outcomes such as changes to health or health behaviours, improvements in patients’ knowledge, or patients’ satisfaction with care. These three dimensions of care were seen as linked, such that good structures allowed for good processes which in turn helped produce good outcomes.
Donabedian also distinguished two main elements of care processes [223]. The first – the
technical performance of clinicians – related to the strategies of care arrived at and applied
by clinicians (e.g. making a diagnosis, applying a treatment, etc.). Clinicians’ technical
performance depended on the knowledge they possess and on the judgements and skills
used to apply appropriate strategies in patient care. Whether a clinician’s technical
performance is considered “good” or not depends on how it compares to the highest
standards of care available at the time (i.e. “best practice”). Such standards should be based
on scientific evidence that certain practices lead to the most improvements in health. The
second element of care processes related to the management of interpersonal relationships.
During medical consultations, patients communicate information necessary for diagnosing
and treating their condition(s), as well as preferences that allow clinicians to select the most
appropriate care strategies. Throughout this process, clinicians need to display virtues such
as concern, empathy, honesty and tact, and make many intuitive adjustments to individual
requirements in technical care to provide the best care possible for each and every patient.
For Donabedian, this vital element of care closely reflected the art of medicine, though was
frequently ignored in many investigations into health care quality [223].

Donabedian’s work served to further advance conceptualizations of quality beyond the
physician-centric views of the past. This trend continued in the 1980s and 1990s, as
contemporary organizational theories were increasingly used to understand health
organizations and issues related to care quality. For example, Berwick adopted notions from
ecological organizational theories to describe organizational change and quality
improvement, arguing that institutions failing to respond effectively to customer needs
would go extinct and that health organizations could increase their “fitness for survival”
relative to competitors by undertaking projects designed to increase quality and reduce costs
[224]. Other authors adopted concepts from coalitions theory, contingency theory, strategic
analysis approaches and systems approaches (e.g. complex adaptive systems) to bring new
perspectives to the study of quality [225-227]. Contrary to past views tying quality of care to
professional practices, these new views reinforced the idea that quality resided also at the organizational or systems level.

In recent years, several multi-dimensional definitions of health care quality have been proposed that can be applied at organizational and system levels. For example, in their influential report “Crossing the Quality Chasm”, the Institute of Medicine in the US urged patients, providers, regulators and policymakers to work together and commit to improving health care quality in six specific domains: safety, effectiveness, patient-centredness, timeliness, efficiency, and equity [38]. Building off this work, the Organisation for Economic Co-Operation and Development (OECD) reviewed a wide range of health care quality and performance frameworks and identified several other important dimensions of quality, such as accessibility, appropriateness, continuity, and efficiency [228]. Definitions of several dimensions proposed by the IOM and OECD are provided in Table III.

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In addition to these frameworks for assessing quality in general health care, there have been recent efforts to identify dimensions of quality specifically relevant to primary health care. For example, Hogg and colleagues [229] used literature reviews and expert consultations to identify two main domains within their framework of primary care quality: a structural domain and a performance domain. Within the structural domain, the authors identified three determinants of quality, notably the health care system, the practice context, and the organization of the practice. The performance domain consisted of two main dimensions, including components of health care service delivery (i.e. access, patient-provider relationship, continuity of care, service integration, comprehensiveness, and provider satisfaction) and the technical quality of clinical care (i.e. health promotion and primary prevention, secondary prevention, care for chronic conditions, and care for acute conditions). For their part, Haggerty and colleagues [230, 231] identified a broad list of attributes of primary health care and then used Delphi processes to identify a core set of seven dimensions considered essential for evaluating models of primary health care: (1) first-contact accessibility, (2) comprehensiveness of services, (3) relational continuity, (4) coordination continuity, (5) interpersonal communication, (6) clinical information management, and (7) technical quality of care. Contrary to the IOM and OECD frameworks, both frameworks by Hogg and Haggerty emphasized the importance of dimensions at structural-organizational levels in addition to dimensions at the clinical or patient level.
**Measuring quality of care**

To be useful for monitoring, evaluating or improving health care, the dimensions of health care quality described above must be operationalized and converted into actual measures that can be applied in a given health care setting. Such measures have been referred to as “quality indicators”. A quality indicator is “a measurable element of practice performance for which there is evidence or consensus that it can be used to assess the quality, and hence change in the quality, of care provided” [232]. As this definition suggests, quality indicators are considered strongest and most beneficial when they have been developed using a systematic approach based on broad evidence base syntheses (e.g. systematic reviews) and expert consensus methods, such as Delphi techniques (i.e. an interactive method involving repetitive administration of anonymous questionnaires, usually across two or three email or postal rounds) or expert panels [233].

As Donabedian explained, to assess quality, performance of a health care professional or organization must be compared against a specific standard based on best available evidence. Such normative standards can be set by highly qualified professionals, professional groups, or else identified in existing clinical practice guidelines [233, 234]. Guidelines are “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” [235]. They include recommendations on best practices based on structured reviews of the scientific literature and expert opinions; these recommendations can be considered the standards of care against which actual clinical or organizational performance is compared. In some cases, standards based solely on expert opinion can also be used when evidence on a given topic is lacking or inadequate [233].

For the purposes of this thesis, the dimensions of quality of most interest are those related to the appropriateness of care as well as to the structures and processes associated with the care provided to primary care patients with depression. Measures of care processes and
particularly those related to technical quality of care have become widely used over the past two decades given their relative advantages over other types of measures [236-239]:

- They capture actual care provided to patients and so are of interest to many stakeholders and especially to patients themselves;
- They are relatively easy to measure without major bias or error and they are usually easy to interpret;
- They tend to be sensitive to changes in quality of care and can be more quickly acted upon than measures such as outcomes that may only become available after long periods of time have elapsed;
- They provide clear directions for quality improvement efforts (i.e. they are actionable) and can prompt wider and more diverse actions;
- They can identify deficiencies in quality using smaller sample sizes and can be assessed relatively unobtrusively compared to other types of measures (e.g. data used from administrative or medical records).

Many health care and primary care performance frameworks, such as the Healthcare Effectiveness Data and Information Set (HEDIS) developed in the US [240] and Quality and Outcomes Framework (QOF) developed in the United Kingdom [241], rely largely on measures of care processes. In this thesis we focus largely on two main care processes, the recognition and treatment of depression. The accurate recognition of depression is considered a critical step in the process of providing appropriate care to patients with depression [12, 15] and yet recognition rates in primary care have historically been low (see discussion below). Similarly, providing appropriate, high-quality treatment to patients is closely associated with better depression-specific clinical outcomes [242-245], though once again deficits in the primary care treatment of depression have been widely reported. These care processes provide a strong basis for measurable quality indicators that are both informative to researchers, primary care providers and decision makers and also subsequently actionable by these stakeholders.
Measures of the structural aspects of care, on the other hand, have historically received less attention than those based on care processes or outcomes. One of the reasons for this is that early structural measures (e.g. practice size, provider types, accreditation status of facilities) were found to be weaker predictors of care quality than these other measures and were usually less actionable as well [246]. Furthermore, many structural conditions have failed to show associations with clinical outcomes [246, 247]. Indeed, the relationships between structures and processes or outcomes have been described by various authors as weak, conflicting, complex, and paradoxical [234, 247, 248].

More recently, however, there has been greater evidence linking structural characteristics to quality of care, though structure-outcome relationships remain elusive [246, 248, 249]. A recent review by Hearld et al. [249] showed that robust evidence existed for significant structure-process pairings in hospital settings and that organizational characteristics were particularly associated with process measures such as adherence to clinical practice guidelines. However, this literature remains incomplete in numerous ways: (1) most studies are conducted in hospital settings and not other, community-based settings, (2) the organizational characteristics investigated across studies have been very limited in scope, (3) most organizational measures used in studies have not been validated in a rigorous manner, (4) studies have been overwhelmingly quantitative in nature, with very few qualitative or mixed-method conducted on this topic, and (5) few conceptual or theoretical frameworks have guided investigations on this topic and thus studies have emphasized “what” structures relate to processes or outcomes but not “how” or “why” they do [246, 248, 249]. In many ways, what Donabedian concluded almost 50 years ago [234] remains true today: the factors involved in relationships and interactions between structures of care and processes or outcomes of care remain poorly understood.
The quality of care for chronic diseases in primary care

While the past 20 years have seen the arrival of new treatments, technologies, and clinical guidance aimed at improving the health care delivered to people with chronic diseases, significant gaps and variations in chronic disease care quality have also been extensively documented during this time period [38, 250]. In 1998, the review of Schuster et al. [251] showed that roughly 40% of Americans with chronic diseases failed to receive care consistent with available guidelines. In studies conducted with primary care patients, important quality of care deficits were observed for patients with breast cancer, HIV/AIDS, asthma, hypertension, diabetes, and depression [251]. Such findings led the IOM to conclude that “between the health care we have and the care we could have lies not just a gap, but a chasm” [243, p. 1].

The situation faced by the United States is not unique. The Canadian Institute for Health Information has similarly identified significant gaps between recommended care and the care that the chronically ill actually receive in Canada [252]. As appreciation for these care gaps has grown, many Canadian provinces have begun introducing new policies and frameworks related to the prevention and management of chronic diseases in the hopes of improving care for the chronically ill in their populations [253-257].

The quality of depression care in primary care

Few chronic diseases have been the subject of more scrutiny from quality evaluators than depression. Indeed, the literature on depression care quality is vast and based upon several decades of research. A review of this literature suggests that three care gaps in particular stand out above all others.

The first concerns the gap existing between the prevalence of major depression in the general population and the proportion of people that receive care for their mental health problems. Reports of this gap first surfaced in early epidemiological mental health surveys, including the Epidemiologic Catchment Area study (ECA: 1980-1985) and the National
Comorbidity Survey (NCS: 1990-1992) [8]. In both surveys, major depression was shown to be a prevalent disorder in populations, with annual prevalence rates of 1.7% to 3.4% observed in the ECA and 8.6% in NCS [8]. However, only 53.9% and 36.4% of respondents with major depression reported receiving treatment in the 12 months leading up to the ECA and NCS surveys, respectively [8]. In the WHO Collaborative Study on Psychological Problems in General Health Care, conducted during a similar time period as the NCS, only 49% of respondents with mental disorders were recognized as psychiatric cases by their primary care providers and only a quarter of these patients received some treatment [180]. The findings of these surveys – that half or fewer people with current major depression received mental health treatment – were also consistent with several other early studies examining treatment rates for depression in primary care [165, 167, 180, 258]. What is alarming about these studies is that the same care gap seems to persist to this day. Numerous studies carried out in the general population or in primary care settings since the year 2000 show that more than 40% of people currently depressed fail to seek or receive any treatment at all for their mental health problems [8, 93, 259-263].

A second, related care gap pertains to the recognition of major depression by primary care providers. Recognition is described as being “the starting point for providing effective treatment for depression” [4]. However, recent meta-analyses covering over 60 studies conducted since the 1980s have concluded that primary care providers recognize fewer than half of the true cases of depression in their practices [27, 28]. Providers were more successful at ruling out depression as a possible diagnosis in people without the disorder, correctly doing so in over 80% of cases [27, 28]. Mitchell et al. [28] also showed however that approximately 15% of patients judged to be depressed did not in fact meet standardized criteria for depression. Interestingly, Cepoiu et al. [27] provided some evidence that studies conducted since 1998 observed higher rates of depression recognition that previous studies, though the pooled average rate for these more recent studies remained low (42%).
Based solely on these reported rates of under-recognition, one could infer that the needs of primary care patients with depression are not being adequately addressed. However, the problem is deeper than the diagnosis alone [175]. The third care gap relates to the finding that many patients being treated for their depression receive treatment that falls short of evidence-based standards of care. This is evidenced by an exhaustive systematic review recently conducted by our research team [29]. This review examined treatment quality for depression in primary care in 65 studies published between 1992 and 2010. We assessed 13 types of treatment quality indicators, including indicators for the quality of pharmacotherapy (e.g. antidepressant use, dosage, duration, etc.), psychotherapy (e.g. psychotherapy use or intensity), and education of patients about depression (e.g. basic education about depression or specific to a particular topic such as treatment). Particular attention was devoted to indicators of appropriate or “adequate” depression treatment, i.e. treatment that responds to clinical needs while meeting minimal standards of care as determined by best available evidence (usually clinical practice guidelines). When a single indicator captured information about the adequacy of both pharmacological and psychological treatment, it was referred to as an indicator of “minimally adequate treatment”. An example would be an indicator assessing (a) whether the patient received an antidepressant medication at a dose considered minimally appropriate according to some guideline, and (b) whether the patient received psychotherapy with a minimal number of psychotherapy sessions.

Several results of our review are noteworthy. First, we identified a great diversity of quality indicators across studies and observed very wide variations in performance across indicators. We found that rates of antidepressant use had risen over time, with studies from the 1980s and early 1990s reporting use in approximately one-third of patients whereas higher rates above 60% were observed in more recent studies. In contrast, most studies on the receipt of psychotherapy revealed that fewer than a third of patients received any form of psychotherapy for depression during study observation periods. In addition, while performance for specific aspects of treatment was occasionally reported to be high, performance on indicators capturing multiple aspects of treatment was usually much lower.
For example, performance on indicators of treatment dosage or duration reached as high as 95% and 85%, respectively, across studies. However, when indicators assessed whether patients received either an adequate dosage or duration of antidepressant treatment accompanied by an adequate follow-up on medication by a provider, performance ranged from only 9% to 27%. Similarly, only 14% to 19% of patients receiving psychotherapy did so at an adequate intensity (e.g. sessions lasting at least 15 minutes) and duration (e.g. at least 6 sessions). Finally, performance on indicators assessing minimally adequate treatment was low, ranging from 14% to 56% across 30 studies. These findings provide clear evidence that a considerable proportion of patients with depression fail to receive appropriate, high-quality care in primary care settings.

The non-treatment or under-treatment of depression has important consequences for people suffering from the disorder and longer duration of untreated illness has negative impacts on the recurrence and overall duration of depressive episodes [264]. Meanwhile, appropriately recognizing and treating depression has important benefits for patients’ mental health but also their physical health as well and overall quality of life [13].

**Section summary**

Primary care providers play a fundamental role in the delivery of appropriate care for chronic diseases and mental disorders such as depression. However, there is now substantial evidence of gaps in the quality of care for depression in primary care, as measured notably by indicators for care processes related to the recognition and treatment of depression. Such indicators can be valuable in that they measure actual care delivered and can provide clear directions for quality improvement. Yet, depression care is not delivered in a vacuum; organizational settings are also believed to influence the quality of depression care that people receive. Unfortunately, only a limited number of studies have investigated relationships between organizational influences and processes of care for chronic diseases such as depression, and only a limited number of structural factors have been examined within studies, as will be discussed in the next section. There is a clear need for a more
thorough investigation of associations between these factors and depression care processes as a means of identifying novel strategies for improving the quality of care provided for depression in primary care.

1.5. Influences on the quality of care for depression in primary care

Provider-level influences

Hundreds of studies have been performed that examine factors influencing the quality of care provided to people with depression. If there is a single lesson that can be drawn from this literature, it is that a confluence of factors operating at different levels play a determining role in the quality of depression care delivered to patients.

Studies in primary care have shown, for example, that several characteristics of clinicians can have an effect on depression care quality. A number of studies have examined clinicians’ knowledge, training and skills in depression care, considered important foundations for the accurate recognition and appropriate treatment of depression [30]. Studies suggest that GPs’ knowledge of depression is generally good [265, 266] and that many are confident in their skills for managing depression [267, 268]. However, knowledge about depression and its treatment can vary widely across practitioners and only half of GPs feel confident in their ability to diagnose depression or assess suicide risk [269]. Insufficient knowledge of the diagnostic criteria for depression has been associated with lower rates of recognition [269, 270]. Conversely, GPs more confident in their ability to identify depression are more likely to provide their patients with guideline-based care and less likely to refer patients to specialized mental health services [271]. Care may be more biased towards pharmacological approaches, however, as GPs are more knowledgeable and confident in applying drug therapies than psychotherapy and other strategies for preventing recurrence [267, 268]. Relative to psychiatrists, GPs report being less satisfied with the training they receive on mental health care as part of their residencies and continuing medical education [272].
Indeed, the inadequate education and training of primary care providers in the detection and management of mental disorders has long been a subject of criticism [175, 180].

Clinicians’ communications skills and practice styles also seem to influence depression care quality. Primary care providers that show more interest in and devote more time towards emotional and psychosocial issues in communications with patients are better at diagnosing mental disorders [269, 270]. More patient-centred communication and practice styles have also been linked to increased recognition of depression [30], while greater propensity to treat depression or other chronic diseases predicts increased depression treatment [273, 274].

Findings have been more mixed for other potential provider-level influences on depression care quality, such as primary care providers’ attitudes and beliefs or their personal characteristics (e.g. age, gender, discipline) [30, 265, 268, 271, 274-277]. GP perceptions of barriers to care, such as patient resistance to treatment or access to expertise in mental health, have been shown to impede guideline-consistent depression care [278].

**Patient-level influences**

Characteristics at the level of primary care patients also have a clear influence on the quality of care that these patients receive for their depression. The most consistently studied characteristics have been patients’ age and sex. With respect to age, a number of studies suggest that middle-aged patients have higher likelihood of having their depression recognized and appropriately treated compared to younger adults and older adults [190, 279-283]. Women have also been shown to more frequently receive high-quality depression care relative to men in many studies [279, 280, 283-285], but not all [190, 277, 281, 286]. Taken together, such findings are not surprising given that most depressed patients encountered by primary care clinicians are women generally between the ages of 25 to 55.
Evidence of effects from other sociodemographic characteristics has been less consistent. In some studies, patients with lower education, minority status (e.g. African-American), or who are married have been found to be at higher risk of receiving suboptimal depression care [279-281, 284, 285], though such effects are not observed consistently across studies.

Similar inconsistent findings have been observed for characteristics such as patients’ personal or family income, employment status, and access to health insurance. Low income, unemployment, and a lack of insurance have been proposed by some authors to be potential barriers to depression care [280, 284, 286, 287]. However, evidence that these factors are indeed barriers has come primarily from the United States where the health care system is predominantly private in nature. Most studies conducted in countries such as Canada and Germany – where universal, publicly funded health insurance covers much medical care – have not observed these relationships [281, 284, 285, 288]. One recent study from Quebec did however observe that primary care patients with supplementary private health insurance were more likely to receive guideline-consistent depression treatment than those without insurance [190]. As noted by the authors, this result may stem from the fact that the quality indicator they used to assess treatment adequacy incorporated patients’ receipt of psychotherapy, a form of treatment not widely available in the province’s public health services.

A highly consistent finding across studies has been the association between measures of depression severity and quality of depression care. Patients with greater severity of depression – whether measured from the standpoint of depressive symptoms, chronicity of the disorder, number of previous episodes, or suicidality – are more likely have their depression recognized and treated appropriately than patients with less severe depression [190, 280, 281, 284, 286, 288, 289]. On one hand, this fact is reassuring, as it suggests that patients with the most needs are able to access high-quality care. However, as the Medical Outcomes Study has shown [166], mild and even subthreshold depression depressive disorders are highly disabling and require appropriate attention from providers.
Finally, the influence of comorbid conditions on depression care quality has been assessed in several studies. These studies will be reviewed in the next chapter section.

**Organizational and system influences**

Relative to research on patient- and provider-level factors, much fewer studies have sought to understand how organizational or system factors affect the quality of care for depression generally and in primary care specifically. It is notable that most existing studies on this topic have been conducted in the United States. As in other countries, the dominant form of practice for GPs in the US throughout much of the 20th century was solo practice, either in the patients’ home or by mid-century increasingly in offices [290]. Physicians were remunerated largely through fee-for-service funding arrangements, a funding model in which they receive a fee for every medical service or encounter provided (e.g. a procedure, an office visit, etc.) [291]. This payment model encourages physicians to increase their productivity to maximize their income, all the while adhering to the ethical code of their profession [292]. However, this model also has its disadvantages. In particular, most fee-for-service payment models were established at a time when the majority of health problems that GPs encountered were acute illnesses [291]. As these models inherently reward a mode of practice characterized by brief, repeated encounters, they were increasingly considered a deterrent to care for the growing number of patients with chronic diseases seeking primary care services [291]. Frustration among some physicians grew as the model generated a practice culture dominated by “the tyranny of the urgent” [293]. Moreover, such payment models failed to reimburse GPs for many of the distinct features of primary care most suitable for chronically ill patients, i.e. accessible, comprehensive, continuous and coordinated care [291].

As the US health care system expanded rapidly throughout the last half of the century and costs escalated, new approaches to cost-containment proliferated. This included the arrival of managed care organizations, new reimbursement mechanisms for services, and a gradual
rise in group-based practice [179, 290, 294]. Federal funding for various managed care organizations, such as Health Maintenance Organizations (HMOs), began in 1973 and over the next two decades a variety of new organizational models of care delivery emerged [179, 294]. The distinctive features of HMOs are their emphasis on group practices for physicians and on their use of prepaid capitation payment models, which involve physicians receiving a periodic (e.g. monthly) payment from the HMO for each HMO-enrolled patient, whether or not they actually receive care during that time period [291]. In theory, the capitation payment model provides physicians with the financial flexibility to better support important primary care functions (e.g. increasing access through delivery of after-hours care or increasing coordination through team-based care) [291]. Capitation-based practices encourage competition between physicians on the basis of the quality of their care; the more patients that are enrolled, the more income increases [292]. In addition, payments are risk-adjusted such that higher payments are accorded for patients expected to be higher users of health services [291]. However, this payment model is not without its own disadvantages. Poor early attempts at risk-adjustment and the absence of incentives for productivity created financial shortfalls in the management of some chronically ill patients and led some physicians to see their patients even less frequently and for less time than under fee-for-service schemes [291].

One of the earliest efforts to understand how these new organizational arrangements influenced depression care was carried out in the late 1980s as part of the Medical Outcomes Study. In contrast to previous epidemiological surveys of mental health care, the Medical Outcomes Study sought to understand how variations in patient outcomes related to the systems from which patients received their care [173]. It collected detailed information on structures of care in survey sites, including the organization of practices, mix of specialties, and financial incentives for providers and patients. Wells et al. [166] used data on 650 patients that had current major depressive disorder and found that patients receiving care from physicians remunerated through capitation were less likely to be recognized as depressed and appropriately managed compared with patients of physicians paid by fee-for-
service schemes. The authors attributed this difference to the less intensive style of care being provided in capitation-based managed care settings.

Several years later, Meredith and colleagues surveyed providers from 80 primary care clinics classified into two types of managed care organizations, namely “staff/group” model organizations and “network” model organizations [266]. Staff/group model organizations were practices in which most clinicians worked exclusively for a single managed care organization with a large, uniform management structure, and thus were paid from a single source. In most of these organizations, primary care providers worked alongside a range of specialty providers within the same organizational structure. In contrast, in network model organizations primary care providers and specialists typically worked in separate small practices linked only by the payment plan, and could be affiliated with multiple payers. Compared with network models, staff/group models tended to facilitate access to referrals because primary care would often share the same physical workspaces as mental health specialists. These practices also tended to be more supportive of using non-physician staff and had higher standards for staff hiring than in network model practices. The results of Meredith’s survey showed that providers within staff/group model organizations perceived themselves to be more burdened from depression treatment and more challenged by time constraints than providers within network model organizations. Not surprisingly, these providers reported being less likely to initiate depression treatment themselves and more likely to refer patients to the mental health specialists in their organizations. That physicians in network clinics show greater propensity to treat depression was corroborated by a later study by Henke et al. [44].

In the years that followed, several studies revealed that rates of depression treatment and appropriate treatment varied widely across primary care organizations [295-298]. Wells et al. [295] assessed the quality of depression care for 1204 primary care patients receiving managed care from 8 study sites, finding that rates of appropriate antidepressant treatment ranged from 18.5% to 42.3% across sites. Similar disparities in recognition rates for women
with depression (13% to 41%) were recently observed across 118 primary care facilities in the Veterans Health Administration (VHA) [298].

A number of studies have also explored the structural capabilities of primary care clinics to use commonly recommended care management processes (CMPs) for depression [45, 299-301]. The study conducted by Casalino and colleagues [299] was particularly impressive. In 2000, these authors surveyed 1040 large physician organizations (most clinics delivered primary care) and assessed the extent to which they used 5 CMPs (case management, physician feedback, disease registries, clinical practice guidelines, and self-management supports) to improve the quality of their care for four chronic conditions, namely diabetes, asthma, heart failure, and depression. They found that relatively few organizations (17%) had implemented CMPs for depression and that organizations had fewer CMPs for depression than for the three other chronic conditions. Factors strongly associated with greater use of CMPs included the size of the practice, higher information technology capabilities, and requirements to report quality of care data and activities to outside organizations. In a qualitative follow-up to this study, Bodenheimer et al. [300] found that the main barriers to adoption of CMPs were a lack of resources, reimbursement mechanisms that did not reward high quality, inadequate information technologies, lack of leadership, and physician resistance. Casalino and colleagues then performed their survey again in 2006 with 369 organizations that had participated in the 2000 survey [301]. They found that the use of registries and guidelines for depression had increased over the 6-year period but that CMPs for this disorder remained low relative to the other conditions.

Another large study was recently completed by Friedberg et al. [302]. This study, conducted in over 400 primary care practices in Massachusetts, explored relationships between 24 structural characteristics of clinics and HEDIS process measures for the quality of care for 8 chronic conditions, including depression. The structural characteristics fell into five categories: patient assistance and reminders, electronic health records, culture of quality, enhanced access, and other practice characteristics (e.g. practice size, teaching practice).
Three HEDIS measures were used to capture the appropriateness of depression care, namely (a) optimal acute phase contacts, (b) effective acute-phase treatment, and (c) effective continuation-phase treatment. The only structural characteristic associated with effective acute- and maintenance-phase treatment was the presence of language interpreter services, which were linked to lower quality of care. Also noteworthy was that the relationship between multifunctional electronic health records and higher quality of care for several chronic diseases (e.g. breast cancer, colorectal cancer, diabetes), but not depression. This influence of electronic health records was apparent, however, only when they included a greater number of advanced functionalities (e.g. medication list, lab results, electronic reminders).

Finally, two studies from outside the US have investigated the characteristics of primary care practices associated with guideline-consistent depression treatment [190, 271]. Duhoux et al. [190] found that 52% of primary care patients with past-year major depressive episode from Quebec had received minimally adequate depression treatment in the previous year and that the likelihood of receiving adequate treatment was higher in clinics where psychotherapy was available on-site, most GPs used treatment algorithms for depression, and payment models were not considered to be important barriers to care. For their part, Smolders et al. [271] assessed the influence of physician and practice characteristics on GPs adherence to guidelines in the psychological and pharmacological treatment of 665 primary care patients with depression. Practice characteristics included the type of practice (e.g. solo versus group practice), practice size, multidisciplinary nature of the practice, and size of patient population, whereas physician characteristics related to demographic characteristics, interests and attitudes towards depressive disorders, perceived barriers to care and use of guidelines, experiences with collaboration with mental health professionals, and levels of burnout. Among their findings, Smolders found that GPs working in practices with small patient populations were more likely to provide appropriate pharmacological treatment to their patients than GPs with larger practice populations. However, none of the practice
characteristics assessed remained significant in multivariate analyses and overall these factors explained very little of the variance in guideline-consistent treatment.

**The “competing demands in psychosocial care” model**

The above literature review on the determinants of depression care quality provide clear evidence that quality resides not within any single factor or level but is a complex phenomenon with influences arising from multiple levels. In the late 1990s, Michael Klinkman proposed a comprehensive conceptual framework to help explain why depression was so often under-recognized and under-treated in primary care settings (Figure 1) [30].

**Figure 1. The competing demands in psychosocial care model**
His central argument was quality gaps in depression were not the fault of a single stakeholder or factor but instead “the natural consequence of the presence of competing demands during primary care encounters” [30]. Very often, patients will present to their primary care providers with multiple health problems and worries that cannot easily be addressed within the timeframe of a single, time-constrained consultation. As patients and providers interact in a given clinical setting, some problems will be prioritized and others will be left aside for future visits. As Klinkman and others [30] have suggested, emotional problems may simply compete less successfully for time and attention during clinical visits than other types of problems, including acute or chronic physical health problems. Klinkman’s model encourages us to explore such possibilities and consider the multitude of factors that interact to shape care provided for depression.

Section summary

Klinkman’s model provides a valuable framework for understanding that there are multiple determinants to the quality of depression care and that patient, provider and organizational factors may each independently affect quality of care. What remains less understood is the relative influence of these factors on quality and particularly how factors in different domains interact with one another and impact depression care. There is also considerable uncertainty surrounding the appropriate organization-level factors to evaluate, as studies have been largely atheoretical with little rationale underpinning authors’ choices of organizational measures. Finally, another limit is that many studies have considered patients with depression to be a homogeneous group, ignoring differences in quality between patients with different comorbid chronic conditions and how other factors may differentially impact different patient groups. These relationships between patient comorbidity and the quality of care for depression are discussed in the next section.
1.6. Challenges of caring for people with depression and comorbid chronic conditions

Management and organization of care for patients with depression and comorbid chronic conditions

Primary care providers have reported that patients with multiple chronic conditions are among the most challenging patients to manage [303, 304] and the challenges seem magnified when one or more of conditions are mental disorders [305].

For instance, recognizing depression when it presents with other chronic conditions can be difficult [10, 15]. Chronic conditions are a major source of distress for many patients and clinicians may perceive patients’ depressed mood to be an inevitable and normal reaction to living with one or more long-term health conditions [306]. Patients themselves may attribute depressed mood to their other conditions and deliberately or subconsciously mask symptoms during meetings with care providers [307]. The physical symptoms of depression such as fatigue, change in appetite, or sleep problems are common and easily attributable to a wide range of other physical or mental disorders [10, 308]. It is often thought that clinicians may require several visits with a depressed patient before they can work through the differential diagnosis process and arrive at a diagnosis of depression [307]. If clinicians sense that patients are resistant to a depression diagnosis, they may also engage in a lengthy process of ruling out other medical conditions as the source of the patient’s emotional problems [187]. Furthermore, clinicians may hesitate to apply the potentially stigmatizing label of depression in patients perceived to be too vulnerable to benefit from a formal diagnosis or treatment [306, 309].

In a similar vein, comorbid chronic conditions may impede optimal treatment of depression in various ways. Clinicians and patients may disagree on which conditions to address during consultations and which to prioritize in treatment [310]. Some GPs report that they hesitate to prescribe antidepressants in patients with multiple chronic conditions for fear of harmful effects of polypharmacy [50, 309, 311]. Indeed, the co-occurrence of depression with other
chronic diseases may call for complex treatment regimens that are burdensome for patients to manage on a daily basis [312]. Cognitive impairments brought on by chronic diseases can also complicate patients’ ability to follow strict, demanding pharmacological regimens [50]. Not surprisingly, some studies have found chronic physical comorbidity to be associated with non-adherence to antidepressant treatment [313, 314].

It is also becoming increasingly clear that the way primary care services are currently organized in many health systems is problematic for the care of people with depression and comorbid chronic conditions [159, 315]. In these settings, clinical consultations remain brief and patients and clinicians have insufficient time to “open the door” and discuss depression and how it may interact with patients’ other conditions [307, 316]. Patients will often see multiple providers in general and specialist care and coordination of care between providers is often reported to be poor [311, 317]. Particularly problematic are cases where patients receive medications from multiple sources without communication between providers about the interactions between treatments [310]. Provision of psychotherapy may be particularly relevant for these patients but this form of treatment is relatively inaccessible in many countries, including Canada [309, 311, 318].

One of the most important problems, however, is the separation of primary care and mental health services in many health care systems [159]. Patients with depression and comorbid chronic conditions will frequently receive care from both primary care clinicians and mental health professionals and yet communication and collaboration between these providers can be limited [319, 320]. In many settings, mental health professionals are physically located in different practice settings as primary care clinicians and often do not share information electronically through information systems [321, 322]. Primary care clinicians are frequently challenged to access the expertise of mental health professionals [51, 320] and separations between providers can be reinforced by health insurance plans and other funding streams for services [315]. Furthermore, divisions between services for physical and mental health can be deeply ingrained in professionals and traditional boundaries between primary care
and mental health professionals are often fiercely protected and maintained [322]. Such realities threaten the delivery of high-quality, holistic care to patients with co-occurring mental and chronic physical health conditions.

**Comorbidity and the quality of care for depression**

The preceding paragraphs outline the many challenges of providing high-quality care to patients with depression and comorbid chronic conditions. Despite these challenges, however, the empirical evidence surrounding relationships between patient comorbidity and depression care quality is surprisingly mixed. Several studies have reported that patients’ chronic physical conditions can indeed hinder the accurate recognition and appropriate treatment of depression in primary care [31, 323], consistent with Klinkman’s model of competing demands on psychosocial care. However, other authors have observed higher quality of depression care in patients with greater chronic physical comorbidity [279, 324]. These authors have argued that such comorbidity leads patients to make greater use of health services, thus increasing their opportunities to have their depression recognized and treated adequately. With respect to psychiatric comorbidity (e.g. comorbid anxiety disorders), several studies have found that patients with multiple mental disorders receive a higher quality of depression care [289], though this relationship seems inconsistent across quality indicators [288]. It has also been suggested that a more nuanced relationship between comorbidity and quality exists, with depression care quality being influenced positively or negatively depending on the specific combination of conditions at play [282, 325]. Currently, the precise relationship between patient comorbidity and depression care quality has not been firmly established and it remains unclear which particular patient groups may be particularly at risk of receiving suboptimal depression care in primary care.

**Quality improvement initiatives for depression and chronic diseases in primary care**

What is less debatable is that continued efforts to improve the quality of care for depression and other chronic conditions in primary care are urgently needed. The IOM [38, 315] and
other organizations around the world [6, 326] have called for fundamental changes to the way chronic care and mental health care services are delivered in primary care and the larger health care system.

Over the past two decades, a wide range of interventions and conceptual models for transforming primary care services for people with chronic or mental illness have emerged in Canada and abroad [6, 35, 38, 48, 250, 327-331]. Some interventions have been more targeted towards patients and providers, such as educational interventions, strategies to support patient self-management of their conditions, and the widespread dissemination of clinical practice guidelines to support clinical decision-making. Other interventions have emphasized organizational changes, such as the development of disease registries (i.e. lists of patients with chronic conditions that allow important clinical data to be tracked), the introduction of chronic disease case managers (i.e. professionals – usually nurses – that provide active monitoring and follow-up of patients and facilitate coordination of care), and other approaches to foster collaboration between providers. These interventions have been applied in a variety of chronically ill patient populations, including patients with depression, with mixed results [34, 35, 332, 333]. For instance, educational interventions alone have had minimal impacts on depression care and patient outcomes whereas strategies targeting organizational features have shown more promise, though some have been less impactful in patients with comorbid chronic conditions [34, 35]. Additionally, a recent trend has been the implementation of more multifaceted strategies that incorporate multiple potentially effective improvement interventions designed to influence care at different levels. Systematic reviews suggest that these multifaceted strategies are more effective in generating improvements to clinical care processes and health outcomes than approaches based on single interventions [34, 329, 334].

However, many quality improvement initiatives for depression and other chronic diseases introduced over the years have been limited in at least three ways. First, most interventions and quality improvement initiatives are undertaken without any underlying theoretical
foundations to suggest how and why these improvement strategies should affect care and health outcomes [335]. A second issue is that many interventions that do seem effective remain inaccessible to a wide portion of people that could benefit from them. Studies suggest that it is particularly challenging to implement these quality improvement interventions broadly into routine care and many attempts to do so have revealed that interventions that produce positive results in one clinical setting may not produce such results in another [335]. This highlights the often-underappreciated role that context play in the diffusion of evidence-based practices. Finally, the vast majority of interventions that have emerged have been conceived on the basis of a single-disease perspective to care management and quality improvement [89, 336]. For example, two systematic analyses of more than 20 recent clinical practice guidelines for depression and other chronic diseases have shown that most guidelines do not provide explicit guidance on the risk factors for and overall management of comorbid conditions [36, 37]. In a similar vein, many disease management interventions for depression – including multifaceted ones – have been designed to address single diseases and these interventions have been shown to be less impactful on patients with comorbid conditions [35]. Moreover, such initiatives, while well intentioned, may actually lead to new redundancies, inefficiencies, and inequities in health care systems [250, 337].

Section summary
Comorbidity is a common phenomenon in depression and one that challenges primary care providers’ ability to provide appropriate depression care in a variety of ways. Though it is widely assumed that comorbid chronic conditions negatively impact the quality of depression care in primary care, evidence exists which runs counter to this view. In this thesis, a systematic review is proposed to evaluate the nature of the association between comorbidity and quality and potentially identify patient populations particularly at risk of receiving suboptimal depression care. This information is valuable as there is now heightened interest in interventions aiming to improve depression care quality in various settings and particularly in primary care. However, if such interventions are to be effective and sustainable, they
should have a solid theoretical underpinning and take into consideration the contexts in which they will be implemented and the characteristics of patients whose care they aim to improve. The mixed-methods study that we propose is intended to shed light on these particular knowledge gaps. In the following section, we describe the context for the current doctoral research, i.e. primary care services in the province of Quebec, Canada.

1.7. Primary care services for depression and chronic diseases in the province of Quebec

Primary care services in Quebec

As in other jurisdictions, Quebec’s health care system has become increasingly diverse with respect to the types of organizations involved in the delivery of primary care services. Between 1972 and 2002, the dominant primary care organizational models were local community health centres (Centres locaux de services communautaires – CLSCs), family medicine units (Unités de médecine familiale – UMF), and general practitioners in private practice [338].

Conceived in the 1970s to be the point of entry into the health care system, CLSCs are primary health care organizations offering a broad range of preventive and curative health services, social services, and home care services to geographically defined populations [339]. Services within CLSCs are multidisciplinary and physicians are paid by salary as opposed to fee-for-service amounts [338]. Though the government’s vision was that a network of CLSCs would be the dominant model of primary health care in Quebec, opposition from physicians has consigned CLSCs to minority status [48, 338]. In 2013, approximately 11% of front-line GPs (full-time equivalent) in the province practiced primarily in CLSCs [340]. UMFs are primary care clinics usually located within CLSCs or hospitals that are committed to training new family physicians. There are currently 43 UMFs located across the province that are affiliated to the four major universities of Quebec. Prior to the 2000s, the dominant model of primary care in Quebec consisted of physicians working primarily in private clinics or
polyclinics paid through fee-for-service funding arrangements [48, 338]. In 2013, 34% of the province’s front-line GPs practiced in this model [340].

Since 2002, several new organizational models have been introduced, most notably Family Medicine Groups (Groupes de médecine familiale – GMF). A GMF is a group of family physicians (usually between 6 and 12 full-time equivalent physicians) that work in close collaboration with nurses to provide primary care services to a large group of rostered patients (1000 – 2200 patients per full-time equivalent physician) [338, 341]. Physicians working within GMFs are expected to ensure care and coordination of care for their patients and make available walk-in services on nights, weekends and holidays [342]. For vulnerable patients with chronic diseases, GMFs must make services available during extended hours. Nurses within GMFs are actively involved in evaluating and educating patients, preventing disease (e.g. screening) and promoting health, providing or adjusting a prescribed treatment, systematically monitoring patients and promoting self-management, and liaising with other professionals in the health system [338, 342]. Physicians can also hire other health professionals (e.g. social workers, pharmacists, psychologists) to provide more comprehensive care to patients. Within GMFs, physician payment is a blend of fee-for-service and capitation models with additional sums awarded for care for vulnerable patients, extended hours care, and administrative duties [338]. In addition, the government covers the salaries of nurses and administrative assistants and finances computer equipment for the clinic. By 2013, the number of front line GPs practicing primarily in GMFs had risen to 44% [340]. It should be noted however that at least 60% of GPs practice in multiple settings and that in some cases GPs working within GMFs share physical workspaces with other non-GMF GPs and other professionals [343].

This recent emergence of new primary care organizational forms took place in the context of important reforms to the larger health care system. Beginning in 2003, the government introduced legislation that created 95 health and social service centres (Centres de santé et de services sociaux – CSSSs) by merging CLSCs, long-term care centres, and in most cases a
general hospital [344]. The introduction of CSSSs resulted in a shift in responsibility over the planning and coordination of services away from regional health agencies towards these local organizations. Each CSSS is responsible for establishing a local service network that collectively provides a complete range of health and social services (from primary to tertiary care) designed to improve the health and well-being of their population [344]. Primary care clinics that become GMFs are required to enter into service agreements with CSSSs to become part of the continuum of care available within the local services network [338].

**Primary mental health care services in Quebec**

As discussed in chapter section 1.3, many people experiencing mental health problems in Quebec seek help in primary care. Primary care patients can receive services from various sources, including GPs, mental health professionals working in public services (e.g. CLSCs), or mental health professionals such as psychologists working in private practice. If distress is transient or if mental illness is at subthreshold levels, patients can access supports from psychosocial service teams (e.g. social workers, psychologists) working within most CLSCs.

For individuals with diagnosable mental disorders, services have evolved greatly since 2005. In that year, the Quebec ministry of health and social services released a five-year mental health action plan called “La force des liens” [345]. The main objective of the reforms was to ensure that the province had an efficient mental health care system that offered better care and improved access to treatment and support services for all people suffering from mental health problems. The government believed that the foundation for achieving this goal resided in the strengthening of mental health services delivered in primary care.

Three important strategies were adopted to enhance the services provided to primary care patients with mental disorders. The first involved the creation of primary mental health care teams (one for youth and one for adults) within all CSSSs responsible for 50,000 inhabitants or more. At the core of these teams are psychologists, social workers, and nurses, though other health professionals (e.g. GPs, occupational therapists, pharmacists, nutritionists) can
also become members. The three core functions of teams are to: 1) evaluate the mental health status of patients that are referred to them, 2) provide evidence-based treatment (usually psychotherapy) and follow-up care to patients with mild to moderate mental illness or stabilized severe mental illness, and 3) to share their expertise and provide supports to partners within the CSSS and other partners within the local services network [346]. When necessary, persons requiring more specialized mental health services can be referred to such services by the primary mental health care team. Teams are also expected to support clients’ reintegration into the community and engage in activities to prevent the onset or deterioration of mental health problems [346].

According to the mental health action plan, within each primary mental health care team a certain number of designated team members will take on the role of the “guichet d’accès”, or single access point for services [345]. This role involves evaluating individuals referred to the team and determining whether their care would be best managed by their primary care provider, the primary mental health care team, more specialized services, or other community-based services within the local service network. Requests for specialized services originating from providers in the community are encouraged to pass through the guichet d’accès, highlighting an important “gatekeeping” role by the primary mental health care team. Members of the guichet d’accès orient clients to the services that best suit their needs and thus play an important role in ensuring accessibility and continuity of mental health care.

To further support primary care clinicians in the delivery of mental health care, the Ministry created the role of “responding professionals” – normally psychiatrists – that act as an expert resource for primary mental health care teams and other primary care providers in their territory with whom they share a service agreement [345, 346]. Their role is not to intervene directly in client care but rather provide advice and leadership in a primary care context.
Taken together, these three strategies aimed to allow primary care clinicians to take on greater responsibility for the care of people with mental disorders while at the same time surrounding them with the necessary supports to be able to accomplish this goal.

Section summary
Primary care services in Quebec have undergone dramatic changes over the past decade and an important focus of reforms has been to strengthen mental health services delivered within primary care. It remains unclear, however, whether the current organization of primary care services in Quebec is supportive of high-quality care for people who suffer from both depression and comorbid chronic conditions. Indeed, little is known about the characteristics of primary care clinics associated with depression care quality and whether patients with certain comorbidity profiles receive better care in some settings but not in others. This thesis seeks to shed light on these topics.
Chapter 1 Summary

Several conclusions can be drawn from this literature review. First, the co-occurrence of depression with other chronic diseases is a widespread and serious problem that represents a major challenge to health care providers, health system planners and to overall public health. Such comorbidity exerts a substantial burden on affected individuals and their loved ones, indeed more than the burden caused by depression or chronic diseases alone.

Second, most individuals with depression and comorbid chronic conditions receive the bulk of their care from primary care providers. However, despite greater awareness of the prevalence of depression and the availability of effective treatments for the disorder, many patients continue to have their depression go unrecognized or treated suboptimally in primary care settings. It is currently unclear to what extent the presence of comorbid chronic conditions contributes to these gaps in depression care and what the influence of comorbidity is relative to other potential influences on depression care quality.

Third, evidence suggests that the organizational settings in which care is delivered can have an important impact on the quality of depression care that patients receive and an increasing number of interventions have begun to target factors at this level. At the same time, studies specifically examining links between the organizational characteristics of primary care clinics and depression care quality are scarce and there is little guidance surrounding the characteristics to target in order to design more effective and sustainable interventions. Furthermore, studies have devoted little effort to understanding how or why organizational characteristics might influence important care processes for depression and this limits quality improvement efforts.
Finally, there is little understanding of whether different organizational contexts in primary care enable or impede high-quality depression care for patients with different types or profiles of comorbid chronic conditions, despite the fact that the vast majority of patients suffering from depression present with one or more chronic disease comorbidities. While certain types of profiles of comorbid chronic conditions may be associated with a higher or lower quality of depression care, it is unclear whether these relationships are stable across organizational settings or whether some settings or characteristics enable better care for patients with some types or combinations of chronic conditions but not others.

Addressing these knowledge gaps should advance our knowledge of the relationship between organizational factors and the quality of care and more importantly provide useful information supporting the development of more targeted organization-level strategies to improve the quality of key depression care processes in primary care services in Quebec and possibly elsewhere.
Chapter 2: Objectives

Primary care patients with depression and comorbid chronic conditions are a vulnerable population that often receives suboptimal depression care in primary care settings. It is thus important to better understand how comorbid chronic conditions may influence depression care quality and identify strategies that can be used to improve the quality of care delivered to these patients. Doing so should help to improve the health and quality of life of these patients.

The ultimate objective of this thesis is thus to better understand how the organizational characteristics of primary care clinics influence the care provided to patients with depression and different types of comorbid chronic conditions.

As a first step towards this objective, it was important to clarify the relationships between chronic disease comorbidity and the quality of depression care in primary care and identify factors – including any organizational factors – having a potential influence on these relationships. In this step we focused our attention on comorbid chronic physical conditions, as their particular relationship with the quality of depression care was less clear than the effects of comorbid mental disorders. We also chose to focus on two main care processes for depression, recognition and treatment, because these represent meaningful and informative indicators of depression care quality that can be easily targeted in future quality improvement efforts.

Articles 1 and 2 thus describe a systematic review of the literature with the following specific aims:

1. To examine whether and why recognition of depression in routine primary care settings differs between adults with higher and lower chronic physical comorbidity burden (Article 1);
2. To examine the influence of chronic physical comorbidity burden on the quality of depression treatment and follow-up care in routine primary care settings and explore factors leading to divergent study results (Article 2).

Our systematic review further helped us identify relevant details regarding measures for patient comorbidity and depression care quality that helped inform the next phase of this doctoral research. In this next step, we examined the quality of depression care in primary care services in Quebec and how different individual-level (e.g. types of comorbidity) and organizational-level characteristics could influence the care that patients received. The specific objective of article 3 was thus:

3. To examine which characteristics of primary care practices were associated with the recognition and minimally adequate treatment of depression in patients with different profiles of comorbid chronic conditions.

Finally, article 4 describes a qualitative exploration into the influence of primary care organizational characteristics on the care provided to patients with both mental disorders (such as depression) and chronic physical conditions. The specific objective of this article was:

4. To explore primary care providers’ perceptions of the challenges of managing patients with mental-physical multimorbidity and how their organizational contexts support (or impede) their ability to provide quality care to these patients.
Chapter 3: Conceptual framework

3.1. Knowledge management
The conceptual foundations for this thesis are drawn from the organizational sciences literature on knowledge management. The area of knowledge management (KM) emerged in the early 1990s out of work within various fields, including business administration, sociology, education, computer science, and library and information sciences [347, 348]. Interest in KM was sparked especially by the increasingly popular ‘knowledge-based view’ of the firm and the growing recognition of the value of knowledge within organizations [349, 350]. The knowledge-based view postulates that knowledge is the most strategically important resource within organizations and therefore central to sustainable organizational performance [349]. The achievement of organizational goals thus critically depends on being able to help organizational actors systematically find, share, use and create knowledge [349-351].

In the health care field, interest in KM has risen steadily over the past ten years and the reasons for this are numerous. Health care systems are increasingly understood to be ‘knowledge-rich” environments and health care professionals and other health system actors rely greatly on their knowledge to perform their jobs effectively, i.e. they are “knowledge workers” [352, 353]. However, new medical advances are made all the time and the body of medical knowledge available to clinicians is immense and rapidly expanding [352, 354]. Indeed, clinicians are constantly confronted with new information and are increasingly challenged to memorize or effectively apply the vast amounts of knowledge that are relevant to their clinical practice [354]. This has only been enhanced by the arrival of information technologies such as the Internet and electronic medical records that make an abundance of information easily available but also challenge clinicians to find the right information when they need it [354-356]. Health care systems are also composed of many thousands of individuals working within hundreds of organizations, with each individual having their own knowledge and with some knowledge residing preferentially within certain professions or
groups [352, 354]. Delivery of health care in this context often requires that individuals share their knowledge within and across professional and organizational boundaries to best meet patient needs. In recognition of this, organizations such as the WHO [357] and the National Health Service in the United Kingdom [352, 353] have developed systems and strategies to identify and support internal knowledge needs.

Ideas derived from the KM literature are especially relevant in the context of primary care and the delivery of care to people with multiple chronic conditions. In their daily practice, GPs and other primary care providers draw from a very broad knowledge base covering the majority of human health conditions and the means for addressing many health problems. Applying knowledge towards the care of primary care patients with multiple chronic conditions may be particularly challenging, however, as they can present with an almost infinite number of disease combinations, with most having a low prevalence [358]. Relatively little scientific attention has been devoted to the treatment and effects of combinations of chronic diseases and GPs perceive current disease-specific clinical guidelines to be of limited help in the management of patients with multimorbidity [359]. Not surprisingly, qualitative studies have illustrated how multimorbidity can give rise to clinical uncertainty and difficulties in making decisions about treatment and care management, even among senior clinicians [304, 360].

The limited success and sustainability of a large number of interventions designed to improve the quality of care provided to primary care patients with chronic diseases has sparked interest in alternative strategies for bridging gaps between best practices and actual practices [347]. KM has recently been proposed as a model for supporting the implementation of evidence-based health care practices [347] and for enhancing care quality in primary care [361] and for patients with multimorbidity [362]. In the next section, we present the model that was used to guide this thesis and which may be useful for supporting future quality improvement initiatives for primary care patients with depression and comorbid chronic conditions.
3.2. Conceptual framework

Inspired by the seminal work of Donabedian and by authors in the KM field, we developed a conceptual framework that illustrates the links between primary care practice characteristics (i.e. structures) and the quality of depression care provided to patients with depression and comorbid chronic conditions (i.e. care processes).

The basic elements of the model (see Figure 2) – enablers, processes, and organizational performance – are drawn from the integrated KM model developed by Lee and Choi [363]. These authors defined KM enablers as “organizational mechanisms for fostering knowledge consistently.” They defined knowledge processes as “a structured coordination for managing knowledge effectively” and include “activities such as creation, sharing, storage, and usage.” Organizational performance was described as “the degree to which companies achieved their business objectives.”

In the context of this thesis, we defined knowledge processes as the knowledge activities performed by clinicians or other actors in primary care. Examples of knowledge processes commonly identified in the literature are finding, sharing, storing, using and creating knowledge [364, 365]. Knowledge “flows” can be understood to be sequences of knowledge activities performed in support of some action or decision [366].

For their part, KM enablers are defined here as the aspects of clinical environments that create enabling conditions for the flow of knowledge in those settings. Thus, while knowledge processes can be viewed as the basic ingredients of knowledge flows, enablers provide the infrastructures necessary for primary care organizations to increase the efficiency of their knowledge flows [363].

Inspired by the exhaustive literature review of Choo and de Alvarenga Neto, four main types of enablers were identified, namely strategic/structural enablers, social enablers,
informational enablers, and epistemic enablers [367]. “Strategic/structural” enablers are the organizational structures, architectural aspects, or strategic plans or conditions that facilitate the flow of knowledge in primary care organizations. Examples of such enablers are formal work structures fostering collaboration, reward systems, training or mentorship programs, physical workspaces, and leadership promoting knowledge flows.

“Social” enablers are defined as the organizational attributes that foster social environments conducive to knowledge flows and include such things as personal relationships between clinicians, norms of trust, respect and mutual support, values related to teamwork, etc. In essence, such enablers help people to relate to each other in a positive way, thus facilitating a range of knowledge processes.

“Informational” enablers refer to the wide range of information technologies that can support knowledge processes. Examples of such technologies commonly observed in primary care settings include computers, the Internet, email, electronic health records, fax machines, telemedicine, diagnostic equipment, etc.

Finally, “epistemic” enablers are defined as the organizational characteristic or practices that allow clinicians to be exposed to new ideas and diverse forms of knowledge while also helping to establish common knowledge and objectives within the organization. According to Choo and de Alvarenga Neto, both of these requirements need to be present and must reinforce one another [367]. Such a view is echoed by Grant [349], who recognized that organizations often depend on members that possess different stocks of knowledge but that opportunities to build common knowledge were important as it allowed actors to share and integrate aspects of knowledge that were not common between them. In the context of this thesis, examples of epistemic enablers include interdisciplinary or inter-organizational meetings, hiring practices promoting professional or cultural diversity, and forums for exchange and for establishing common goals.
Our conceptualization of organizational performance is based on the KM framework developed for primary care organizations by Orzano and colleagues [347]. These authors viewed quality of care as a key element of organizational performance and a key outcome resulting from KM processes. They also identified “intermediate outcomes” that help us understand the links between these KM processes and performance aspects such as quality of care. Examples of intermediate outcomes are decision-making processes (i.e. exploring and defining problems and evaluating and selecting solutions) and learning (i.e. gaining insights and understanding) at both the individual and group levels [347].

Adding each of these elements together creates a comprehensive framework for understanding how different primary care organizational characteristics can support the flow of knowledge within clinical settings. These knowledge flows have the potential to help providers to make sense of complex clinical situations and allow them to learn and take decisions about the care they provide to patients with depression and comorbid chronic conditions. When providers can access the knowledge they need, they should be able to provide a higher technical quality of care to their patients, as appropriate delivery of care processes such as recognizing and treating depression is fundamentally dependent on providers’ knowledge.

That said, it is clear that factors other than patient comorbidity and organizational characteristics may also influence depression care quality (e.g. other patient characteristics and provider characteristics). As such, our conceptual framework integrates several constructs identified in Klinkman’s competing demands model [30] to arrive at a more comprehensive framework, presented below (see Figure 2).
Figure 2. Conceptual framework (* assessed qualitatively only)

- **Practice ecosystem domain**
  - Structural/Strategic enablers
  - Social enablers
    - Knowledge processes *
      - Finding
      - Sharing
      - Storing
      - Using
    - Informational enablers
    - Epistemic enablers

- **Patient domain**
  - Sociodemographic characteristics
  - Depression severity
  - Comorbidity profile

- **Clinician domain** *
  - Attitudes and beliefs
  - Knowledge and experience
  - Discipline of practice

- **Organizational learning and decision-making** *

- **Technical quality of care**
Chapter 4: Methods

4.1. Overall research design and strategy

To achieve the objectives outlined in this thesis, two strategies were used. First, a systematic review of the literature was conducted to address objectives 1 and 2. Systematic reviews are attempts to identify, appraise and synthesize all the empirical evidence that meets pre-specified eligibility criteria to answer a given research question [368]. Explicit methods are used to minimize bias in order to produce more reliable findings that can be used to inform decision-making and future research.

Second, objectives 3 and 4 were addressed through a mixed-methods study adopting a sequential explanatory design [369]. Mixed-methods studies involve the collection and analysis of both quantitative and qualitative data. Mixed-methods research arguably provides a better understanding of research problems than when either quantitative or qualitative approaches are used alone because it involves gathering more comprehensive evidence for studying a research problem and the combination of approaches can offset the weaknesses of either approach used by itself [369]. A sequential explanatory design is a two-phase design in which quantitative data is collected and analyzed first and then is followed by a subsequent collection and analysis of qualitative data [369]. This design allowed us to (a) examine statistical associations between the quality of depression care, primary care patients’ comorbidity profiles, and primary care organizational characteristics, and (b) subsequently expand on and explain quantitative results using qualitative data collected from people or organizations that participated in the quantitative component of the study.

4.2. Systematic review methods

The full details of the methods for the systematic review are presented in articles 1 and 2 in Chapter 5 and are summarized here. A protocol for this review was developed and was published in the International Prospective Register of Systematic Reviews (PROSPERO) [370].
**Literature search**

The search strategy was comprehensive and developed in collaboration with an experienced information specialist. It involved searches of five major databases from inception until July 2013: Medline, Embase, PsycINFO, CINAHL, and the Cochrane Central Register of Controlled Trials. The following search concepts were used: depression, primary care, general practitioner, chronic disease, and comorbidity. For each of these concepts both free-text and subject headings were used, as were a range of related terms and variant spellings (e.g. comorbidity versus co-morbidity). The full search strategy used for the Medline database is presented in Appendix 1. Additional articles of interest were sought through reference searches and reverse citation searches (using Google Scholar) of included articles. We further consulted recent systematic reviews on related topics [27-29] to minimize the possibility of omitting relevant articles.

**Eligibility criteria**

To be eligible for inclusion in the review, studies were required to meet seven main inclusion criteria:

1. Study participants had to be adults with a clinically significant depressive disorder (e.g. major depression, dysthymia). Studies that did not firmly establish the presence of a depressive disorder or that focused on patients with subthreshold disorders or psychological distress were considered ineligible.

2. A subsample of participants with depression also had to have one or more chronic diseases. To determine which diseases qualified as “chronic” versus non-chronic, we relied on work conducted by O’Halloran and colleagues [371] who conducted a systematic review of the literature to identify defining characteristics of chronic diseases and then applied these key characteristics to a broad diagnostic classification system of health conditions to identify a subset of chronic conditions. This led to the identification of 130 non-psychological conditions considered chronic in nature. Studies focusing on conditions not identified as chronic according to this list (e.g.
benign tumors, short-term injuries) were excluded from the review. We included, however, studies that examined participants with pain conditions if it could be established that pain resulted from at least one of the 130 conditions in our list or was clearly chronic in nature.

3. Studies had to present data related to eligible indicators of depression care quality, which were identified as indicators of depression recognition or treatment (including follow-up care). For depression recognition, only studies focusing on the routine and unassisted recognition of depression were included, i.e. studies in which recognition was not clearly assisted by an intervention (e.g. educational program or systematic use of rating scales). Previous systematic reviews [27-29] helped establish the range of quality indicators considered eligible.

4. Studies had to present data that contrasted the quality of depression care received by patients with higher and lower burdens of chronic physical comorbidity. The term “burden” was adopted to reflect the reality that, in many studies, authors provided data comparing groups of depressed patients with lower amounts of chronic physical comorbidity (but not necessarily no comorbidity) to patients with higher amounts of chronic physical comorbidity. Adopting this view allowed us to consider a range of comparisons between patient groups, including “categorical” comparisons (e.g. depression with less than two chronic conditions versus depression with two or more chronic conditions) and comorbidity “pairings” (e.g. depression without diabetes versus depression with diabetes). We also included studies that reported data related to continuous measures of comorbidity, including unweighted counts of comorbid chronic physical conditions (e.g. 0, 1, 2, 3, etc. conditions) as well as counts of conditions that were weighted by the severity of each condition (e.g. with severity determined by levels of drug use or service use or effects on mortality).

5. Studies had to focus on participants receiving depression care primarily by primary care clinicians, defined as clinicians that are accountable for the majority of personal health care needs and that practice in the context of family and the community [144]. We included population-based studies if it was clearly reported that the majority of
respondents (>50%) received care from primary care clinicians or in primary care settings.

6. Studies could be experimental or observational in nature. Experimental studies, such as randomized controlled trials, were eligible if quality of care data was collected at baseline (i.e. before an intervention), from usual care arms of trials, or from all participants when it was judged that the intervention would have no effect on the relevant quality indicators. Qualitative studies were excluded from the review, as were vignette studies, studies not published in peer-reviewed journals, letters/editorials, and studies available only as scientific meeting abstracts.

7. Study findings had to be published in English or French.

**Study selection**

Studies retrieved from our searches were exported into the software RefWorks. After removal of duplicates, titles and abstracts were screened using a piloted, standardized screening tool. Next, full-text copies of potentially eligible studies were screened using pre-defined criteria. During both stages, screening was performed independently by two review authors and disagreements or uncertainty were discussed until agreements were reached.

**Data extraction and synthesis**

Following screening, the first author extracted the data from eligible studies into piloted Excel spreadsheets and a second reviewer verified its accuracy. The following data was extracted: study authors, year of publication, study design, study setting (e.g. country), data collection years, data sources, participant characteristics (age and sex), methods used to establish diagnoses of depression and chronic physical conditions, use of comorbidity index or system, comorbidity groupings, depression quality indicators, indicator data sources, and results on indicators.

In addition, we extracted data required to appraise study quality. Quality appraisal covered the following aspects based on the Quality Assessment Tool for Quantitative Studies [372]:

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representativeness of the study sample, participation rate, assessment of confounders, approach used to establish depression diagnosis (i.e. gold standard), blinding of providers to patients’ depression status, strength of data collection methods for chronic physical conditions and quality indicators, and appropriateness of analyses. The Qualitative Assessment Tool for Quantitative Studies can be applied to both experimental and observational studies and has been endorsed by the Cochrane Public Health Review Group [373]. Two review authors independently appraised study quality and differences in ratings were discussed until agreements were reached.

In preliminary analyses we noted significant differences between studies with respect to study types and approaches to measuring chronic physical comorbidity and depression care quality. Given this heterogeneity, a meta-analysis was deemed inappropriate and a narrative synthesis of results was performed [374]. In this thesis, results related to relationships between chronic physical comorbidity and depression recognition are presented in article 1. Article 2 presents findings pertaining to relationships between chronic physical comorbidity and depression treatment and follow-up care.

4.3. Methods for the quantitative phase of the mixed-methods study

The data used to achieve objective 3 were derived from Project Dialogue, a four-year (2006-2010) research program examining contextual and organizational factors influencing the quality of primary mental health care services in the province of Quebec [375]. Project Dialogue comprised three interrelated studies: (1) a contextual study, (2) an organizational survey, and (3) a patient survey. The overarching objective of the project was to understand how the interaction between contextual factors and new mental health policies (i.e. the recent mental health action plan) impacted organizational models of primary mental health care, and thus consequently impacted the quality of primary mental health care services provided as well as the health outcomes of patients using these services. The conceptual framework for Project Dialogue is presented in Appendix 2.
**Contextual study**

The objectives of this study were to (1) gain an understanding of how health services were organized generally and for mental health problems in particular within each of the local service networks participating in the study, and (2) document contextual factors within each local service network that influence the implementation of the 2005 mental health action plan. The contextual study was conducted in 15 local service networks selected to have the greatest possible contextual diversity. Selection of networks was based on data pertaining to geography (e.g. population density, remoteness), population characteristics (e.g. demographic structure), resources (e.g. availability of specialized resources), and historical characteristics (e.g. prior existence of shared mental health care programs). Data was collected through searches for documentation and interviews with key stakeholders taking place in three waves from 2006 to 2009. Data from this component of Project Dialogue were not used in this thesis.

**Organizational survey**

The organizational survey aimed to identify the major primary care and primary mental health care organizational models of service delivery that existed within the 15 local service networks involved in the contextual study. We considered primary care “organizations” (or clinics) to be any organizational entity in which one or more GPs delivered general medical services [376]. Within each local service network, surveys were mailed to all eligible primary care clinics. Of the 285 clinics that were solicited to participate, 76 completed the cross-sectional organizational survey. Data collection took place from November 2007 to June 2008.

**Patient survey**

Sixty-four (64) of the 76 primary care clinics that participated in the organizational survey also provided us with permission to recruit clinic patients for a survey of their care experiences. This allowed us to form a large cohort of primary care patients with depressive
and/or anxiety disorders that were exposed to different organizational models of care delivery.

Participants were recruited between March and August 2008. A two-stage screening procedure was used to identify patients eligible for entry into the cohort and these patients were then followed over a period of one year. Data collection occurred at four time points: (1) during patient recruitment in the waiting rooms of clinics (Time 0), (2) at the first telephone/web survey 2 to 4 weeks following each patient’s recruitment (Time 1), (3) at the second telephone/web survey taking place 6 months later (Time 2), and (4) at the third telephone/web survey taking place another 6 months later (Time 3). The survey allowed us evaluate patients’ health status at different time points and examine several dimensions of care experiences, including the accessibility, continuity, effectiveness, responsiveness, and appropriateness of care. In this thesis, only data from Times 0 and 1 were used.

**Participants and data collection**

For the organizational survey, local respondents within each local service network provided the research team with an exhaustive list of primary care clinics in their territories. Clinics were eligible for the survey if they featured at least one GP that offered general medical services to undifferentiated adults. A range of clinic types was targeted by the survey, including CLSCs, GMFs, large private clinics (> 6 GPs), small private clinics (2-5 GPs), and solo practitioners. Recruitment and response rates for the organizational survey are presented in Figure 2. Various tracking strategies were used to optimize recruitment and completion of the survey, including repeated follow-up contacts by fax and telephone, personal follow-ups by local respondents, and letters sent to clinics from regional departments of general medicine. Survey questions were completed by the respondents most knowledgeable about their clinic’s structure and functioning, often the head clinician or administrator at the clinic.
Survey questions were drawn primarily from a questionnaire previously used in a large survey of 473 primary care clinics conducted by Pineault et al. [377, 378]. This latter questionnaire consisted of over 60 mostly closed-ended questions gathering information on patients’ vision of services, structures, resources, and practices. Findings from this large organizational survey were found to be associated with primary care patients’ care experiences (e.g. accessibility of care) and the technical quality of care for certain chronic diseases (e.g. diabetes and coronary artery disease) [377, 379, 380]. For the organizational survey of Project Dialogue, a questionnaire consisting of 53 questions was developed, including 32 questions drawn directly from the survey of Pineault and colleagues. The remaining questions were developed by our research team and addressed organizational characteristics specific to care for patients with depressive or anxiety disorders. Similar to the questionnaire developed by Pineault, the topics covered in our questionnaire included the organizational
structure and resources of the clinic, clinic services and staff practices, inter-organizational collaborations, the clinic’s vision of services, and values held by clinical staff.

For the patient survey, a total of 33,528 individuals were approached by trained research in the waiting rooms of the 64 clinics participating in the organizational survey. Patient recruitment occurred during randomly chosen periods to ensure proper representation of different weekdays and periods of the day (i.e. morning, afternoon and evening). Eligible patients were those that were 18 years or older, French or English speaking, and were seeking care from a GP for themselves. A total of 22,600 individuals were deemed eligible to participate and 14833 completed a self-administered questionnaire (67.4% response rate) (Time 0). The waiting room questionnaire consisted of 33 questions related to patients’ sources of care, health status and medical conditions, symptoms of anxiety or depression, general daily functioning, use of medications, patterns of service use, and socio-demographic and contact information.

Information on patients’ chronic physical conditions was based on a list of 17 chronic conditions drawn from the Canadian Community Health Survey (cycle 1.2) (cchs ref). This list included “allergies”, “asthma”, “back problems”, “bowel disorder such as Crohn’s disease or colitis”, “cancer”, “chronic bronchitis, emphysema or chronic obstructive pulmonary disease”, “chronic fatigue syndrome”, “diabetes”, “effects of a stroke”, “epilepsy”, “fibromyalgia”, “heart disease”, “high blood pressure”, “migraine headaches”, “osteoarthritis, arthritis or rheumatism”, “stomach or intestinal ulcers”, and “thyroid condition”. Patients were also asked to report whether they had been diagnosed with mental disorders (mood, anxiety and eating disorders). In addition, patients had the opportunity to report additional chronic physical conditions or mental disorders not appearing in the list of conditions. Current symptoms of depression and anxiety were assessed using the Hospital Anxiety and Depression Scale (HADS), a widely used rating scale with good psychometric properties [381] that was recently validated in a Quebec context.
Patients’ daily functioning was assessed using the WHO Disability Assessment Schedule [383].

Two to four weeks after the waiting room interview, telephone or web-based surveys were conducted with patients whose usual source of care was one of the clinics participating in the study AND who reported at T0 (a) that they had elevated depressive or anxiety symptoms in the week leading up to the client survey (HADS depression or anxiety subscale score > 8), OR (b) having been diagnosed with a depressive or anxiety disorder by a physician at some point in their lives, OR (c) that they took medication for depressive or anxiety problems within the year previous to the survey, OR (d) that they consulted a health professional (e.g. GP, psychiatrist, psychologist) for mental health reasons within the previous year. A total 7522 participants were eligible for this follow-up interview and 3382 (response rate 45.0%) completed part 1 of the interview – an assessment of symptoms and criteria corresponding to diagnoses for anxiety and depressive disorders using the Composite International Diagnostic Interview Simplified version (CIDS), a validated, standardized diagnostic interview tool based on the DSM-IV [384]. Patients were eligible to continue with part 2 of the interview and gain entry into the final cohort if: (a) they had suffered from a major depressive episode, generalized anxiety disorder, agoraphobia, social phobia, or panic disorder within the 12 months prior to the interview, according to the CIDS, OR (b) they exhibited high levels of anxiety or depressive symptoms combined with medication, diagnosis by a healthcare professional, or DSM-IV criteria for major depressive episode or anxiety disorder in the previous 24 months. Among these eligible patients, extensive data was collected on their experiences with care, their use of mental health services, their medications, and sociodemographic characteristics.

For the present doctoral thesis, the target population consisted of 824 primary care patients that met DSM-IV criteria for current major depressive episode (i.e. an episode within the 12 previous months) and that also had at least one comorbid mental or chronic physical condition. These patients received care within 61 primary care clinics.
Operationalization of variables – dependent variables

The outcome of interest for the quantitative phase of the mixed-methods study was the quality of care for depression. However, given that we were working with data self-reported from patients and that the quality of care delivered by clinicians was not directly observed, as a proxy, we used data collected from the patient survey to measure two important depression care processes: the recognition and adequate treatment of depression.

The quality indicators used in this thesis were informed by clinical practice guidelines that were available at the time of the organizational and patient surveys. More specifically, they are based on the 2001 Canadian guidelines for depression developed by the Canadian Network for Mood and Anxiety Treatments (CANMAT) in collaboration with the Canadian Psychiatric Association [385]. In these guidelines, diagnosis is described as the cornerstone of treatment plans for depression. Here, we adopt the broader notion of “recognition” as opposed to diagnosis of depression given evidence that clinicians may detect and treat depression without formally providing patients with a diagnosis for their disorder [386].

The accuracy of depression recognition is typically measured by comparing performance of physicians in identifying the presence of depression against a “gold standard”, such as a diagnostic psychiatric interview or validated rating scale [27, 387]. Given that all participants in our target population had past-year major depressive disorder (as determined by the CIDIS), examining the number of patients that reported having been diagnosed with or treated for major depression over this same time period provides an indication of the accuracy with which providers recognized depression. In the Time 1 interview, patients were asked whether, over the previous 12 months, a healthcare professional had told them that they suffered from depression. In addition, in the same interview they were asked whether they had taken antidepressants in the previous 12 months. Consistent with previous primary care studies [27, 190], we thus defined depression recognition as the patient-reported
diagnosis of depression from a healthcare professional or use of an antidepressant medication, with either occurring in the previous 12 months.

The CANMAT guidelines also identify two principal treatment modalities for depression, namely pharmacological treatment (e.g. antidepressant medications) and psychotherapy. To assess whether patients received depression treatment that could be considered minimally appropriate, we first used the CANMAT guidelines to help establish what could be considered minimally adequate pharmacological treatment and minimally adequate psychotherapy. We defined minimally adequate pharmacotherapy as the patient-reported use of an antidepressant medication (past-12 months) accompanied by four or more visits with the prescribing physician in the previous year. Patients were specifically asked about the number of follow-up visits they had with the physician that prescribed them antidepressants during the time 1 interview. Such follow-up visits following the prescription of antidepressants were recommended by the CANMAT guidelines to allow physicians to monitor response to the medication and potential side-effects and make adjustments if necessary [385]. The criteria of four follow-up visits with the prescribing physician corresponds to one visit per month during the three-month acute phase of treatment and at least one more visit during the maintenance phase of treatment over the course of the year.

With respect to minimally adequate psychotherapy, the CANMAT guidelines identified two types of psychotherapy, namely cognitive-behavioural therapy and interpersonal therapy, for which the evidence supported their use in the care of people with depression [385]. During the time 1 interview, patients were asked if they had received psychotherapy in the previous year and, if so, which type of psychotherapy they received. Definitions for each type of psychotherapy were provided to patients. In addition, patients were asked in the time 0 interview whether they had consulted a health care professional for mental health reasons over the previous year and, if so, how many times. Based on this information, we defined minimally adequate psychotherapy as the patient-reported receipt of guideline-recommended psychotherapy accompanied by 12 or more visits to a professional for mental
health reasons, with both occurring in the previous 12 months. The use of a minimum of 12 visits to a professional for mental health reasons corresponds to the minimum number of sessions that are required for a patient to be considered to have received a full course of either cognitive-behavioural or interpersonal therapy according to the CANMAT guidelines [385].

Based on these indicators, we could then determine whether patients received minimally adequate depression treatment, defined as the receipt of either minimally adequate pharmacological treatment and/or minimally adequate psychotherapy within the previous year. This indicator has been used in a previous study by our research team and shown to predict improvements in depressive symptoms over the course of a year [242].

**Operationalization of variables – independent variables**
Consistent with thesis objective 3 and our conceptual framework, we evaluated the influence of both patient-level and organizational-level factors on the quality of depression care received by our target population. Below, we describe the constructs we assessed and their operationalization.

**Comorbidity profile**
We were interested in examining the quality of depression care received by patients with different types of comorbid chronic conditions. Inspired by recent studies investigating the influence of patient comorbidity on depression care quality [289, 388], we categorized patients into one of three comorbidity “profiles” using data from the patient survey: (a) psychiatric comorbidity only, (b) chronic physical comorbidity only, and (c) both psychiatric and chronic physical comorbidity. Patients with psychiatric comorbidity only had one or more mental disorders comorbid to depression but no comorbid chronic physical conditions. Patients with chronic physical comorbidity only had one or more chronic physical conditions comorbid to depression but no psychiatric comorbidity. Patients in the final group had at least one comorbid mental disorder and at least one comorbid chronic physical condition.
This categorization of patients was preferred over the use of separate measures for psychiatric and chronic physical comorbidities, as studies show important interaction effects between these comorbidity types on depression care quality [289, 388]. Our comorbidity profile variable was constructed using dichotomous variables related to patients’ chronic conditions. Information about patients’ chronic physical conditions came from the Time 0 interview, specifically our list of 17 chronic physical conditions, as well as an open-ended question about additional long-term physical conditions that had been diagnosed by a health professional. Information about patients’ mental disorders came from both the Time 0 and Time 1 interviews. In the Time 1 interview, the CIDIS interview provided information about whether patients suffered from generalized anxiety disorder, agoraphobia, social phobia, or panic disorder. In addition, in the Time 0 interview, patients were asked to report if they suffered from an eating disorder and they were also asked an open-ended question about other long-term mental disorders that had been diagnosed by a health professional.

**Other patient-level factors**

As discussed in chapter 1, a wide range of patient characteristics have been found to be associated with depression care quality. Informed by this research, we evaluated the influence of the following patient characteristics: age, sex, education, employment, marital status, perception of income, having a regular doctor, use of primary care services, access to supplementary private insurance, severity of depression, and history of depression. The operationalization of these characteristics is provided in Table IV below.

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<th>Table IV. Patient characteristics assessed</th>
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For variables related to education, employment, marital status, and perception of income, some response options were combined together to form variables with fewer categories.

The HADS scale comprises 14 items: 7 items measure symptoms of anxiety (HADS-A subscale) and 7 items measure symptoms of depression (HADS-D subscale). Each item is scored on a four-point scale (0 to 3), with the total score ranging from 0 to 21 for each subscale. The reference period for the scale is the previous week and higher scores indicate greater distress and a higher probability that the patient is experiencing a depressive or anxiety disorder. The HADS has been shown to have good acceptability, reliability, and convergent and discriminant validity in primary care and other populations [381]. For this thesis, we used a French-Canadian version of the scale recently validated by our research team [382] and in particular the HADS-D subscale to evaluate the severity of depressive symptoms.

**Primary care organizational characteristics**

The organizational survey was the source of data for all the primary care organizational characteristics that we assessed (see Appendix 3). Given that the survey collected a large amount of information on organizations, the choice of which features of organizations to evaluate was based on our conceptual framework and on previous studies related either to the quality of depression or chronic disease care in primary care or to knowledge management enablers [44, 45, 190, 302, 367, 377, 380, 389].

As a first step, initial variables were created for each question of the organizational survey. Next, variables with relevance to the conceptual framework were listed and subsequently grouped into four conceptual domains, i.e. structural/strategic, social, informational, and epistemic characteristics. This led to the identification of 32 variables grouped into the four domains. Next, a literature review was conducted to examine the evidence supporting the influence of each of these factors in depression or chronic disease care and their relevance for knowledge management. Based on this literature review, 16 variables – 4 in each domain – were identified that seemed most relevant for inclusion in analyses. For most variables,
categorization within a domain was relatively straightforward (e.g. the availability of electronic medical record systems within the informational domain). However, several variables had relevance for more than one domain of enabling characteristics. As such, we performed tests of internal consistency on the variables within each category in an effort to verify that the variables in each group were the ones most related to each other. It should be noted however that this procedure was not intended to help us draw inferences about whether one domain or another as a whole was more influential in effecting quality of care; the purpose was simply to help us make choices regarding the categorization of variables.

The operationalization of the final 16 variables representing enabling primary care organizational characteristics is presented below (see Table V). For variables in the structural/strategic, social and epistemic domains, Cronbach alphas ranged from 0.60 to 0.70, suggesting adequate internal consistency. For variables in the informational domain, the Cronbach alpha was slightly lower ($\alpha = 0.52$). However, the four variables selected for this domain were identified as most relevant based on our literature review. For the structural/strategic domain, the four variables ultimately selected were more reflective of strategies than organizational structures and so these characteristics were referred to simply as “strategic” enablers.

Based on our literature review, we also identified three potentially important barriers to depression care, namely patients’ comorbid medical problems, lack of time for follow-up care, and payment models perceived inadequate for optimal depression or anxiety care [44, 190]. The operationalization of these constructs also appears in Table V.

<table>
<thead>
<tr>
<th>Table V. Operationalization of primary care organizational characteristics</th>
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</thead>
<tbody>
<tr>
<td><strong>Strategic</strong></td>
</tr>
<tr>
<td>Operationalization</td>
</tr>
<tr>
<td>Original question</td>
</tr>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Length of time dedicated for initial consultation of patients with depressive or anxiety disorders</td>
</tr>
<tr>
<td>Numbers of GPs using manuals and/or clinical practice guidelines in practice for depressive or anxiety disorders</td>
</tr>
<tr>
<td>Number of GPs using treatment algorithms with patients suffering from depressive or anxiety disorders</td>
</tr>
<tr>
<td>Importance given to GPs at the clinic working as a team</td>
</tr>
<tr>
<td>Accessibility of mental health professionals limits optimal care for patients with depressive or anxiety disorders</td>
</tr>
<tr>
<td>GPs at the clinic share clinical duties</td>
</tr>
<tr>
<td><strong>Social</strong></td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>Characteristic</td>
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<tr>
<td>Operationalization</td>
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<td>Original question</td>
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<td>Operationalization</td>
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<tr>
<td>Original question</td>
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<tr>
<td><strong>Epistemic</strong></td>
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<tr>
<td>Operationalization</td>
</tr>
<tr>
<td>Original question</td>
</tr>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>Operationalization</td>
</tr>
</tbody>
</table>
| Original question                                         | “At your clinic, how many GP devote the majority of their clinical practice time to patients with mental health problems?” ** | “At your clinic, how many GP devote the majority of their clinical practice time to patients with mental health problems?” ** | “At your clinic, how many GP devote the majority of their clinical practice time to patients with mental health problems?” **
<table>
<thead>
<tr>
<th><strong>Epistemic</strong></th>
<th>Characteristic</th>
<th>Presence of a psychologist on-site that providers refer patients to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operationalization</td>
<td>No, Yes</td>
<td>“In the building in which your clinic is located, are there services offered by... psychologist(s)? “Does your primary healthcare medical team refer patients to these other professionals?”</td>
</tr>
<tr>
<td>Original question</td>
<td>“In the building in which your clinic is located, are there services offered by... psychologist(s)? “Does your primary healthcare medical team refer patients to these other professionals?”</td>
<td></td>
</tr>
<tr>
<td>Characteristic</td>
<td>Presence of a psychiatrist on-site that providers refer patients to</td>
<td></td>
</tr>
<tr>
<td>Operationalization</td>
<td>No, Yes</td>
<td>“In the building in which your clinic is located, are there services offered by... psychiatrist(s)? “Does your primary healthcare medical team refer patients to these other professionals?”</td>
</tr>
<tr>
<td>Original question</td>
<td>“In the building in which your clinic is located, are there services offered by... psychiatrist(s)? “Does your primary healthcare medical team refer patients to these other professionals?”</td>
<td></td>
</tr>
<tr>
<td><strong>Depression Care Barriers</strong></td>
<td>Characteristic</td>
<td>Barrier: Patients’ more urgent medical problems</td>
</tr>
<tr>
<td>Operationalization</td>
<td>Highly, Fairly, Slightly/Not at all</td>
<td>“To what extent do you consider that the following factors limit the physician(s) of your clinic to offer an optimal level of care for patients suffering from (anxiety and depressive disorders): More urgent medical problems”</td>
</tr>
<tr>
<td>Original question</td>
<td>“To what extent do you consider that the following factors limit the physician(s) of your clinic to offer an optimal level of care for patients suffering from (anxiety and depressive disorders): More urgent medical problems”</td>
<td></td>
</tr>
<tr>
<td>Characteristic</td>
<td>Barrier: Lack of time for follow-up</td>
<td></td>
</tr>
<tr>
<td>Operationalization</td>
<td>Highly, Fairly, Slightly/Not at all</td>
<td>“To what extent do you consider that the following factors limit the physician(s) of your clinic to offer an optimal level of care for patients suffering from (anxiety and depressive disorders): Lack of time for follow-up”</td>
</tr>
<tr>
<td>Original question</td>
<td>“To what extent do you consider that the following factors limit the physician(s) of your clinic to offer an optimal level of care for patients suffering from (anxiety and depressive disorders): Lack of time for follow-up”</td>
<td></td>
</tr>
<tr>
<td>Characteristic</td>
<td>Barrier: Inadequate payment models</td>
<td></td>
</tr>
<tr>
<td>Operationalization</td>
<td>Highly, Fairly, Slightly/Not at all</td>
<td>“To what extent do you consider that the following factors limit the physician(s) of your clinic to offer an optimal level of care for patients suffering from (anxiety and depressive disorders): Inadequate mode of remuneration”</td>
</tr>
<tr>
<td>Original question</td>
<td>“To what extent do you consider that the following factors limit the physician(s) of your clinic to offer an optimal level of care for patients suffering from (anxiety and depressive disorders): Inadequate mode of remuneration”</td>
<td></td>
</tr>
</tbody>
</table>

* Question drawn from organizational survey developed by Pineault and colleagues
** Added question inspired by question drawn from organizational survey developed by Pineault and colleagues
*** Question developed by the Dialogue project team
Quantitative phase analyses

To examine relationships between organizational- and patient-level influences on the quality of depression care, our statistical analyses relied on multilevel regression analysis. In most previous studies on the determinants of depression care quality, investigators have attempted to explain quality outcomes exclusively in terms of individual-level independent variables, essentially ignoring that patient care takes place within particular clinical contexts that may have differing influences on care. Even when group- or organizational-level variables are considered, they are sometimes disaggregated to the individual-level so that all predictors in the statistical model are tied to the individual unit of analysis, an approach that assumes that factors influence outcomes in the same way across contexts [390].

Through the use of multilevel analysis, we were able to examine the effects of patient-level predictors and organizational-level predictors simultaneously. Patients were viewed as nested within primary care clinics and variations in the recognition of depression and their receipt of minimally adequate treatment were explored as a function of their own characteristics and the characteristics of their usual setting of care. Multilevel logistic regression analyses were used given that both our dependent variables for depression recognition and minimally adequate treatment were dichotomous in nature.

Our modelling approach was consistent with the stepped approach used by Haggerty and colleagues in a previous study of organizational factors and quality of care in primary care [391] (see article 3). For each of our outcome measures, we used “null models” to examine to what extent the probability of the outcome varied across the 61 primary care clinics in our sample. We then entered blocks of relevant organizational variables and individual patient-level variables into the models in a stepwise fashion. In multivariate models, we allowed intercepts but not slopes to vary across clinics.
Only variables with P values of < 0.10 were retained for the adjusted models. Dummy variables were created for all variables with more than two categories. Variables related to the number visits to the clinic in the past year and to depression severity were centred around the grand mean. All multivariate models controlled for patient sex, regardless of its P value. Our variable related to service use was only included in models of depression recognition. We calculated variance inflation factors to assess multicollinearity in our variables. Variance inflation factors above 10 indicate multicollinearity and suggest the need for corrective actions [392]. In our analyses, all variance inflation factors were below 3, suggesting an absence of problematic correlations between variables.

In an effort to explore interactions between primary care organizational characteristics, patients’ comorbidity profiles, and our two dependent quality of care variables, we used the estimates of our multilevel models to calculate the predicted probabilities that three virtual patients with different comorbidity profiles would be recognized as depressed or treated adequately for their depression in two virtual clinics having different characteristics. The details of these analyses and the results are presented in article 3.

4.4. Methods for the qualitative phase of the mixed-methods study

For this second, qualitative phase of the mixed-methods study, we undertook an embedded multiple case study [393] of primary care organizations that had participated in the first, quantitative study phase. Case study approaches have been used extensively in research on health services and are particularly appropriate for the in-depth examination of contemporary social phenomena and the real-life contexts in which these phenomena occur [393]. In the context of this thesis, the aim was to explore how primary care clinicians managed patients with depression and comorbid chronic conditions and how their organizational settings influenced the care delivered to these patients. We focused especially on care provided to patients with mental-physical multimorbidity (e.g. depression with diabetes or heart disease), as it is these patients that were identified in the quantitative phase of the study to be more at risk of receiving suboptimal depression care.
**Selection of cases**

Cases were purposively sampled and consisted of CSSSSs that had participated in Project Dialogue and contributed data to the quantitative phase of this study. Targeting CSSSSs was considered appropriate given their role in coordinating mental health and chronic disease care within their local service networks. The sampling frame consisted of four CSSSSs located in or around the island of Montreal. This sampling frame was selected because: (a) each of these four CSSSSs were linked to several primary care organizations of different types (e.g. CLSCs, GMFs, large clinics, solo providers) that had made significant data contributions to the quantitative phase of the study, and (b) we wanted to keep the research manageable and limit travel costs. Invitations to participate in the research study were sent to all four CSSSSs. Two CSSSSs declined to participate due to obligations towards other research projects, leaving two CSSSSs (CSSS A and B) as the cases under study.

There were two embedded units of analysis. The first unit of analysis was family medicine teams affiliated with the two CSSSSs. These teams practiced in different organizational settings (e.g. CLSCs, large family medicine clinics) and a maximum variation sampling approach was used to identify clinics that differed from each other with respect to organization type and performance on quality of depression care measures (e.g. recognition and treatment adequacy – from the quantitative study phase). The second unit of analysis was the adult primary mental health care teams affiliated with the CSSSSs (one per CSSS). Both family medicine teams and primary mental health care teams are important loci of care for patients with depressive disorders and as such it was considered important to understand how organizational factors influenced the delivery of care to patients with mental-physical multimorbidity within each type of team. Moreover, these teams are often asked to share the responsibility for mental health care and so exploring the interactions between teams was expected to provide insights into key characteristics enabling care within each CSSSS.
**Participants and data collection**

Contact with sites and participants was facilitated by authorities within each CSSS that were responsible for overseeing their CSSS’s research activities. Authorities then helped identify key resource people (e.g. team directors) that supported participant recruitment. Sampling of participants proceeded according to a combination of snowball sampling and maximum variation sampling approaches [394]. Specifically, we solicited the participation of clinicians that differed with respect to their level of experience, profession (e.g. family medicine, psychology, nursing, etc.) and team membership (i.e. either the family medicine team or primary mental health care team). Team directors and participants also helped identify new participants of interest. In total, 16 clinicians participated in the study, including 9 from CSSS A and 7 from CSSS B. Characteristics of participants can be found in article 4.

We collected multiple sources of data on each case, including semi-structured interviews with clinicians, non-participant observations of clinical settings, and documentation relevant to the services delivered within each CSSS. Fieldnotes were also taken, which included personal observations and impressions of interactions with participants and reflections on study procedures.

Interviews were conducted by the first author from October 2013 to January 2014. They took place at the clinicians’ place of work and lasted on average 53 minutes (range of 30 to 77 minutes). Interviews were guided by an interview guide and information sheets that were developed based on our conceptual framework (see Appendix 4). The interview guide covered the following topics: the description of participants’ practice settings, their role in their organization(s), the perceived challenges of caring for patients with mental-physical multimorbidity, and the characteristics of the clinical practice settings that facilitated or hindered care for patients with mental-physical multimorbidity. The information sheets were used by the first author to ensure that a wide range of organizational characteristics was discussed during the interview. All interviews were audio-recorded and transcribed verbatim by the first author.
The first author made non-participant observations on the days of interviews. They were based on a structured observation guide and sought to gather information on teams’ physical settings and workspaces (e.g. clinic location, layout of office space, meeting rooms), information technologies available to clinicians, and potential interactions between staff. To facilitate these observations, the first author was also given a tour of facilities at each study site. On occasion, participants also shared documentation of relevance to the study (e.g. descriptions of services) and some useful information and documents were extracted from the CSSS websites. In all, 18 documents were included in our analyses.

**Qualitative phase analyses**

We carried out a thematic analysis of qualitative data [394, 395] that followed several steps (see article 4). Steps included developing an initial coding framework [395] based on the themes identified in our interview guide, having two analysts independently conduct deductive and inductive analyses of a subsample of two interviews, revising our coding framework until agreement was reached, and then coding the remaining interviews while remaining open to the possibility of new framework modifications.

Following these analyses, preliminary case summaries for both CSSSs were written and discussed among the research team. To prepare the case summaries, we created conceptual matrices [396] for each team and CSSS to examine how different primary care organizational characteristics (organized in rows) were linked to different knowledge processes and outcomes (organized in columns). All participants also received a copy of the summary for their “case”, which included a description of their clinic and the organizational characteristics perceived to influence care for patients with mental-physical multimorbidity. Participants were invited to comment on the case summaries and make suggestions for corrections if necessary. Six participants, including one from each study site, returned corrected case summaries to the research team.
The final analyses took into consideration the revised description of cases and integrated non-participant observations and coded organizational documents. These latter elements were helpful in corroborating findings and provided reliable details (e.g. dates of events, names of services) that complemented the data obtained through interviews. The software NVivo (version 10) was used to facilitate data management and analysis.

4.5. Mixed methods analysis
Given the sequential nature of our mixed-methods study, we proceeded first with a quantitative analysis of data (results reported in article 3) and then subsequently performed a subsequent analysis of qualitative data from primary care clinics involved in the first phase of the study (results reported in article 4). In the discussion chapter of this thesis, we bring both phases together and use qualitative findings to expand on and provide explanations for our qualitative findings [369]. In addition, results that were non-significant or contrary to expectations in the quantitative phase are discussed in light of qualitative results.

4.6. Ethical issues
Project Dialogue received ethics approval from the Comité éthique de la recherche en santé (CERES) de l’Université de Montréal as well as the research ethics committees for each study site within the 15 local service networks. Participants in the organizational survey provided informed, written consent prior to completing the questionnaire and also provided consent for the recruitment of patients within their clinic for the patient survey. Patients provided informed, written consent prior to completing the waiting room interview at Time 0.

Ethics approval for this thesis was obtained by the CERES of l’Université de Montréal (June 13 2013) and the research ethics committee of the Agence de la santé et des services sociaux de Montréal (June 20 2013). Furthermore, ethics approval for the qualitative phase of the study was also obtained from the research ethics committees of the two CSSSs involved in the study. At least a week before their participation in this phase of the study, all participants received via email a copy of the consent form and an information sheet that provided details
about case study objectives and procedures. All participants provided informed, written consent prior to interviews and were aware that they could withdraw from the study at any time without prejudice. The ethics certificates from the CERES and Agences de la santé et des services sociaux de Montréal are presented in Appendix 8.
Chapter 5: Results

5.1. Article 1: The influence of chronic physical comorbidity burden on depression recognition in primary care: a systematic review

Authors
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Paper status and Journal
In revision in the Journal of Psychosomatic Research

Contribution of the first author
The first author conceived and designed the review, helped design the literature search strategy, led the screening of records and performed the data extraction, led the appraisal of study quality, performed the analysis, and wrote and revised the manuscript with support from co-authors.
Abstract

**Objective:** People with depression often suffer from comorbid chronic physical conditions and such conditions are widely believed to interfere with primary care providers’ ability to recognize their depression. We aimed to examine the evidence related to the influence of chronic physical comorbidity burden on depression recognition in routine, community-based primary care settings.

**Methods:** We conducted a systematic review of the literature on depression recognition in primary care that featured comparisons between patient groups with higher and lower burdens of chronic physical comorbidity. Medline, Embase, PsyclINFO, CINAHL and Cochrane Central Register of Controlled Trials were searched from inception to July 2013. Reference list and reverse citation searches were also performed. A narrative synthesis was conducted given clinical and methodological heterogeneity between studies.

**Results:** Our search identified 5817 unique citations, out of which we identified 13 studies reporting data on the relationship between chronic physical comorbidity burden and depression recognition in primary care. Four studies provided some evidence that higher chronic physical comorbidity burden negatively affected primary care providers’ ability to recognize depression. In contrast, two studies reported higher rates of recognition in patients with higher comorbidity burden and seven studies reported no differences in recognition between comorbidity groups.

**Conclusion:** Chronic physical comorbidity burden does not consistently affect depression recognition negatively in primary care. Instead, recognition seems to vary depending on the specific conditions or combination of conditions examined. Methodological choices of authors, such as approaches to measuring recognition and chronic medical comorbidity, also likely explain some divergent results across studies.

**Keywords**
Depression, Chronic disease, Comorbidity, Primary care, Recognition, Systematic Review
Introduction

Depression is a highly prevalent and disabling condition that is projected to be the leading cause of disease burden worldwide by 2030 [1]. The disorder has an early age of onset – early- to mid-twenties – and is often recurrent, with approximately 30% of affected individuals experiencing a chronic-recurrent course [2-4]. In many countries, most care for depression is delivered in primary care [5]. Depression affects approximately 10% of primary care patients [6, 7], yet recent reviews suggest that it is recognized in only half of these patients [8, 9].

Numerous factors contribute to the under-recognition of depression in primary care [10, 11]. At a patient level, the presence of co-existing chronic medical (i.e. physical) conditions (CMCs) is widely thought to impede the recognition of depression by primary care providers [12, 13]. CMCs are observed in over 50% of depressed patients and studies show that having multiple CMCs is common [14-16]. In the context of a brief medical consultation and multiple conditions requiring time and attention, general practitioners (GPs) may prioritize concerns related to these CMCs over patients’ emotional problems [10, 17]. Recognizing depression can also be difficult when depressive symptoms mirror symptoms of physical disease (e.g. fatigue, weight loss) or when patients with CMCs emphasize their physical complaints during consultations [18, 19]. Furthermore, practitioners may not diagnose depression if they believe that the patient is experiencing normal distress consequent to a CMC or if they perceive that applying a label or treatment will bring little benefit to an already vulnerable patient [20, 21].

While it may indeed be challenging for providers to recognize patients’ depression in the context of CMCs, it remains unclear whether greater comorbidity burden actually translates into lower rates of recognition. Empirical evidence on the topic appears to be mixed and several authors have suggested that chronic medical comorbidity may actually improve recognition rates by increasing patients’ contact with the health system and thus opportunities to discuss their depression with providers [22, 23].
Clinical practice guidelines identify accurate recognition of depression as an essential step in the process of providing appropriate treatment for this disorder [13, 24]. As such, it is important to determine whether some patient populations with particular comorbidity profiles are more at risk of having their depression go unrecognized than others. This review thus aimed to examine whether and why recognition of depression in routine primary care settings differs between adults with higher chronic medical comorbidity burden (e.g. patients having one or more CMCs or severe chronic physical comorbidity) and those with lower chronic medical comorbidity burden (e.g. patients with no CMCs or milder chronic physical comorbidity).

Methods
We conducted a systematic review of studies investigating the influence of chronic medical comorbidity on the quality of depression care in primary care. In this article (review part one), we present results on the relationship between chronic medical comorbidity and the recognition of depression. Review part two presents results on chronic medical comorbidity and the treatment and follow-up care for depression [25]. Our systematic review procedures and reporting followed Centre for Reviews and Dissemination [26] and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [27] guidance. The protocol for the overall review was published in the International Prospective Register of Systematic Reviews (PROSPERO: CRD42012002595).

Literature search
An experienced information specialist (LP) developed the search. We conducted searches of Medline, Embase, PsycINFO, CINAHL and the Cochrane central register of controlled trials from inception until July 2013. We used the following search concepts: depression, primary care, general practitioner, chronic disease and comorbidity. Both free-text and subject headings were used, as were appropriate variants and wildcards in order to account for plurals and variations in spelling (see Appendix 1 for the full Medline search strategy). We
also searched reference lists of all included papers and used reverse citation searches to monitor the literature until March 2014. Only articles published in English or French were retained.

**Eligibility criteria**

All study designs were eligible with the exception of qualitative studies. Randomized controlled trials were eligible if they reported depression recognition data at baseline or in usual care trial arms. Participants were adults with clinically significant depression (e.g. major depression, dysthymia) as determined by a diagnostic psychiatric interview or validated depression rating scale. Studies including only adults with subthreshold depression or psychiatric distress were considered ineligible.

Study eligibility also depended on the availability of data contrasting depression recognition in patients with higher and lower chronic medical comorbidity. Eligible comparisons included categorical comparisons (e.g. depression with no comorbid CMCs versus depression with one or more comorbid CMCs), comorbidity pairings (e.g. depression without diabetes versus depression with diabetes), and unweighted or weighted comorbidity counts (i.e. continuous measures). We categorized CMCs based on previous work by O’Halloran and colleagues [28]. These authors identified 130 non-psychological chronic conditions that represented the following disease categories: cancer, blood, digestive, eyes, ears, circulatory, musculoskeletal, neurological, respiratory, skin, metabolic/endocrine/nutritional, urinary, genital and other (e.g. tuberculosis) conditions. Studies were ineligible if participants presented only with physical complaints or medical illnesses not identified as chronic. Also excluded were studies that did not compare participant subgroups with greater and lesser chronic medical comorbidity and studies that only compared groups with psychiatric comorbidity.

The main outcome of interest was the recognition of depression. This included the diagnosis of depression but could also outcomes that combined the diagnosis or detection of
depression with other indications of recognition (e.g. identification of symptoms, referral to mental health specialists, prescription of antidepressants) [8]. This corresponds to an “active recognition” of depression that may more accurately reflect clinical reality in primary care settings [29]. However, indicators that were based solely on referrals or antidepressant prescriptions and that did not incorporate the diagnosis of depression or identification of depressive symptoms were not eligible. With respect to study setting, the review focused on care provided by primary care providers as defined by the Institute of Medicine [30], i.e. clinicians accountable for the majority of personal health care needs that practice in the context of family and the community. When studies included populations receiving care in multiple settings, only studies in which it could clearly be established that the majority (> 50%) of participants received care in primary care were included. Finally, we excluded vignette studies, studies not published in peer-reviewed journals, letters, and studies available only as meeting abstracts.

Study selection
We exported identified studies into RefWorks and, after removal of duplicates, two reviewers (MM, ID) independently screened titles and abstracts using a piloted, standardized screening tool. Following this initial screening, two reviewers (MM, AMC) independently screened full text copies of potentially eligible studies using pre-defined criteria. Disagreements or uncertainty during screening were resolved through discussion.

Data extraction and synthesis
A single reviewer (MM) extracted the data from studies using piloted electronic forms and a second reviewer (AMC) verified its accuracy. The following information was extracted: study authors, year of publication, study design, study setting (country, sectors of care), data collection years, data sources, participant characteristics (age, sex, race/ethnicity), methods used to establish diagnoses of depression and CMCs, use of comorbidity index or system, comorbidity groupings, depression recognition indicators, indicator sources and results on indicators. In addition, we extracted data required to appraise study quality. Quality
appraisal was performed independently by two reviewers (MM, PR) and covered the following aspects, inspired by the Quality Assessment Tool for Quantitative Studies [31]: representativeness of the study sample, participation rate, assessment of confounders, approach used to establish depression diagnosis (i.e. gold standard), blinding of providers to patients’ depression status, strength of data collection methods (for CMCs and quality indicators), and appropriateness of analyses.

We explored heterogeneity qualitatively using tables to contrast studies on four main dimensions: (1) study population demographic characteristics (age, sex), (2) study population depression characteristics (depression diagnoses, data sources), (3) study population comorbidity characteristics (CMCs assessed, comorbidity measures, data sources), (4) study characteristics (study design, study setting, indicator results reporting) [26]. There was considerable heterogeneity between studies, notably in approaches to measuring and reporting chronic medical comorbidity, and thus we performed a narrative synthesis of results. When the necessary information was available, we calculated unadjusted odds ratios to examine differences in outcomes between comorbidity groups when such findings were not explicitly reported. Interpretation of findings took results of quality appraisal into consideration.

**Results**

**Included studies**

Following the selection process, 13 studies met inclusion criteria for the review (Figure 1). The characteristics of these studies are presented in Table 1. Studies were conducted in 5 countries: Netherlands (n=5), United States (n=4), Canada (n=1), Spain (n=1) and United Kingdom (n=1). Ten studies were cross-sectional while the remaining three studies were cohort studies. Data collection covered the years between 1986 and 2009. Three studies focused on older adults (> 55 years) and two studies excluded older patients. Study sample sizes ranged from 53 to 824 participants.
Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart

Records identified through database searching and other sources  
\( n = 9244 \)

Number of duplicates  
\( n = 3427 \)

Records screened  
\( n = 5817 \)

Records excluded  
\( n = 5362 \)

Full-text articles assessed for eligibility  
\( n = 455 \)

Full-text articles excluded  
\( n = 402 \)
- Ineligible patient population (\( n = 26 \))
- Absent/Ineligible quality indicators (\( n = 201 \))
- Absent/Ineligible comparisons (\( n = 152 \))
- Ineligible setting (\( n = 6 \))
- Ineligible study type (\( n = 15 \))
- Not English/French (\( n = 2 \))

Number of studies included in the overall review  
\( n = 53 \)
- Depression recognition  
\( n = 13 \)
- Depression treatment & follow care  
\( n = 46 \)

Focus of review article part 2

Focus of this article (review part 1)
Diagnostic interviews, most often a version of the Composite International Diagnostic Interview [32], were used to establish depression in 9 studies while depression rating scales were used in 4 studies. Across studies, the number of comorbid CMCs examined ranged from 3 to 24 conditions, though precise numbers could not be established for 5 studies. The most commonly cited disease categories were circulatory conditions (e.g. heart disease, stroke; n=7) and endocrine/metabolic/nutritional conditions (e.g. diabetes; n=6) whereas ear (e.g. deafness; n=0) and blood conditions (e.g. HIV/AIDS; n=2) were the categories least examined. In the five studies not providing this information, authors indicated that at least some CMCs were chronic in nature. To assess the influence of chronic medical comorbidity burden on depression recognition, authors grouped comorbid conditions categorically (n=9), in pairings (n=2), or used unweighted comorbidity counts (n=2).

Study quality varied across studies, being considered strongest in 1 studies [33], moderate in 7 studies [22, 23, 34-38], and weaker in 5 studies [29, 39-42]. We noted that studies often used acceptable tools to establish the presence of depression and measure recognition and physical comorbidity, though were frequently limited by low participation rates, not controlling for relevant confounders, and/or small sample sizes (see Table 2 in Appendix 5).

**Chronic medical comorbidity and depression recognition**

Indicators of depression recognition and results on indicators are presented in Table 1. Overall, 4 of the 13 studies provided moderate to weak evidence that a higher burden of chronic medical comorbidity was associated with a lower likelihood of depression recognition in primary care (i.e. negative comorbidity burden-recognition relationship). Two studies provided moderate evidence that higher chronic medical comorbidity burden was associated with higher likelihood of depression recognition (i.e. positive comorbidity burden-recognition relationship) whereas in the 7 remaining studies, there was moderate to weak evidence of no relationships between comorbidity burden and depression recognition were observed.
Table 1. Characteristics of studies examining chronic medical comorbidity burden and depression recognition (n=13)

<table>
<thead>
<tr>
<th>Authors, country and data collection years</th>
<th>Study design and population</th>
<th>Gold standard and assessment period(^a)</th>
<th>Criteria for recognition and data source</th>
<th>Comorbidity variable(s) and comorbidity tool used(^b)</th>
<th>Results(^c)</th>
</tr>
</thead>
</table>
| **Ani et al. [31]** United States | Cross-sectional study in 3 inner-city primary care clinics 315 mostly Hispanic and African-American adults aged 18 years and over with new diagnosis of depression | PHQ-9 ≥ 10 Depression assessment: previous 2 weeks | Diagnosis of depression in medical record at index visit Medical records | Categorical:  
(G1) DEP + No CMCs  
(G2) DEP + Mild/Moderate comorbidity  
(G3) DEP + Severe comorbidity  
Comorbidity tool: Charlson Comorbidity Index | Percentages:  
G1=30%  
G2=32%  
G3=34%  
Odds ratios (CI):  
G1=1.00  
G2=1.26 (0.66-2.45)  
G3=1.56 (0.74-3.31)  
Covariates: Sociodemographic (age, gender, ethnicity), depression (severity) and healthcare (service use) characteristics |
| **Aragones et al. [22]** Spain 2001 – 2002 | Cross-sectional study in 10 primary care centers 120 primary care patients between ages of 18 and 70 with major depression and/or dysthymia | SCID-I Depression assessment: previous month | Recognition of depression at index visit Physician self-report | Categorical:  
(G1) DEP + No/Mild comorbidity  
(G2) DEP + Moderate/Severe comorbidity  
Comorbidity tool: Duke Severity of Illness Checklist | Percentages:  
G1=74%  
G2=66%  
Odds ratios (CI)*:  
G1=1.00  
G2=0.66 (0.29-1.52)  
*Calculated by review authors |
| **Bogner et al. [34]** United States 2001 – 2003 | Cross-sectional study in 13 primary care practices 355 older primary care patients between the ages | CES-D-20 > 16 Depression assessment: previous 2 weeks | Recognition of depression at index visit Physician self-report | Comorbidity pairings:  
(G1) DEP +/- Heart attack  
(G2) DEP +/- Heart failure  
(G3) DEP +/- Angioplasty  
(G4) DEP +/- Angina  
(G5) DEP +/- Stroke | Odds ratios (CI)*:  
G1=1.60 (0.93-2.76)  
G2=2.34 (1.13-4.85)  
G3=1.50 (0.84-2.66)  
G4=1.03 (0.43-2.46)  
G5=1.37 (0.78-2.43)  
Odds ratios (CI)*:  
G1=1.24 (0.65-2.37)  
G2=2.82 (1.13-7.07)  
G3=1.41 (0.68-2.93)  
G4=1.34 (0.50-3.85)  
G5=0.89 (0.44-1.80) |
<table>
<thead>
<tr>
<th>Study</th>
<th>Data Collection Method</th>
<th>Country</th>
<th>Time Period</th>
<th>Sample Description</th>
<th>Comorbidity Assessment</th>
<th>Comorbidity Pairing</th>
<th>Covariates</th>
<th>Odds Ratios (95% CI)</th>
<th>Additional Details</th>
</tr>
</thead>
</table>
| Borowsky et al. [21] | Cross-sectional study in large and small group practices, solo practices and health maintenance organizations | United States | 1986 – 1992 | 661 adult primary care patients with subthreshold depression, current major depression, history of depression and/or dysthymia | DIS Depression assessment: previous 12 months | Any of the following reported in post-visit surveys:  
- Mental health problem identified as main reason for visit  
- Depression detected in previous 12 months  
- Mental health counseling at visit  
- Referral of patient to a mental health specialist  
Physician self-report | Comorbidity tool: None | No unadjusted results reported | Odds ratios (95% CI):  
G1=1.33 (1.10-1.61)  
G2=1.36 (1.01-1.82)  
G3=1.32 (0.94-1.83)  
Covariates:  
Sociodemographic (age, sex, education, ethnicity, income), depression (diagnosis), healthcare (physician specialty, physician remuneration) and other (health/functional status) characteristics |

of 65 and 92: 160 had clinically significant depressive symptoms according to the CES-D, 160 scored below threshold on the CES-D but were taking medications for mental health problems, sleep or pain, and 35 scored below threshold on the CES-D and were not taking medications for mental health problems, sleep or pain.
<table>
<thead>
<tr>
<th>Reference</th>
<th>Study Design and Setting</th>
<th>Depression Measure</th>
<th>Assessment Timeframe</th>
<th>Method of Depression Diagnosis</th>
<th>Comorbidity Tool</th>
<th>Odds Ratios (CI)</th>
<th>Covariates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fernandez et al. [32]</td>
<td>Cross-sectional study in primary health care centers in Spain 2005 – 2006</td>
<td>SCID-I</td>
<td>Code for depression in medical chart in previous 12 months Medical records</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ≥ 1 CMCs</td>
<td>None</td>
<td>No unadjusted results reported</td>
<td>Odds ratios (CI): G1=1.00 G2=2.41 (0.57-10.25) Covariates: Sociodemographic (age, sex, education, employment), depression (past depression, family history), healthcare (inter-clinic variation) and other (disability, primary complaint) characteristics</td>
</tr>
<tr>
<td>Kamphuis et al. [49]</td>
<td>Cohort study in 6 primary care practices in Netherlands 2003 – 2007</td>
<td>CIDI</td>
<td>Either of the following in the 6 months before and after baseline patient interview: • Code for depression • Antidepressant treatment</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ≥ 1 CMCs</td>
<td>None</td>
<td>Percentages: G1=35% G2=36% Odds ratios (CI)*: G1=1.00 G2=1.04 (0.55-1.95) *Calculated by review authors</td>
<td>No adjusted results reported</td>
</tr>
<tr>
<td>Licht-Strunk et al. [36]</td>
<td>Cohort study in 14 urban and rural primary care practices in Netherlands 2000 – 2003</td>
<td>GDS-15 &gt; 5 and PHQ-9 &gt; 5</td>
<td>Either of the following at 12-month follow-up: • Considered depressed by general practitioner • Receiving antidepressant treatment</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + 1 CMC (G3) DEP + ≥ 2 CMCs</td>
<td>None</td>
<td>Percentages: G1=40% G2=32% G3=32% Odds ratios (CI)*: G1=1.00 G2=0.69 (0.14-3.40) G3=0.70 (0.17-2.88) *Calculated by review authors</td>
<td>No adjusted results reported</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Participants</td>
<td>Depression assessment</td>
<td>Comorbidity tool</td>
<td>Categorical:</td>
<td>Percentages*:</td>
<td>Odds ratios (CI):</td>
</tr>
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</table>
| Mener et al. [37] | Cross-sectional study in 61 large or small group practices, solo practices and health and social service centres | 824 primary care patients aged 18 years and over with major depressive episode in previous year and at least one comorbid chronic physical and/or mental condition | CIDI-Simplified Depression assessment: previous 12 months | None | Either of the following in previous 12 months: • Diagnosis of depression • Receiving antidepressant treatment | G1=74% 
G2=59% 
G3=73% | G1=1.00 
G2=0.44 (0.25-0.76) 
G3=0.72 (0.42-1.22) | Sociodemographic (age, sex, employment), depression (severity), and healthcare (service use, health insurance, patient access to family doctor, clinic access to mental health professionals, availability of electronic medical records at clinic, payment model barriers) characteristics |
| Nuyen et al. [35] | Cross-sectional study in Dutch general practices | 191 primary care patients aged 18 years and over with major depression and/or dysthymia | CIDI-Auto Depression assessment: previous 12 months | None | Code for depression in the previous 12 months | G1=28% 
G2=34% 
G3=16% 
G4=37% | G1=1.00 
G2=0.55 (0.19-1.58) 
G3=0.24 (0.07-0.78) 
G4=5.32 (1.23-22.98) | Sociodemographic (age, sex, education), depression (severity), and healthcare (service use) characteristics |
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Country</th>
<th>Year</th>
<th>Population</th>
<th>Case Definition</th>
<th>Outcome</th>
<th>Analysis</th>
<th>Findings</th>
<th>Adjusted Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piek et al. [27]</td>
<td>Cohort study with 64 general practitioners</td>
<td>Netherlands</td>
<td>2004 – 2008</td>
<td>Cohort study with 64 general practitioners</td>
<td>361 primary care patients aged between 18 and 65 years</td>
<td>Major depression and/or dysthymia in previous year</td>
<td>CIDI-Short Form</td>
<td>Depression assessment: previous 12 months</td>
<td>Any of the following either 1 year before or after baseline interview: Code for depressive or other psychological problem, Antidepressant use, Referral to mental health care, Medical records</td>
</tr>
<tr>
<td>Rost et al. [33]</td>
<td>Baseline cross-sectional study from usual care arm of a randomized controlled trial in 6 primary care practices</td>
<td>United States</td>
<td>1996 – 1997</td>
<td>Baseline cross-sectional study from usual care arm of a randomized controlled trial in 6 primary care practices</td>
<td>93 untreated primary care patients aged 18 years and over with major depression</td>
<td>IDD ≥ 5</td>
<td>Depression assessment: previous 2 weeks</td>
<td>Any of the following at index visit: Provider inquired about depression, Provider diagnosed depression, Provider recommended depression treatment, Patient self-report</td>
<td>Unweighted comorbidity count (Scores ranging from 0 to 14)</td>
</tr>
<tr>
<td>Study</td>
<td>Setting</td>
<td>Participants</td>
<td>Methodology</td>
<td>Diagnosis Criteria</td>
<td>Comorbidity Tool</td>
<td>Results</td>
<td>Adjusted for</td>
<td>Notes</td>
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<tr>
<td>Tylee et al. [38] United Kingdom 1986 – 1988</td>
<td>Cross-sectional study with 36 general practitioners 72 female primary care patients aged between 16 and 65 years with major depression</td>
<td>Combined clinical interview Depression assessment: previous month General practitioner reported depressive symptoms AND one of the following (post-visit): • Arranged for follow-up visit • Prescribed antidepressant • Managed depression without drugs • Referred to another provider Physician self-report</td>
<td>Categorical: (G1) DEP + No physical illness (G2) DEP + Mild physical illness (G3) DEP + Serious physical illness Comorbidity tool: None</td>
<td>Percentages: G1=68% G2=42% G3=29% Odds ratios (CI)*: G1=1.00 G2=0.34 (0.11-1.03) G3=0.20 (0.05-0.72) Calculated by review authors</td>
<td>No adjusted results reported</td>
<td></td>
<td></td>
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<tr>
<td>Volkers et al. [39] Netherlands 2000 – 2002</td>
<td>Cross-sectional study in Dutch general practices 53 older primary care patients aged 55 years and over with major depression</td>
<td>CIDI-Auto Depression assessment: previous 12 months Code for depression or depressive symptoms in the previous 12 months Medical records</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ≥ 1 CMCs Comorbidity tool: None</td>
<td>Percentages: G1=40% G2=19% Odds ratios (CI): G1=1.00 G2=0.35 (0.05-2.39)</td>
<td>No adjusted results reported</td>
<td></td>
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</table>

*a CES-D: Center for Epidemiologic Studies Depression Scale, CIDI: Composite International Diagnostic Interview; DIS: Diagnostic Interview Schedule; IDD: Inventory to Diagnose Depression; GDS: Geriatric Depression Scale; PHQ-9: Patient Health Questionnaire for Depression; SCID-I: Structured Clinical Interview for DSM-IV disorders

*b CDS: Chronic Disease Score; CMC: Chronic medical condition; DEP: Depression

*c CI: Confidence intervals; G1, G2, etc.: Group 1, Group 2, etc.; OR: Odds Ratio
Among the studies finding a negative relationship between chronic medical comorbidity and recognition, an early study by Tylee and colleagues [39] found that women with major depression and serious physical illness were one fifth as likely to have their depression recognized by a general practitioner compared to patients with no physical illness (adjusted OR=0.20, 95% CI=0.05-0.72). Sample size in this study was small (n=72) and authors did not perform multivariate analyses nor did they report the range of CMCs considered in analyses. Rost et al. [34] used a count-based measure of comorbidity to examine the influence of competing demands from CMCs on depression recognition in 93 untreated primary care patients and found that each comorbid CMC reduced patients’ likelihood of having their depression recognized by 33% after controlling for sociodemographic characteristics, depression severity, and other characteristics (e.g. patients’ acceptability of treatment). As was the case with the study by Tylee, however, such findings were based on a relatively small sample of patients.

In a recently completed study, Menear et al. [37] examined patient self-reported recognition of depression in a larger sample of 824 primary care patients with past-year major depressive episode and comorbid chronic physical and/or psychiatric conditions. The authors found that patients with chronic physical comorbidity only (i.e. one or more CMCs with no psychiatric comorbidity) were less than half as likely to be recognized as depressed than patients with psychiatric comorbidity only (adjusted OR=0.44, 95% CI=0.25-0.76) whereas the patient group with both physical and psychiatric comorbidity did not show a difference in odds of depression recognition. Similar findings were reported by Nuyen et al. [36], who used medical records to examine the impact of chronic physical and psychiatric comorbidity on depression diagnosis rates in 191 primary care patients. These authors also found that patients with chronic physical comorbidity alone were significantly less likely to receive a depression diagnosis relative to patients with no comorbid conditions (adjusted OR=0.24, 95% CI=0.07-0.78), though patients with physical and psychiatric comorbidity were much more likely to be diagnosed as depressed (adjusted OR=5.32, 95% CI=1.23-22.98). In contrast to all the other studies on depression recognition, those by Menear and Nuyen were the only
ones to examine interactions between chronic physical and psychiatric comorbidity as opposed to assessing their effects separately. Both studies also controlled for the effects of depression severity and service use in multivariate analyses.

The two studies finding a positive relationship between chronic medical comorbidity and depression recognition were the only two studies to investigate the influence of specific comorbid CMCs. Bogner et al. [35] examined the influence of five comorbid cardiovascular diseases on the recognition of depression in 340 older (>65 years) primary care patients with clinically significant depressive symptoms. Compared to patients without heart failure, patients with comorbid heart failure were found to be almost three times more likely to be identified as depressed by primary care physicians (adjusted OR=2.82, 95% CI=1.13-7.07) after controlling for several sociodemographic characteristics, depressive symptoms, and other covariates such as cognitive status and use of services. In contrast, no relationships were found between depression recognition and the presence of comorbid myocardial infarction, angioplasty, angina, or stroke. Borowsky et al. [22] asked family physicians and internists to report whether their patients had been depressed in the past 12 months, sought care for mental health problems, received counselling, or were referred to specialized mental health services in post-visit questionnaires. Patients (n=661) had DSM-III established depressive disorders and the influence of three comorbid CMCs, i.e. hypertension, diabetes and heart disease, was assessed. In regression models (controlling for sociodemographic, depression and healthcare characteristics), authors found that patients with hypertension were more likely to have their mental health problems recognized than patients without hypertension, though similar findings were not observed in patients with comorbid diabetes or heart disease.

Seven studies reported no relationship between chronic comorbidity burden and depression recognition and two of these studies [23, 38] were the only studies in the review to use weighted comorbidity indices to measure burden of chronic medical comorbidity. Aragones et al. [23] used the Duke Severity of Illness Checklist to examine the influence physical
comorbidity on 120 primary care patients with major depression and/or dysthymia and observed no difference in depression recognition between patients with moderate/severe comorbidity (scores 51-100) and those with mild or no comorbidity (scores 0-50). Similarly, Ani and colleagues [38] used the Charlson Comorbidity Index to examine the influence of chronic medical comorbidity on depression recognition in 315 primary care patients with newly established depression based on the PHQ-9. Patients without chronic medical comorbidity (score of 0), with milder comorbidity (score of 1-2), and with more severe comorbidity (score of 3 or more) were all recognized at similar rates (≈ 30%) and no differences were observed in multivariate analyses.

Among the five other studies reporting no relationship between comorbidity burden and recognition, four [33, 40-42] relied on very basic categorical comparisons (e.g. no CMCs versus at least one CMC) to assess impact of chronic medical comorbidity and another [29] used a continuous but unweighted count measure. The study by Fernandez et al. [33] provided the only strong evidence in this group. These authors reported a 20% recognition rate across their sample of 339 patients with depression and/or dysthymia and no differences in the likelihood of recognition between those with or without at least one comorbid CMC after controlling for sociodemographic, depression, healthcare and other characteristics.

**Discussion**

This review aimed to examine the relationship between chronic medical comorbidity burden and the recognition of depression in primary care settings. Comorbid CMCs are widely believed to act as a barrier to the recognition of depression by primary care providers. This review suggests however that there is only limited empirical evidence showing that chronic physical comorbidity negatively influences recognition rates. Most studies in this review observed no significant relationships between chronic medical comorbidity burden and recognition and 2 studies provided moderate evidence for a positive influence of CMCs on recognition.
What may explain diverging results across studies? Our analysis points to several potential factors, including how the influence of chronic medical comorbidity was assessed, how depression recognition was defined and measured, and whether other influences on depression recognition were evaluated by study authors. Contrasts between studies based on other data that were extracted, such as study design or settings, population characteristics (e.g. all adults versus older adults), or methods used to establish the presence of depression (e.g. clinical interview versus rating scale), did not yield any obvious patterns of results.

Chronic medical comorbidity burden was measured and its influence assessed in different ways across studies. The number of CMCs examined varied widely among included studies but this factor did not seem to influence results. In contrast, findings seemed to vary depending on the approach used to compare patients with different burdens of chronic medical comorbidity. For instance, the two studies relying on comorbidity pairings were the only two studies to provide evidence of a positive relationship between chronic medical comorbidity and recognition. The studies by Borowsky et al. [22] and Bogner et al. [35] showed that some comorbid CMCs – but not others – increased the likelihood of depression recognition even after controlling for several confounding factors. These results are consistent with several recent studies on depression treatment [43-45] and suggest that certain comorbidities such as hypertension, heart disease or diabetes may increase providers’ propensity to recognize depression, possibly due to different prevalence rates for depression in these conditions or to the known clinical relationships existing between these conditions [43, 44].

Among the 9 studies that adopted categorical comorbidity comparisons, four relied on very basic comparisons (e.g. no comorbid CMCs versus one or more CMCs) [33, 40-42] and none of these studies reported significant associations between comorbidity burden and depression recognition. Only two studies [23, 38] used validated tools, such as the Charlson
Comorbidity Index, to help measure chronic medical comorbidity burden but neither demonstrated associations between patients’ burden and depression recognition.

Interestingly, studies by Menear et al. [37] and Nuyen et al. [36] used categorical comparisons to establish comorbidity profiles that took into consideration both patients’ chronic medical comorbidity and psychiatric comorbidity, as opposed to examining the effects of these factors separately. In both studies, the comorbidity profile with the lowest likelihood of depression recognition over a one-year period was patients suffering from chronic physical comorbidity without any psychiatric comorbidity, whereas patient groups with psychiatric comorbidity had mostly higher odds of recognition. Studies adopting very similar comorbidity profiles in the literature on depression treatment have produced similar results [37, 46], consistent with the view that a greater diversity of psychiatric symptoms facilitates provider awareness and management of depression [47, 48].

Two studies relied on continuous measures of chronic medical comorbidity, with only the study by Rost et al [34] providing moderate evidence for a negative comorbidity burden-recognition relationship. However, these continuous measures were not weighted to account for the severity of patients’ CMCs and thus were unlikely to accurately capture patients’ actual chronic medical comorbidity burden [49]. Continuous chronic disease counts are widely used and have been shown to perform well in predicting some disease outcomes (e.g. mortality), yet are weaker than measures adjusting for disease severity in predicting health care utilization [50] and may also be less appropriate for use with depression care processes.

Differences across studies may also have been due to variations in how depression recognition was defined and different levels of sensitivity and specificity of approaches used to measure this care process. Indeed, Joling et al. [51] recently showed that measures of depression recognition based solely on diagnostic codes for depression can be less accurate than those based on other indications (e.g. antidepressant prescriptions, specialist referrals).
and that measurement error is reduced when measures include multiple indications for recognition as opposed to a single type of indication. In our review, 6 studies adopted indicators capturing a single indication for recognition (e.g. diagnostic codes for depression, physician self-reported recognition), with significant comorbidity burden-recognition relationships reported in 2 studies (1 positive and one negative relationship). A slightly higher proportion of studies (4/7) reported significant comorbidity burden-recognition relationships (1 positive, 3 negative) among studies using indicators based on multiple indications of recognition. It is thus possible that in the first 6 studies, nondifferential misclassification of recognized patients as unrecognized biased some estimates of effect towards the null, though potential biases from differential misclassification cannot be ruled out in the latter 7 studies.

Depression recognition was also assessed over different time periods across studies, with 5 studies focusing on recognition outcomes occurring during a single index visit and 8 studies assessing recognition over longer time periods (e.g. several months). Three studies specifically assessed GPs’ recognition of depression in patients with new or active depressive episode, with Tylee et al. [39] and Rost et al. [34] reporting that greater chronic medical comorbidity burden was associated with lower likelihood of recognition. These studies provided early support for the view proposed by Klinkman that medical comorbidities interfere with depression recognition because they give rise to “competing demands” on GPs’ attention during primary care encounters [10]. Interestingly, the more recent study by Ani et al. [38] did not corroborate the findings of the two previous studies, possibly due to the way these authors measured depression recognition. Whereas both Tylee and Rost relied on indicators of recognition that included both the identification and active management of depression (e.g. recommending antidepressant treatment), Ani based findings only on diagnostic codes for depression. As such, their measure may have been less accurate or sensitive to differences between comorbidity groups stemming from differences in depression management.
A criticism of Klinkman’s model is that it does not explicitly account for the possibility that repeated physician-patient interactions over time [52]. It has been argued that accuracy of depression recognition improves over time as GPs have more opportunities to sift through patients’ multiple problems and ultimately address their depression [53]. Such arguments are supported by evidence linking higher service use to increased recognition of depression [29, 54, 55]. However, among the 8 studies in this review that assessed depression recognition over longer time periods, only the study by Borowsky et al. [22] reported some evidence for a positive comorbidity burden-recognition relationship. Five of the remaining 7 studies, including all 3 cohort studies, observed no differences in depression recognition between comorbidity groups. Aside from Nuyen and colleagues [36], who found a higher annual number of GP contacts in patients with comorbid CMCs, none of the other studies actually examined whether comorbidity groups differed with respect to service use, leaving open the possibility that patients with greater chronic medical comorbidity did not actually visit clinics more often and have more opportunities to discuss their depression with providers compared with patients with lesser medical comorbidity.

It is also possible that factors other than medical comorbidity have more influence on providers’ ability to recognize depression over longer time periods. Indeed, Klinkman’s model of competing demands identifies a wide range of patient, provider, and organization-system level factors that are likely to influence depression recognition [10]. Unfortunately, most studies included in this review failed to consider factors beyond the patient level. At this level, depression severity [22, 37, 38] and comorbid psychiatric disorders [29, 36] emerged as a strong predictors of depression recognition, consistent with previous studies [9, 47, 56]. Consulting specifically for mental health problems was also a strong predictor in one study [33], further highlighting how patients’ willingness to discuss emotional problems facilitates depression recognition [57].

No studies reported findings pertaining to the influence of GP characteristics, despite the fact that their communication skills, attitudes and practice styles have each been shown to
impact accurate diagnosis of psychiatric disorders [57]. Finally, only the study by Menea et al. [37] took into consideration multiple organizational characteristics, identifying several clinic characteristics associated with depression recognition. The findings of this review and of other studies [58, 59] indicate that more attention should be paid to how provider and organizational level factors may differentially impact short and long-term recognition rates in patients with different profiles of comorbid conditions.

**Directions for future research**

It remains unclear why certain CMCs or combinations of conditions may more strongly impact depression recognition and whether their influence varies over time. Longitudinal studies that closely monitor depression recognition and management of patients with new episodes of depression are needed to help tease apart differential influences of comorbidities and identify patient populations at risk for suboptimal care. Studies should ensure use of accurate measures of recognition and validated tools/indices for comorbidity. Furthermore, studies are needed that consider a broader range of influences on depression recognition, such as the nature of the patient-provider relationship and especially characteristics of the providers and organizations involved in depression care.

**Limitations**

This review used a comprehensive search strategy to identify articles addressing our research objectives. However, we only considered eligible studies that were published in English or French and as such some relevant articles published in other languages may have been missed. We also included only studies that contrasted depression recognition in patients with higher and lower burdens of chronic medical comorbidity, thus leaving out numerous studies assessing recognition rates solely in chronically ill patients. Finally, we adopted a relatively strict definition for chronic medical comorbidity, which led to the exclusion of several studies (e.g. studies by Freeling et al. [60], Pini et al. [48] and Crawford et al. [61]) that examined the influence of physical illness on depression recognition but that did not clearly specify whether conditions were chronic or acute in nature. Given that these studies
suffered from various limitations with respect to study quality (e.g. small sample sizes, poor reporting of methods, no examination of confounders) and reported similarly mixed results with respect to the effects of physical illness on depression recognition, it is unlikely that their inclusion in the review would have changed our findings.

**Conclusion**

Our results challenge the view that chronic medical comorbidity consistently leads to lower rates of depression recognition in primary care settings, finding instead that likelihood of recognition varied in part as a result of the specific conditions or combinations of conditions being investigated. Other methodological factors also seemed to play a role, such as how depression recognition was defined and measured and whether other potential influences on recognition were considered. More rigorous investigations into the relationship between chronic medical comorbidity and recognition should lead to a better understanding of the causes of these inequities as well as targeted solutions for those patients vulnerable to having their depression go undetected.

**Sources of funding and support**

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References


5.2. Article 2: Chronic physical comorbidity burden and the quality of depression treatment in primary care: a systematic review

Authors
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Paper status and Journal
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Contribution of the first author
The first author conceived and designed the review, helped design the literature search strategy, led the screening of records and performed the data extraction, led the appraisal of study quality, performed the analysis, and wrote and revised the manuscript with support from co-authors.
Abstract

Objective: We aimed to examine whether the treatment and follow-up care for depression in routine primary care differs between adults with higher chronic physical comorbidity burden compared to adults with lower chronic physical comorbidity burden and explored factors leading to divergent results across studies.

Methods: We conducted a systematic review of English and French articles using Medline, Embase, PsycINFO, CINAHL and Cochrane Controlled Trials Register from inception to July 2013. Reference list and reverse citation searches were also conducted. Search terms included depression, primary care, general practitioner, chronic disease and comorbidity. Study eligibility required inclusion of relevant quality indicators and data contrasting participants with higher and lower chronic physical comorbidity burden. Study selection and quality appraisal was carried out independently by two review authors. A narrative synthesis of results was performed.

Results: Our search yielded 5817 unique citations and 46 studies met inclusion criteria. Studies provided data on quality of pharmacotherapy (n=28), psychotherapy (n=4), combined measures of treatment quality (n=14), and follow-up care (n=9). Across studies, evidence that higher chronic physical comorbidity burden was associated with lower depression treatment or follow-up care quality was reported in 13 studies whereas evidence for the opposite relationship was reported in 15 studies. Four studies reported mixed results and 14 studies observed no relationships between comorbidity burden and depression treatment or follow-up care quality.

Conclusion: Review findings suggest that chronic physical comorbidity does not consistently lead to lower quality of depression treatment or follow-up care in primary care.

Keywords
Depression, Chronic disease, Comorbidity, Primary care, Treatment, Systematic Review
Introduction

The co-occurrence of depression and chronic disease is increasingly recognized as an important clinical and global public health issue [1, 2]. Relative to the general population, depression is two to three times more prevalent among people suffering from chronic medical (i.e. physical) conditions (CMCs) [3, 4] and is especially prevalent in older populations and among people with multiple CMCs [3, 5]. Comorbidity of depression and chronic disease is associated with high burden of illness and medical costs [4] and greater disability and functional impact than when depression or chronic diseases present alone [6-8]. Given such impacts, active treatment of depression in people with comorbid CMCs is recommended [9, 10] and has been shown to be effective [11, 12].

In primary care, patients with comorbid depression and CMCs are routinely encountered [13, 14] though management of these patients is considered challenging [15]. Chronic medical comorbidity is widely thought to negatively affect depression treatment by creating competing demands that divert time and attention away from mental health problems during clinical consultations [16, 17]. Additional challenges stem from difficulties disentangling physical symptoms of depression from those of CMCs, perceptions that depression is a normal or unavoidable consequence of chronic physical illness, or that such comorbidity can complicate treatment regimens and increase risks of adverse drug interactions [15, 18].

Some authors have argued, however, that the relationship between chronic medical comorbidity and the quality of depression treatment may not be so straightforward. Indeed, reports have found comorbid CMCs to be associated with higher treatment quality, possibly as a result of patients’ increased service use, clinicians’ practice style, or need for more aggressive treatment [19-22]. Others suggest that likelihood of receiving of high-quality depression treatment varies depending on the specific conditions affecting patients [23].
No review of this literature has been performed and it remains unclear why results may differ between studies. As such, we carried out a systematic review of the evidence on the association of chronic medical comorbidity burden and depression treatment quality in primary care and explored study characteristics leading to divergent study results.

**Methods**

This article represents part two of a larger systematic review investigating the association between chronic medical comorbidity burden and the quality of depression care in primary care. Review part one presents findings related to the recognition of depression in primary care [24] whereas here the focus is on the treatment and follow-up care for depression in these settings. Our systematic review procedures and reporting followed Centre for Reviews and Dissemination [25] and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [26] guidance. The protocol for the overall review was published in the International Prospective Register of Systematic Reviews (PROSPERO: CRD42012002595).

**Search strategy**

An experienced information specialist (LP) searched Medline, Embase, PsycINFO, CINAHL and the Cochrane Central Register of Controlled Trials from inception until July 2013 using the following search concepts: depression, primary care, general practitioner, chronic disease and comorbidity (see Appendix 1 for full Medline search strategy). To identify additional articles of interest, we searched reference lists of all included papers and conducted reverse citation searches up until March 2014. Our search was restricted to English and French language articles.

**Eligibility criteria**

The review targeted adults with clinically significant depression (e.g. major depression, dysthymia) as determined by diagnostic psychiatric interview, validated depression rating scale, medical record or medical-administrative codes, or reported by physicians. Studies that focused exclusively on adults with subthreshold depression or psychiatric distress were
ineligible. Studies also had to include depression treatment data for at least some participants with higher chronic medical comorbidity burden (e.g. patients with one or more CMCs or more severe chronic physical comorbidity) and some with lower chronic medical comorbidity (e.g. patients with no CMCs or milder chronic physical comorbidity). To guide eligibility and categorization of CMCs, we used O’Halloran and colleagues’ list of 130 non-psychological CMCs [27] representing 14 distinct disease categories: cancer, blood, digestive, eyes, ears, circulatory, musculoskeletal, neurological, respiratory, skin, metabolic/endocrine/nutritional, urinary, genital and other (e.g. tuberculosis). Studies investigating the influence of comorbid pain on depression treatment were considered eligible if pain was chronic in nature or could be attributed to any of the 130 CMCs. However, studies were ineligible if participants presented only with physical complaints or medical illnesses not identified as chronic. Also excluded were studies that did not compare participant subgroups with higher and lower comorbidity burden and studies that only compared groups with psychiatric comorbidity.

We defined quality indicators as measurable elements of practice performance for which there is evidence or consensus that they can be used to assess the quality, and hence change the quality, of care provided [28]. Indicators typically refer to the structures, processes, or outcomes of care and measure the gaps that exist between actual care and some standard [29]. In this review, we were interested in indicators for depression care processes such as pharmacotherapy, psychotherapy/counselling, or a combination of these treatment types [30]. We distinguished indicators related to the basic provision of treatment (e.g. prescription of an antidepressant) from those related to the provision of “adequate” treatment, i.e. treatment that meets certain explicit standards of quality set by best available evidence, such as from clinical practice guidelines. These standards could relate for example to appropriate dosages or durations for pharmacotherapy or an appropriate type or intensity of psychotherapy. When indicators considered both the adequacy of pharmacotherapy and psychotherapy, they were termed indicators of minimally adequate treatment [30]. When
reported separately, we also examined indicators of follow-up care quality, including follow-up continuity, promptness, and intensity (see definitions below) [31].

All study designs were eligible with the exception of qualitative studies. Randomized controlled trials (RCTs) were eligible when data on depression treatment or follow-up care were collected at baseline prior to intervention or from participants in usual care trial arms. We accepted RCTs that presented data for participants receiving an intervention only when it was judged that the intervention was unlikely to influence the specific quality indicators of interest. We excluded vignette studies, studies not published in peer-reviewed journals, letters, and studies available only as meeting abstracts. With respect to study settings, the review focused on care provided by community-based primary care providers as defined by the Institute of Medicine [32]. When studies included populations receiving care in multiple settings, only studies in which it was clearly indicated that the majority (> 50%) of participants received care in primary care were included.

**Study selection**

Two reviewers (MM, ID) independently screened titles and abstracts of all unique records using a standardized screening tool and subsequently full text copies of potentially eligible studies were screened independently by two reviewers (MM, AMC) using pre-defined criteria. Disagreements or uncertainty during screening were resolved through discussion.

**Data extraction and synthesis**

We extracted the following information from eligible studies: study authors, year of publication, study design, study setting (country, sectors of care), data collection years, data sources, participant characteristics (age, sex, race/ethnicity), methods used to establish diagnoses of depression and CMCs, use of comorbidity index or system, comorbidity groupings, depression treatment indicators, indicator sources and results on indicators. Extraction was performed by a single reviewer (MM) and verified for accuracy by another (AMC). Two reviewers (MM, PR) also independently extracted and appraised data related to
study quality. This included data on representativeness of the study sample, participation rate, assessment of confounders, approach used to establish depression diagnosis (i.e. gold standard), blinding of providers to the diagnostic status of participants as established by study authors, strength of data collection methods (for CMCs and quality indicators), and appropriateness of analyses, consistent with the domains of the Quality Assessment Tool for Quantitative Studies [25].

Heterogeneity was explored qualitatively using tables to contrast studies on four main dimensions: (1) study population demographic characteristics (age, sex), (2) study population depression characteristics (depression diagnoses, data sources), (3) study population comorbidity characteristics (CMCs assessed, comorbidity measures, data sources), (4) study characteristics (study design, study setting, indicator results reporting) [25]. There was considerable clinical and methodological heterogeneity between studies, notably in measures of comorbidity and in depression care quality indicators, and thus we performed a narrative synthesis of results. When the necessary information was available, we calculated unadjusted odds ratios to examine differences in outcomes between comorbidity groups when such findings were not explicitly reported. Interpretation of findings took results of quality appraisal into consideration.

**Results**

*Included studies*

The preliminary search yielded 5817 unique records and following screening a total of 46 studies met inclusion criteria for the review (Figure 1). Characteristics of included studies are presented in Table 1. Studies were conducted in 13 countries, with 27 (59%) studies being undertaken in the United States. Data collection covered the years between 1986 and 2009.
Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart

Records identified through database searching and other sources  
\(n = 9244\)

\[\rightarrow\]

Number of duplicates  
\(n = 3427\)

\[\rightarrow\]

Records screened  
\(n = 5817\)

\[\rightarrow\]

Records excluded  
\(n = 5362\)

\[\rightarrow\]

Full-text articles assessed for eligibility  
\(n = 455\)

\[\rightarrow\]

Full-text articles excluded  
\(n = 402\)
- Ineligible patient population \((n = 26)\)
- Absent/Ineligible quality indicators \((n = 201)\)
- Absent/Ineligible comparisons \((n = 152)\)
- Ineligible setting \((n = 6)\)
- Ineligible study type \((n = 15)\)
- Not English/French \((n = 2)\)

\[\rightarrow\]

Number of studies included in the review  
\(n = 53\)

- Depression treatment & follow care  
  \(n = 46\)
- Depression recognition  
  \(n = 13\)

\[\rightarrow\]

Focus of review part 1

Focus of this review (part 2)
<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Study design a</th>
<th>Population</th>
<th>Sample size</th>
<th>Depression criteria b</th>
<th>No. CMCs (categories) c</th>
<th>Outcomes assessed d</th>
<th>Quality assessment</th>
</tr>
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<tbody>
<tr>
<td>Akincigil et al. [51]</td>
<td>United States</td>
<td>Cohort</td>
<td>Adults</td>
<td>4312</td>
<td>ICD-9 codes</td>
<td>9 (4)</td>
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<td>United States</td>
<td>Cross-sectional</td>
<td>Adults</td>
<td>315</td>
<td>PHQ-9 ≥ 10</td>
<td>19 (9)</td>
<td>C, F</td>
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<td>120</td>
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<td>NR</td>
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<td>Adults</td>
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<td>CIDI</td>
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<td>Weak</td>
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<td>Cohort</td>
<td>Adults</td>
<td>776522</td>
<td>ICD-10 codes</td>
<td>4 (3)</td>
<td>C</td>
<td>Strong</td>
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<td>Older adults</td>
<td>340</td>
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<td>C</td>
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<td>Cross-sectional</td>
<td>Older adults</td>
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<td>Cohort</td>
<td>Adults</td>
<td>4102</td>
<td>ICD-9 codes</td>
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<td>Prime-MD</td>
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<td>M</td>
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<td>Adults</td>
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<td>Adults</td>
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<td>Database codes</td>
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<td>Methodology 2</td>
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<td>Weak</td>
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<td>M</td>
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<td>Cohort</td>
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<td>30 (10)</td>
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<td>Estimation</td>
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<td>Simon et al.</td>
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<td>Adults</td>
<td>439</td>
<td>SCID</td>
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<td>1312</td>
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<tr>
<td>Unutzer et al.</td>
<td>United States</td>
<td>RCT-B</td>
<td>Older adults</td>
<td>1797</td>
<td>SCID</td>
<td>10 (NR)</td>
<td>C</td>
<td>Strong</td>
</tr>
<tr>
<td>Unutzer et al.</td>
<td>United States</td>
<td>RCT-B</td>
<td>Older adults</td>
<td>1801</td>
<td>SCID</td>
<td>10 (NR)</td>
<td>M</td>
<td>Moderate</td>
</tr>
<tr>
<td>Wang et al.</td>
<td>Canada</td>
<td>Cross-sectional</td>
<td>Adults</td>
<td>608</td>
<td>CIDI-Short Form</td>
<td>21 (10)</td>
<td>C</td>
<td>Moderate</td>
</tr>
<tr>
<td>Wang et al.</td>
<td>United States</td>
<td>Cohort</td>
<td>Older adults</td>
<td>12130</td>
<td>Database codes</td>
<td>19 (9)</td>
<td>O</td>
<td>Strong</td>
</tr>
<tr>
<td>Watson et al.</td>
<td>United Kingdom</td>
<td>Cohort</td>
<td>Adults</td>
<td>145784</td>
<td>Database codes</td>
<td>NR</td>
<td>M</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

a RCT-B: Cross-sectional study using baseline data from a randomized controlled trial; RCT-NE: Randomized controlled trial in which intervention was judged to have no effect on quality indicators of interest; RCT-UC: Cohort study using data from usual care arm of a randomized controlled trial; RCT-UX: Cross-sectional study using data from usual care arm of a randomized controlled trial.

b CES-D: Center for Epidemiologic Studies Depression Scale, CIDI: Composite International Diagnostic Interview; DIS: Diagnostic Interview Schedule; HADS: Hospital Anxiety and Depression Scale, ICD: International Classification of Diseases, ICPC: The International Classification of Primary Care, IDD: Inventory to Diagnose Depression; PHQ-9: Patient Health Questionnaire for Depression; PRIME-MD: Primary Care Evaluation of Mental Disorders, SCID: Structured Clinical Interview for DSM-IV, UM-CIDI: University of Michigan CIDI interview, WMH-CIDI: World Mental Health CIDI interview

c NR: Not reported

d C: Indicator combining medication and psychotherapy, F: Follow-up care, M: Medication, O: Other treatment-related indicator, P: Psychotherapy
The specific number of CMCs comorbid to depression was reported in 39 studies and ranged from 1 to 30 conditions. Circulatory conditions were the most commonly examined disease category (e.g. heart disease, stroke; 37 studies), followed by endocrine/metabolic/nutritional conditions (e.g. diabetes; 33 studies) and cancer (30 studies). In the 7 studies not providing this information, it was indicated that at least some physical conditions were chronic in nature. A comorbidity index or case-mix system was used in 11 studies, the most frequent measures being the Chronic Disease Score (5 studies) and the Charlson Comorbidity Index (3 studies). To assess the association of comorbidity and the quality of depression care, authors adopted categorical groupings in 28 studies (e.g. low/mild physical comorbidity versus severe physical comorbidity), comorbidity pairings in 15 studies (e.g. depression without diabetes versus depression with diabetes), and continuous comorbidity scores in 9 studies (i.e. weighted or unweighted counts of comorbid CMCs).

With respect to indicators of depression treatment quality, 28 studies provided results related to pharmacotherapy alone, 4 provided results for psychotherapy alone, 14 included measures combining pharmacotherapy and psychotherapy quality, and 3 reported other treatment-related measures (e.g. depression management changes). Nine studies presented separate results for depression follow-up care. Performance ranges were often broad, likely due to differences between studies in populations, indicators used and other methods (see [30] for a detailed discussion). Across all studies, evidence that a higher burden of chronic medical comorbidity was associated with a lower quality of depression treatment or follow-up care (i.e. a negative comorbidity burden-treatment relationship) was observed in 13 studies. Evidence linking higher comorbidity burden to a higher quality of depression treatment or follow-up care (i.e. a positive comorbidity burden-treatment relationship) was observed in 15 studies. Mixed positive and negative results were found in 4 studies and no associations between comorbidity burden and the quality of depression treatment follow-up care were observed in 14 studies. Table 2 presents a breakdown of the quality indicators and results featured in included studies, whereas additional detailed results for each study are available in Tables 3 and 4 (see Appendix 6).
Finally, our study quality appraisal led us to consider 20 studies as providing strong evidence, 20 as providing moderate evidence, and 6 providing weak evidence (Table 1). Approaches used to establish depression, measure physical comorbidity and care quality, and analyze data were often acceptable across studies. In contrast, studies were commonly limited by low participation rates, not controlling for relevant confounders, small sample sizes, and/or incomplete reporting of methods. Additional details related to study quality are available in Table 5 (in Appendix 5).

The sections that follow present results on the associations between chronic medical comorbidity burden and depression treatment and follow-up care, organized by the type of indicator examined.
Table 2. Overview of quality indicators used in studies included in the review

<table>
<thead>
<tr>
<th>Aspect of care</th>
<th>Type of indicator</th>
<th>N studies (n strong quality)</th>
<th>All studies performance range (range strong quality)</th>
<th>Direction of association with comorbidity burden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment: Medication</td>
<td>M1 – Antidepressant treatment</td>
<td>16 (5)</td>
<td>7 – 94% (18 – 82%)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>M2 – Adequate dosage of antidepressant treatment</td>
<td>5 (0)</td>
<td>8 – 71% (NA)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>M3 – Adequate duration of antidepressant treatment</td>
<td>7 (6)</td>
<td>11 – 61% (11 – 61%)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>M4 – Adequate pharmacotherapy (adequate dosage AND/OR adequate duration AND/OR treatment follow-up)</td>
<td>7 (4)</td>
<td>10 – 60% (10 – 33%)</td>
<td>1</td>
</tr>
<tr>
<td>Treatment: Psychotherapy</td>
<td>P1 – Psychotherapy/counseling</td>
<td>1 (0)</td>
<td>24% (NA)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>P2 – Adequate psychotherapy (psychotherapy AND adequate length of visits)</td>
<td>3 (2)</td>
<td>11 – 37% (24 – 37%)</td>
<td>1</td>
</tr>
<tr>
<td>Treatment: Minimal treatment quality</td>
<td>C1 – Treatment (i.e. provision of any treatment) (antidepressant AND/OR psychotherapy)</td>
<td>8 (3)</td>
<td>7 – 87% (44 – 87%)</td>
<td>2</td>
</tr>
<tr>
<td>-------------------------------------</td>
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</tr>
<tr>
<td></td>
<td>C2 – Minimally adequate treatment (adequate pharmacotherapy AND/OR adequate psychotherapy)</td>
<td>9 (5)</td>
<td>17 – 63% (25 – 63%)</td>
<td>4</td>
</tr>
<tr>
<td>Treatment: Other</td>
<td>O – Examples: Treatment changes, potentially hazardous regimens</td>
<td>3 (1)</td>
<td>60– 88% (88%)</td>
<td>0</td>
</tr>
<tr>
<td>Follow-up care</td>
<td>F1 – Continuity with provider</td>
<td>1 (1)</td>
<td>59% (0)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>F2 – Promptness of follow-up</td>
<td>6 (4)</td>
<td>5 – 65% (5 – 65%)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>F3 – Intensity of follow-up</td>
<td>4 (4)</td>
<td>16 – 48% (16 – 48%)</td>
<td>4</td>
</tr>
</tbody>
</table>

^a Number of studies including that indicator. In parentheses is the number of studies rated as providing strong evidence.

^b Performance ranges for indicators based on whole-samples of participants with depression. Numbers in parentheses are the performance ranges for studies rated as providing strong evidence.

^c Direction of the association between chronic medical comorbidity burden and depression treatment or follow-up care quality: P = Positive, N = Negative, M = Mixed (positive and negative within the same study), NA = No association.
Basic provision of pharmacotherapy

Sixteen studies examined relationships between chronic medical comorbidity burden and the basic provision of antidepressant treatment. Overall, 4 of these studies [23, 33-35] reported some evidence that patients with higher chronic medical comorbidity burden were less likely to be provided antidepressants than patients with lower chronic medical comorbidity burden. In contrast, 5 studies [20, 36-39] found positive relationships between comorbidity burden and pharmacotherapy quality, 2 studies [22, 40] reported mixed evidence, and 5 studies [41-45] observed no significant relationships between comorbidity burden and antidepressant treatment.

One factor that seems to contribute to divergent results is the time period over which the treatment indicators could be satisfied. Three studies [23, 33, 34] measured provision of antidepressants within the 3-month acute phase of depression treatment and all 3 provided strong evidence that higher comorbidity burden was negatively associated with antidepressant provision. In contrast, 5 studies [22, 35, 38-40] specifically examined new initiation of antidepressant treatment over longer time periods ranging from 12 months to several years. Four of these studies found strong-moderate evidence that patients with comorbid CMCs were more likely to be provided treatment than patients without CMCs, though Gill et al. [22] and Jeschke et al. [40] reported additional results in the opposite direction. Gill’s study [22] in particular highlights the influence of choices surrounding observation periods, as these authors assessed patients’ antidepressant use in two populations, i.e. an “incident” patient population with new episode of depression whose antidepressant use was recorded over 12 months and a “prevalent” patient population with active diagnosis of depression whose use was assessed in a cross-sectional manner later in the study. Among their findings, they found that comorbid heart disease and stroke were associated with increased antidepressant use in the incident population but lower or similar use in the prevalent population.
Across studies on provision of antidepressants, no clear patterns emerged with respect to relationships between different approaches to measuring comorbidity (e.g. categorical groupings, comorbidity pairings, continuous measures) and the likelihood of antidepressant treatment. Ten studies [22, 23, 34, 35, 39-43, 45] assessing the influence of individual CMCs or disease types produced mixed results, with several finding that the likelihood of being provided treatment could be greater, lesser or similar depending on the specific CMCs examined [22, 23, 40].

**Adequacy of antidepressant dosages**

Five studies [35, 37, 46-48] reported data on whether patients received dosages of antidepressants that were consistent with recommended levels, though none provided high quality evidence. Both Ohayon et al [37] and Simon et al [46] conducted studies in multiple countries and examined whether depressed patients with or without at least one CMC received antidepressants at recommended doses. In unadjusted analyses, Ohayon [37] found that patients with chronic medical comorbidity were 1.6 times more likely to receive an adequate dosage of antidepressants compared to patients with depression alone. Simon [46] followed a cohort of 652 primary care patients with depression and found that patients with one or more CMCs were several times more likely to receive antidepressants at adequate dosages after controlling for factors such as depression severity, comorbid anxiety disorders and patient-reported barriers to treatment. Interestingly, these results were observed only for patient cohorts from Australia and Spain and not from Brazil or the US, opening the possibility for system-level influences on depression care quality.

Only two studies investigated the influence of specific types of CMCs on dosage adequacy, with Gill et al. [35] providing moderate evidence for a negative association between comorbidity burden and adequate dosages of antidepressants. Specifically, these authors found that patients with comorbid cerebrovascular disease had lower odds of being prescribed adequate dosages of antidepressants relative to patients without this comorbidity (adjusted OR=0.26, 95% CI=0.08-0.88). However, the same authors observed no
relationships between this indicator and comorbidity of heart disease, diabetes, cancer, heart failure or chronic obstructive pulmonary disease (COPD).

**Adequacy of antidepressant duration**

The adequacy of antidepressant treatment duration (or treatment adherence) was often assessed by calculating the total number of days a medication is possessed (based on prescriptions data) over a given period of time (i.e. the medication possession ratio). Seven studies [23, 49-54] included data related to treatment duration in different comorbidity groups, including six that provided strong evidence. We observed mixed results across the studies. Three studies examined acute phase treatment duration in US veterans with newly initiated depression treatment. Jones et al. [49] examined whether the number of comorbid CMCs or diabetes comorbidity influenced whether mostly female veterans received antidepressants covering 80% of the 3-month acute phase period and found that adequate treatment duration was predicted by the unweighted count of CMCs (adjusted OR=1.09, 95% CI=1.01-1.18) but not diabetes comorbidity (adjusted OR=1.01, 95% CI=0.73-1.39). Pirraglia et al. [50] used the same quality indicator and found that mostly male veterans with comorbid COPD, but not comorbid heart disease, diabetes or osteoarthritis, were less likely to receive an adequate duration of treatment (adjusted OR=0.62, 95% CI=0.44-0.87). Jordan et al. [52] assessed depression treatment duration adequacy in mostly male veterans with either depression-COPD comorbidity or trios of CMCs (e.g. depression, COPD and diabetes) and observed no significant differences between comorbidity groups with respect to antidepressant duration adequacy over a 4-month period. All three studies controlled for a range of covariates in analyses. In addition to these studies, 3 other studies [51, 53, 54] examined acute-phase antidepressant treatment duration, reporting mixed results. Treatment duration adequacy in the maintenance phase of treatment was examined in 4 studies, with 3 studies [23, 51, 54] providing strong evidence of no differences between comorbidity groups on duration adequacy over periods of 6 or 8 months after treatment initiation.


**Adequacy of pharmacotherapy**

Seven studies [20, 48, 52, 55-58] reported on findings related to adequate pharmacotherapy, which was defined in several ways. Two high quality studies used measures that combined antidepressant use with treatment follow-up intensity (e.g. a minimum number of visits over a given time period), with Kurdyak et al. [20] reporting a positive relationship between chronic medical comorbidity and treatment adequacy and Jordan et al. [52] observing no such relationship. The significantly higher levels of general and mental health service use observed in patients with comorbid CMCs relative to patients with no CMCs may explain the findings reported by Kurdyak. The remaining 5 studies defined minimally adequate pharmacotherapy as the combination of measures of antidepressant dosing and duration (all based on 6-month observation periods) and 4 of these studies [48, 55, 56, 58] observed no differences between comorbidity groups on pharmacotherapy adequacy. In unadjusted analyses, Simon et al. [57] provided weak evidence that fewer patients with comorbid heart disease received adequate treatment compared with patients without heart disease, though rates of treatment adequacy were similar between patients with comorbid diabetes or COPD and patients without these conditions.

**Provision of psychotherapy**

Only one study provided weak evidence on the relationship between chronic medical comorbidity burden and the basic provision of psychotherapy. Koiike and colleagues [36] followed primary care patients with and without comorbid CMCs over two successive 6-month periods and found that both groups received counselling from mental health specialists at similar (adjusted) rates.

**Adequacy of psychotherapy**

Three studies [58-60] reported measures of adequate psychotherapy, finding mixed results. Two high quality studies used data from the Canadian Community Health Survey and had similar designs and populations, psychotherapy indicators and comorbidity measures. Both Duhoux et al. [60] and Starkes et al. [59] found that higher numbers of CMCs were associated
with a higher likelihood of receiving adequate psychotherapy, defined as 4 or more visits to a professional for mental health reasons, though only Duhoux’s results remained significant after controlling for covariates. In one of the few studies examining the influence of interactions between chronic medical and psychiatric comorbidity, Ettner et al. [58] divided patients into four comorbidity groups: patients with no comorbidity, psychiatric comorbidity only, chronic medical comorbidity only, and both psychiatric and chronic medical comorbidity. They found that patients with chronic medical comorbidity only were the group with the lowest likelihood of receiving adequate psychotherapy, defined as receiving six or more psychotherapy sessions in the first 6 months after depression diagnosis. No studies to date have examined relationships between individual CMCs and psychotherapy quality.

**Provision of any depression treatment**

Eight studies [17, 19, 23, 36, 61-65] examined whether patients were provided either antidepressants or psychotherapy over a given time period. Three of these studies were considered of highest quality, including two [62, 63] that observed a positive relationship between chronic medical comorbidity burden and treatment provision and one [23] that observed a negative association.

The studies by Lagomasino and Unutzer finding a positive association both relied on baseline data from randomized controlled trials but differed with respect to populations (all adults versus older adults) and comorbidity and treatment quality measures. For their part, Nuyen et al [23] followed a cohort of 991 patients with new episode of depression and found that patients with comorbid arrhythmia (adjusted OR=0.17, 95% CI=0.07-0.42) and heart disease (adjusted OR=0.35, 95% CI=1.16-0.80) were significantly less likely to initiate depression treatment within the first 4 weeks after their diagnosis than patients without these CMCs. In all three studies, multivariate analyses were performed that controlled for confounders such as depression severity or comorbid anxiety, though none controlled for potential differences in service use across comorbidity groups or for factors beyond the individual patient level.
**Minimally adequate depression treatment**

Nine studies [17, 19, 58, 60, 62, 63, 66-69] reported data on minimal treatment adequacy (e.g. receipt of adequate pharmacotherapy and/or adequate psychotherapy over a given time period). Five studies were considered high quality [60, 62, 63, 67, 68] and all 5 provided at least some evidence that greater chronic medical comorbidity burden was associated with the provision of minimally adequate depression treatment. For example, Duhoux et al [60] reported that primary care patients with three or more CMCs were more than 3 times more likely to report antidepressants with at least 4 follow-up visits and/or at least 12 visits for psychotherapy in the previous year compared to patients without CMCs (adjusted OR=3.11, 95% CI=1.36-7.09). Similar results were obtained by Lagomasino and colleagues using another indicator of minimal treatment adequacy [63]. Only one of the five studies was a cohort study relying on data from electronic medical records. In their study, Boenisch and colleagues [68] examined minimal treatment quality over a three-month period in a cohort of over 750,000 adults with depressive episode. They found that adults with comorbid diabetes, cerebrovascular disease and heart disease had significantly higher rates of minimally adequate treatment compared to adults without these CMCs. However, the rate or likelihood of receiving minimally adequate treatment was lower in adults with cancer comorbidity (p < 0.001) or those categorized as having one or more CMCs (adjusted OR=0.97, 95% CI=0.96-0.98).

**Other indicators**

Three studies reported data for other treatment-related indicators, notably appropriate depression management or management changes [47, 70] and receipt of potentially hazardous treatment regimens [71]. Only Wang and colleagues [71] observed a significant influence of chronic medical comorbidity on their indicator, finding that older adults’ likelihood of receiving a potentially hazardous treatment regimen (highly anticholinergic antidepressant and/or antidepressant dose above the upper limits of dosage) was lower when adults had a higher number of CMCs but higher when they suffered specifically from cancer (Table 3).
**Adequacy of follow-up care**

Nine studies reported separate measures for depression follow-up care quality, including 1 study [31] examining provider continuity during follow-up (e.g. 50% of visits with the same provider over a given time period), 6 studies [23, 31, 34, 49, 65, 72] assessing promptness of follow-up (e.g. next contact with provider occurring shortly after diagnosis), and 5 studies [31, 49, 52, 66, 73] measuring adequate follow-up care intensity (e.g. attaining a defined number of visits during the acute phase of treatment) (Table 4). All but 1 study [72] constructed their follow-up care indicators using medical record or medical-administrative database data.

In the sole study reporting data on continuity of follow-up care, Houle et al. [31] found that adults with new episode of depressive disorder and a high level of medical comorbidity were no more likely to have adequate follow-up care continuity over 3 months than adults with low to moderate levels of medical comorbidity. With respect to promptness of follow-up, 4 studies [23, 31, 34, 65] examined contacts with providers within the first 4 weeks following diagnosis and all four reported lower likelihood of follow-up among patients with greater chronic medical comorbidity (defined differently across the studies), though this result did not reach significance in Ani et al. [65] (adjusted OR=0.29, 95% CI=0.06-1.49). In contrast, Jones et al. [49] found veterans receiving care in the Veterans Health Administration with higher numbers of CMCs were more likely to receive follow-up care within 14 days of antidepressant initiation (adjusted OR=1.08, 95C% CI=1.01-1.15) after controlling for covariates such as depression diagnosis and history, psychiatric comorbidities, and clinical location of diagnosis. Katon et al. [72] examined follow-up within 3 and 6 weeks but found no relationships between Chronic Disease Scores and adequate promptness. Finally, 4 out of 5 studies assessing whether patients received 3 or more contacts with providers, usually within the first three months after treatment initiation, provided strong evidence that greater chronic medical comorbidity was positively associated with treatment intensity. The fifth study [66] calculated the total number of follow-up visits within 6 months after an index
data and provided moderate evidence that an unweighted comorbidity count did predict follow-up care intensity.

**Discussion**

This systematic review identified 46 studies that examined relationships between chronic medical comorbidity burden and the quality of depression treatment and follow-up care delivered in routine primary care. While such comorbidity is commonly perceived to impede the delivery of high-quality depression treatment, the overall evidence does not fully support this view. Rather, depression treatment and follow-up care quality seems to vary depending on the specific CMCs or combination of CMCs examined by authors. Methodological factors, such as how chronic physical comorbidity burden and quality of care were defined, also seem to contribute to divergent results within and across studies.

While many explanations have been offered regarding the negative or positive influence of comorbid CMCs on treatment quality, we agree with Nuyen [23] that these hypotheses are not necessarily mutually exclusive. For instance, several authors have espoused the “competing demands” hypothesis arguing that depression competes unsuccessfully for time and attention during consultations when patients present with multiple health problems [16, 17]. However, this does not imply that patients’ depression cannot be addressed over time once it is finally recognized as a priority or problems related to comorbid physical conditions have been managed [20]. Such a view is generally consistent with findings of this review. Indeed, among studies examining the basic provision of antidepressants to patients with newly identified depression, the three that evaluated treatment provision during the acute phase observed negative comorbidity burden-treatment relationships while four of five studies investigating treatment provision over longer time periods reported positive comorbidity burden-treatment relationships.

However, several studies controlling for a range of covariates including service use also showed that individual CMCs can be positively, negatively or not associated with treatment
quality over long observation periods. Our analysis of the influence of specific CMCs within and across different quality indicators revealed no consistent patterns and even mixed results within specific disease categories (e.g. cardiovascular conditions). This heterogeneity may be due to several factors. For instance, as noted by Simon [57], a focus on pairs of conditions ignores other comorbid CMCs that may accompany these pairs and potentially impact depression management. Divergent results may also stem from ambiguities around the specific conditions actually being considered in studies due to different levels of disease abstraction, such as when authors investigate “heart disease” or further divide this into heart disease and heart failure or arrhythmia. This latter challenge has been recognized elsewhere [74, 75] and highlights a need for greater consensus around appropriate comorbidity measures. Thus, although differential impacts of specific CMCs on depression quality outcomes seem likely, the mechanisms of how different pairings affect depression decision-making and management remain to be elucidated. Conducting such work is important given some evidence of lower quality treatment delivered to individuals suffering from serious conditions such as cancer [40, 71] and heart disease [22, 57], even over longer treatment periods.

As was the case for individual CMCs, no clear patterns of findings emerged across studies with respect to different categorical or continuous measures of chronic medical comorbidity. Surprisingly, results were equally mixed among studies using a recognized comorbidity index or case-mix system to measure medical comorbidity. Fewer than a quarter of studies made use of such indices or systems, which allow disease severity to be taken into account in analyses and which are known to better predict a range of outcomes than unweighted disease counts [76]. In this review, however, no single index or system best predicted treatment quality or could be considered appropriate for all study types.

Overall, detecting patterns in results across studies was challenging due to wide variations in study populations, data sources used, and selected measures. Methodological variations clearly contributed to the divergent results observed across studies. This was illustrated well
in the study by Fernandez et al. [67], who (1) compared data related to minimal treatment adequacy collected either through patient self-reports or GPs’ clinical charts and (2) examined this data in patients whose depression was established either by diagnostic interview or by the treating physician. These authors found that the presence of at least one comorbid CMC was significantly associated with receipt of minimally adequate depression treatment, but only when treatment quality data was reported by patients and only for patients whose depression was established by their GP. In a similar vein, studies examining different definitions for chronic medical comorbidity burden [19, 23, 68] showed that results can vary significantly based on how this concept is defined and measured.

Studies also made use of a broad range of quality indicators and even for certain indicator types (e.g. adequate pharmacotherapy) there existed a diversity of definitions. Studies examining multiple definitions of an indicator [38, 51, 60] revealed that different definitions could give rise to different results. Interestingly, while more than half of studies derived indicators from clinical practice guidelines, few measures were validated and many lacked in sophistication. This was most notable for measures of psychotherapy quality, which often focused solely on the number of sessions patients’ attended and not the content of these sessions. In the context of care for patients with depression and comorbid CMCs, such treatment indicators that depend on patients’ satisfying a minimal number of clinical visits may have less value given strong associations between comorbidity levels and service use [3, 4]. Some authors [30] have advocated for the development of stronger measures of psychotherapy quality given depressed patients’ preferences for this type of treatment and the challenges they sometimes face due to polypharmacy [9, 77].

**Directions for future research**

Our review highlights several areas for future research. First, no study in this review closely monitored the quality of treatment received by patients with newly identified depression across both the acute and maintenance phases of treatment. Rigorous longitudinal studies are needed to determine whether depression treatment and follow-up care quality varies
over time and authors should explore why different conditions or combinations of conditions may more strongly influence quality than others, possibly through qualitative approaches. Second, well-conducted studies are needed to shed more light on the relationship between chronic medical comorbidity burden and several areas of treatment quality, including the adequacy of antidepressant dosing, psychotherapy quality, and the quality of depression follow-up care. Investigations into other relevant areas of care quality would also be welcome, such as access to care, overall continuity and comprehensiveness of care, safety of care, and patient involvement in care. Finally, the vast majority of studies in this review failed to consider how comorbidity-quality relationships were influenced by factors beyond the individual patient-level. As Klinkman has suggested [16] and others have shown [21, 34, 60, 69], clinician, organization and broader influences can influence the quality of depression care delivered to patients with different comorbidity profiles. More research on these interrelationships is needed to better understand how to ensure the delivery of both high quality and equitable mental health services in primary care.

Limitations

Our search strategy aimed to be comprehensive but we were unable to include search terms for specific CMCs due to the large number of citations retrieved when this strategy was employed. It is thus possible that some studies examining treatment or follow-up care quality in patients with specific chronic diseases were missed. We also adopted a relatively strict definition for chronic medical comorbidity that led us to exclude studies examining the influence of non-chronic physical illness or physical symptoms on depression treatment quality. In primary care, many patients present with ill-defined constellations of symptoms and complaints causing distress and such clinical presentations have also been shown to influence the quality of depression care [78, 79].

Conclusion

Providing high-quality treatment to people with depression in the context of co-existing chronic diseases is widely considered a challenge. Yet, this review suggests that patients with
higher chronic medical comorbidity burden do not consistently receive a lesser quality of depression treatment relative to patients with lower burden of chronic medical comorbidity in routine primary care services. Instead, treatment and follow-up care quality seems to vary as a function of the conditions or combination of conditions investigated as well as other methodological considerations. Additional efforts are needed to improve understanding of disparities in depression care provided to primary care patients with different types and burdens of chronic medical comorbidity so that targeted strategies can be developed to improve primary mental health care services.

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40. Jeschke, E., et al., Depression, Comorbidities, and Prescriptions of Antidepressants in a German Network of GPs and Specialists with Subspecialisation in Anthroposophic Medicine: A
5.3. Article 3: Primary care practice characteristics associated with the quality of care received by patients with depression and comorbid chronic conditions

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Contribution of the first author
The Project Dialogue was conceived and designed by Louise Fournier in collaboration with the Dialogue research team. The design of Project Dialogue and collection of contextual, organizational and patient survey data had been completed before the first author began his study. The first author conceived of the current study using data from the organizational and patient surveys, prepared the data and created all relevant variables, performed the analysis, and wrote and revised the manuscript with support from co-authors.
Abstract

Objective: This study aimed to identify primary care practice characteristics associated with the quality of depression care in patients with comorbid chronic medical and/or psychiatric conditions.

Method: Using data from cross-sectional organizational and patient surveys conducted within 61 primary care clinics in Quebec, Canada, the relationships between primary care practice characteristics, comorbidity profile, and the recognition and minimally adequate treatment of depression were assessed using multilevel logistic regression analysis with 824 adults with past-year depression and comorbid chronic conditions.

Results: Likelihood of depression recognition was higher in clinics where accessibility of mental health professionals was not viewed to be a major barrier to depression care (OR=1.61; 95% CI 1.13-2.30). Four practice characteristics were associated with minimal treatment adequacy: greater use of treatment algorithms for depression (OR=1.77; 95% CI=1.18-2.65), high value given to teamwork (OR=2.48; 95% CI=1.40-4.38), having at least one GP at the clinic devote significant time in practice to mental health (OR=1.54; 95% CI=1.07-2.21), and low perceived barriers to depression care due to inadequate payment models (OR=2.12; 95% CI=1.30-3.46).

Conclusions: Several primary care practice characteristics significantly influence the quality of care provided to patients with depression and comorbid chronic conditions and should be targeted in quality improvement efforts.

Keywords
Primary care, Depression, Comorbidity, Quality of health care, Organizational factors
Introduction

Depression is a common and chronic mental disorder that is recognized and treated primarily in primary care settings [1, 2]. The disorder affects approximately 5% to 10% of patients in primary care [3], though it frequently presents with a wide range of other chronic medical or psychiatric conditions [3, 4]. Indeed, depression is known to be an independent risk factor for the development of other chronic conditions and can also develop in consequence to patients’ pre-existing chronic illnesses [5]. When depression co-occurs with other chronic conditions, it results in greater disability and reduction in health than when depression or other chronic conditions occur alone [3, 6].

Numerous studies show that the quality of depression care is suboptimal in primary care [7] and recently efforts have been made to understand what influence comorbid chronic conditions may have on the recognition and treatment of depression. A widely held view is that comorbid chronic conditions impede these depression care processes in various ways. For instance, comorbid conditions can complicate the presentation of depression and lead to lengthy differential diagnosis processes [8, 9]. Patients’ other chronic conditions may compete for time and attention during medical visits and limit opportunities to address patients’ depression [10, 11]. Furthermore, physicians may be wary of prescribing antidepressant medication to patients already taking multiple medications for other chronic conditions or may avoid treating depression if they regard it as a normal consequence of having a chronic disease [12]. In contrast, some authors have argued that greater comorbidity should lead to depression being recognized and treated more frequently given that patients will be more frequent users of health services, thus offering providers more occasions to address their depression [13]. Still others have provided evidence supporting a more nuanced relationship in which the likelihood of recognition and treatment varies depending on the particular combination of comorbid medical or psychiatric conditions investigated [14-16].
While the precise relationship between chronic conditions and depression care quality remains to be clarified, primary care providers frequently experience major challenges managing patients with comorbid conditions relative to those suffering from depression alone [17-19]. As such, it is critical to identify factors associated with high-quality depression care in patients with chronic conditions as an important step towards more targeted quality improvement efforts. Recently, the role that organizational factors play in care provided for depression [20-24] and other chronic conditions [23-26] has received growing attention. In Canada as in other jurisdictions, primary mental health care services are delivered in an increasingly wide variety of organizational settings given recent primary care reforms and the introduction of new group-based models of care delivery [27]. Yet, little is known about the specific features of care settings that may support high-quality care for depressed patients with different comorbid conditions. The objective of the present study was thus to examine which characteristics of primary care practices were associated with the recognition and minimally adequate treatment of depression in patients with different profiles of comorbid chronic conditions.

**Methods**

**Study Design**

Our study used data from two interrelated surveys from the project “Dialogue”, conducted in 15 Health and Social Service Centre (HSSC) territories in Quebec, Canada [28]. A first organizational survey aimed to describe the characteristics of primary care clinics in each of the study territories. Surveys were mailed to 285 clinics between 11/2007 and 06/2008, with 76 clinics completing the cross-sectional survey. Within 64 of these clinics, a second survey was conducted on the care experiences of a cohort of primary care patients with depressive and anxiety disorders. Between 03/2008 and 08/2008, patients were screened in the clinics’ waiting room by trained research assistants and eligible respondents were invited to complete three telephone/web-based interviews conducted at six-month intervals. Data for the current study were drawn from the organizational survey, the waiting room screening questionnaire, and the first telephone/web-based interview. The Ethics Committee for
Health Research at the University of Montreal, as well as the ethics committees of all local and regional authorities involved in the Dialogue project [29], approved all study procedures.

**Study Population**

Primary care clinics were considered eligible for the organizational and patient surveys if they featured at least one general practitioner (GP) that offered general medical services to undifferentiated adults. The organizational survey targeted a range of clinic types, including local community health centres, family medicine groups, larger (≥ 6 GPs) and smaller (2-5 GPs) medical clinics, and solo practices. It was based on a previously validated Organizational Questionnaire [30, 31] and adapted to capture information on clinics’ structures, resources, philosophy and values, and practices in both general care and mental health care. The survey consisted of 53 questions, which were completed by the respondent(s) most knowledgeable about the clinic’s organization and functioning, most often the head physician at the clinic.

For the patient survey, French and English speaking adults (≥ 18 years) reporting to research assistants that they were seeking care for themselves from a GP, regardless of the motive of consultation, were invited to participate in the study. Of the 22600 eligible patients, 14833 (67.4%) completed the self-administered screening questionnaire (Time 0). Two to four weeks later, 7522 patients were invited to participate in a two-part follow-up interview by telephone or Internet (Time 1). Patients were eligible if they reported: (1) their usual care source was a clinic participating in the study and (2) elevated anxiety and/or depressive symptoms (score of ≥ 8 on the depression or anxiety subscales of the Hospital Anxiety and Depression Scale – HADS [32]), or (3) taking anxiety and/or depression medication, or (4) a diagnosis for a depressive and/or anxiety disorder made by a healthcare professional, or (5) consulting for mental health problems in the past 12 months. A total of 3382 (45.0%) patients completed part one of the interview, the Composite International Diagnostic Interview Simplified (CIDIS), a structured psychiatric assessment based on DSM-IV criteria [33]. Neither patients nor their physicians were informed of the results of the CIDIS, though patients presenting a risk of suicide had their level of risk evaluated and were informed of
services in their region that could assist them. Part two of the interview was conducted with the 1956 patients meeting criteria for entry into the final cohort: (1) a major depressive episode (MDE), generalized anxiety disorder, agoraphobia, social phobia or panic disorder in the past 12 months according to the CIDIS, or (2) high levels of anxiety or depression symptoms combined with medication, diagnosis by a healthcare professional, or DSM-IV criteria for anxiety or depression in the past 24 months. The final sample included 824 patients with past-year MDE and comorbid chronic conditions that were nested within 61 clinics. These patients provided data related to their health (symptoms, diagnoses, disabilities), service use, and treatments received.

**Measures**

*Dependent Variables: Depression Recognition and Minimal Treatment Adequacy*

We defined depression recognition as patient-reported diagnosis of depression from a healthcare professional or use of an antidepressant medication, with either occurring in the previous 12 months.

We defined minimally adequate depression treatment as patient-reported use of an antidepressant medication with 4 or more visits with the prescribing physician in the previous year (minimally adequate pharmacotherapy), and/or receipt of guideline-recommended psychotherapy with 12 or more consultations for mental health reasons in the previous year (minimally adequate psychotherapy). For minimally adequate psychotherapy, cognitive-behavioral therapy and interpersonal therapy were considered guideline-recommended therapies and were defined for patients during interviews. Furthermore, the criterion of 12 visits is considered by guidelines to be the minimum number required for a full course of psychotherapy. Quality indicators were derived from Canadian clinical practice guidelines for depression [34, 35] and previous studies [7, 29]. Two alternative indicators of minimally adequate treatment were also examined for sensitivity analyses, including an indicator based on only 3 or more visits to follow-up on medication and another that
considered psychotherapy as adequate if patients received any type of psychotherapy along with 12 or more mental health visits.

**Independent Variables: Practice- and Patient-Level Characteristics**

Based on previous studies, we identified 16 primary care practice characteristics that were expected to facilitate high-quality care by promoting access to and use of knowledge around depression care [20, 21, 24, 25, 29, 30, 36]. We also examined the influence of three perceived barriers to depression care [20, 29]. The 16 enabling characteristics were grouped into four conceptual domains, i.e. strategic, social, informational, and epistemic characteristics [39]. Strategic characteristics referred to specific strategies that could be adopted by clinics to improve knowledge and quality around depression care and included adopting disease management programs for depression, allotting more time to initial visits for depression, and encouraging use of clinical guidelines and treatment algorithms for depression. Social characteristics referred to social relationships and teamwork in clinics and included the importance given to teamwork by clinic physicians, access to mental health professionals when engaged in depression care, and the extent to which GPs shared clinical duties and were involved in clinic management. Informational characteristics related to the information technologies available at clinics, including access to Internet, electronic medical record (EMR) systems, web-based systems to access patient lab results, and access to external technical platforms. Epistemic characteristics were those likely to support access to and exchange of diverse knowledge around depression care, including formal case discussions around depression care, having access to GPs that devote significant time to mental health, and having psychiatrists and psychologists present on-site at clinics. Finally, we considered clinics’ ratings of the degree to which three well-known barriers limited delivery of optimal depression care, namely patients’ other urgent medical problems, lack of time for follow-up care, and inadequate payment models.

At a patient-level, we considered the following characteristics: age, sex, education, marital status, employment status, perception of economic situation, access to a regular family
physician, access to supplementary private health insurance, severity of depression based on the HADS, history of depression, and comorbidity profile.

Consistent with previous studies [15, 16], we categorized patients into one of three comorbidity profiles: (1) psychiatric comorbidity only, (2) medical comorbidity only, and (3) both psychiatric and medical comorbidity. We collected information on patients’ chronic medical conditions in the screening questionnaire using a list of 17 conditions drawn a from Canadian Community Health Survey [40]. Psychiatric comorbidities were determined using the CIDIS interview or were self-reported during screening (e.g. eating disorders). Patients could also report chronic conditions not listed in the screening questionnaire and those meeting previously established criteria for chronicity [41] were included in analyses.

**Analyses**

We carried out descriptive analyses of primary care practice and patient characteristics and examined overall rates of depression recognition and minimal treatment adequacy. Given the hierarchical nature of the data (patients nested within primary care clinics), we used multilevel logistic regression analyses with random intercepts to examine practice- and patient-level factors associated with depression recognition and minimally adequate treatment. We built our multilevel models following the stepped approach adopted by Haggerty and colleagues [42]. As a first step, we fitted empty models with a primary care clinic random effect but no predictor variables and examined the amount of total variation in each outcome attributable to each level of predictors. Next, we used stepwise regression to identify the strongest level 2 predictors (practice characteristics) within each of our conceptual domains, and then added blocks of variables successively into the model in the following order: strategic, social, informational and epistemic characteristics followed by depression care barriers. We entered practice characteristics into the model first given our primary interest in the effect estimates at this level. In the final, fully adjusted models, level 1 variables (patient characteristics) were added in a stepwise fashion. Variables with p-
values of < 0.10 were retained for the adjusted models, with p’s < 0.05 in the final models indicating statistical significance.

Variables relating to the number of primary care visits and depression severity were grand mean centered. All multivariate models controlled for patient sex, regardless of its p-value. Variance inflation factors were less than three for all variables, suggesting an absence of multicollinearity.

In a final step, we calculated predicted probabilities related to depression recognition and minimal treatment adequacy for three virtual patients having different comorbidity profiles as a function of practice characteristics using estimates from the fully adjusted multilevel models [29]. Virtual Patient A represents a typical patient with psychiatric comorbidity only, Patient B a patient with chronic medical comorbidity only, and Patient C a patient with both types of comorbidity. Other patient characteristics were set at mean levels for each comorbidity group. The three virtual patients receive care from two virtual clinics: Clinic A (“high enabling” clinic), which features attributes associated with increased odds of depression recognition or minimal treatment adequacy, and Clinic B (“low enabling” clinic), which does not have those characteristics. All analyses were performed using STATA 11.2 software.

**Results**

**Practice and Patient Characteristics**

Of the 61 study clinics, 18 were local community health centres, 13 were family medicine groups, 9 were large medical clinics, 13 were small medical clinics, and 8 were solo practices. Practice characteristics thought to influence depression care are presented in Table 1.

Characteristics of the 824 patients with past-year MDE and comorbid chronic conditions are presented in Table 2. More than 75% were female and the mean age was 44 years. With respect to comorbidity profile, 113 (13.7%) patients had MDE with psychiatric comorbidity
only, 298 (36.2%) had chronic medical comorbidity only, and 413 (50.1%) had both types of comorbidity. The majority of patients (61.4%) had experienced an episode of anxiety disorder in the previous year and 9.8% reported being diagnosed with other psychiatric conditions. Among patients with medical comorbidity, 29.0% had one chronic condition, 25.6% had two conditions, and 45.4% had three or more conditions.

**Depression Recognition and Minimal Treatment Adequacy**

Overall, 68.1% of patients were recognized as depressed, with 50.9% reporting having received a diagnosis of depression. With respect to treatment adequacy, 25.6% of patients were considered to have received minimally adequate pharmacotherapy only, 9.2% received minimally adequate psychotherapy only, and 14.9% received both. Altogether, 49.8% of patients received minimally adequate treatment for their depression. Use of alternative criteria to define minimal treatment adequacy did not lead to substantial changes in rates (55.6% when medication follow-up is reduced to 3 or more visits, 51.2% when not requiring psychotherapy to be guideline-recommended).

**Factors Associated with Depression Recognition**

Results from the multilevel analysis of practice- and patient-level characteristics associated with depression recognition are presented in Table 3. Fitting the empty model revealed that between-clinic variability was not significant (p>0.05), with 1% of the variance being at the level of clinics. Multilevel analyses identified one clinic-level factor associated with depression recognition, namely limits to depression care stemming from accessibility of mental health professionals. Specifically, when clinics reported lesser limits due to the accessibility of mental health professionals, patients were 1.61 times more likely to report that their depression was recognized. Two other practice characteristics met criteria for entry into the multilevel model, the availability of an EMR system and depression care barriers due to inadequate payment models, but neither remained significant after entry of patient characteristics.
Table 1. Primary care practice characteristics (N=61)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Clinic has a disease management program and follow-up services for depressive disorders</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>27 (44.3)</td>
</tr>
<tr>
<td>Yes</td>
<td>34 (55.7)</td>
</tr>
<tr>
<td>Length of time dedicated for initial consultation of patients with depressive or anxiety disorders</td>
<td></td>
</tr>
<tr>
<td>Less than 30 minutes</td>
<td>8 (13.1)</td>
</tr>
<tr>
<td>30 minutes or more</td>
<td>53 (86.9)</td>
</tr>
<tr>
<td>Number of GPs using manuals and/or clinical practice guidelines in practice for depression or anxiety disorders</td>
<td></td>
</tr>
<tr>
<td>Some / None</td>
<td>30 (49.2)</td>
</tr>
<tr>
<td>All / Most</td>
<td>31 (50.8)</td>
</tr>
<tr>
<td>Number of GPs using treatment algorithms with patients suffering from depression or anxiety disorders</td>
<td></td>
</tr>
<tr>
<td>Some / None</td>
<td>40 (65.6)</td>
</tr>
<tr>
<td>All / Most</td>
<td>21 (34.4)</td>
</tr>
<tr>
<td><strong>Social characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Importance given to GPs at the clinic working as a team</td>
<td></td>
</tr>
<tr>
<td>Lower / Solo provider</td>
<td>13 (21.3)</td>
</tr>
<tr>
<td>Higher</td>
<td>48 (78.7)</td>
</tr>
<tr>
<td>Accessibility of mental health professionals limits optimal care for patients with depressive and anxiety disorders</td>
<td></td>
</tr>
<tr>
<td>Highly</td>
<td>32 (52.5)</td>
</tr>
<tr>
<td>Fairly / Slightly / Not at all</td>
<td>29 (47.5)</td>
</tr>
<tr>
<td>GPs at the clinic share clinical duties (e.g. coverage of walk-in periods, patient follow-up, replacement for an absent physician)</td>
<td></td>
</tr>
<tr>
<td>Low sharing / Solo provider</td>
<td>17 (27.9)</td>
</tr>
<tr>
<td>Moderate sharing</td>
<td>33 (54.1)</td>
</tr>
<tr>
<td>High sharing</td>
<td>11 (18.0)</td>
</tr>
<tr>
<td>Involvement of GPs in medical-administrative management of the clinic</td>
<td></td>
</tr>
<tr>
<td>Low involvement / Solo provider</td>
<td>15 (24.6)</td>
</tr>
<tr>
<td>Moderate involvement</td>
<td>15 (24.6)</td>
</tr>
<tr>
<td>High involvement</td>
<td>31 (50.8)</td>
</tr>
<tr>
<td><strong>Informational characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Clinic provides GPs with access to internet</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>10 (16.4)</td>
</tr>
<tr>
<td>Yes</td>
<td>51 (83.6)</td>
</tr>
<tr>
<td>Clinic has electronic medical records system</td>
<td>53 (86.9)</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>No</td>
<td>53 (86.9)</td>
</tr>
<tr>
<td>Yes</td>
<td>8 (13.1)</td>
</tr>
<tr>
<td>Clinic has web-based system to transmit patient results</td>
<td>32 (52.5)</td>
</tr>
<tr>
<td>No</td>
<td>32 (52.5)</td>
</tr>
<tr>
<td>Yes</td>
<td>29 (47.5)</td>
</tr>
<tr>
<td>Clinic has access to a technical platform through collaborations with other organizations</td>
<td>32 (52.5)</td>
</tr>
<tr>
<td>No</td>
<td>32 (52.5)</td>
</tr>
<tr>
<td>Yes</td>
<td>29 (47.5)</td>
</tr>
</tbody>
</table>

**Epistemic characteristics**

<table>
<thead>
<tr>
<th>Care for depressive or anxiety disorders is coordinated through statutory case discussion meetings</th>
<th>34 (55.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>34 (55.7)</td>
</tr>
<tr>
<td>Always / Often / Sometimes</td>
<td>27 (44.3)</td>
</tr>
<tr>
<td>Number of GPs who devote majority of time to patients with mental health problems</td>
<td>29 (49.2)</td>
</tr>
<tr>
<td>None</td>
<td>29 (49.2)</td>
</tr>
<tr>
<td>At least one</td>
<td>30 (50.9)</td>
</tr>
<tr>
<td>Presence of a psychologist on-site that providers refer patients to</td>
<td>22 (36.1)</td>
</tr>
<tr>
<td>No</td>
<td>22 (36.1)</td>
</tr>
<tr>
<td>Yes</td>
<td>39 (63.9)</td>
</tr>
<tr>
<td>Presence of psychiatrist on-site that providers refer patients to</td>
<td>51 (83.6)</td>
</tr>
<tr>
<td>No</td>
<td>51 (83.6)</td>
</tr>
<tr>
<td>Yes</td>
<td>10 (16.4)</td>
</tr>
</tbody>
</table>

**Depression care barriers**

<table>
<thead>
<tr>
<th>Patients’ urgent medical problems limit optimal care for patients with depressive and anxiety disorders</th>
<th>11 (18.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly</td>
<td>11 (18.0)</td>
</tr>
<tr>
<td>Fairly</td>
<td>30 (49.2)</td>
</tr>
<tr>
<td>Slightly / Not at all</td>
<td>20 (32.8)</td>
</tr>
<tr>
<td>Lack of time for follow-up limits optimal care for patients with depressive and anxiety disorders</td>
<td>22 (36.1)</td>
</tr>
<tr>
<td>Highly</td>
<td>22 (36.1)</td>
</tr>
<tr>
<td>Fairly</td>
<td>27 (44.3)</td>
</tr>
<tr>
<td>Slightly / Not at all</td>
<td>9 (14.8)</td>
</tr>
<tr>
<td>Inadequate payment models limit optimal care for patients with depressive and anxiety disorders</td>
<td>11 (18.0)</td>
</tr>
<tr>
<td>Highly</td>
<td>11 (18.0)</td>
</tr>
<tr>
<td>Fairly</td>
<td>22 (36.1)</td>
</tr>
<tr>
<td>Slightly / Not at all</td>
<td>25 (41.0)</td>
</tr>
</tbody>
</table>
Table 2. Socio-demographic and clinical characteristics of patients with past-year major depressive episode (N = 824)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%) or Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>628 (76.2)</td>
</tr>
<tr>
<td>Male</td>
<td>196 (23.8)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>18 – 24 years</td>
<td>83 (10.1)</td>
</tr>
<tr>
<td>25 – 44 years</td>
<td>343 (41.6)</td>
</tr>
<tr>
<td>45 – 64 years</td>
<td>341 (41.4)</td>
</tr>
<tr>
<td>≥ 65 years</td>
<td>57 (6.9)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>139 (16.9)</td>
</tr>
<tr>
<td>High school</td>
<td>247 (30.0)</td>
</tr>
<tr>
<td>College</td>
<td>234 (28.4)</td>
</tr>
<tr>
<td>University</td>
<td>203 (24.6)</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
</tr>
<tr>
<td>Working or studying full-time</td>
<td>401 (48.7)</td>
</tr>
<tr>
<td>Not working or studying full-time</td>
<td>423 (51.3)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
</tr>
<tr>
<td>Married / Living common law</td>
<td>413 (50.1)</td>
</tr>
<tr>
<td>Divorced / Separated / Widowed</td>
<td>178 (21.6)</td>
</tr>
<tr>
<td>Single</td>
<td>232 (28.6)</td>
</tr>
<tr>
<td><strong>Perception of income</strong></td>
<td></td>
</tr>
<tr>
<td>Well off / Meeting basic needs</td>
<td>570 (69.2)</td>
</tr>
<tr>
<td>Poor / Very poor</td>
<td>252 (30.6)</td>
</tr>
<tr>
<td><strong>Number of visits to usual clinic in the past year</strong></td>
<td>5.4 ± 5.1</td>
</tr>
<tr>
<td><strong>Has a regular family doctor</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>656 (79.6)</td>
</tr>
<tr>
<td>No</td>
<td>160 (19.4)</td>
</tr>
<tr>
<td><strong>Has supplemental private insurance coverage</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>561 (68.1)</td>
</tr>
<tr>
<td>No</td>
<td>262 (31.8)</td>
</tr>
<tr>
<td><strong>Severity of depression (mean score on HADS)</strong></td>
<td>7.8 ± 4.4</td>
</tr>
<tr>
<td><strong>Years since first episode of depression</strong></td>
<td></td>
</tr>
<tr>
<td>Within past 5 years</td>
<td>202 (24.5)</td>
</tr>
<tr>
<td>More than 5 years ago</td>
<td>617 (74.9)</td>
</tr>
<tr>
<td><strong>Comorbidity profile</strong></td>
<td></td>
</tr>
<tr>
<td>Chronic psychiatric comorbidity only</td>
<td>113 (13.7)</td>
</tr>
<tr>
<td>Chronic medical comorbidity only</td>
<td>298 (36.2)</td>
</tr>
<tr>
<td>Both chronic medical and psychiatric comorbidity</td>
<td>413 (50.1)</td>
</tr>
</tbody>
</table>
At a patient-level, several characteristics were significantly associated with depression recognition, notably patients’ comorbidity profile, where patients having psychiatric comorbidity (with or without chronic medical comorbidity) more likely to have their depression recognized than patients with chronic medical comorbidity only.

In sensitivity analyses, models were re-estimated using the two alternative definitions of minimally adequate treatment and findings followed the same pattern as those above (results not shown).

**Factors Associated with Minimal Treatment Adequacy**

Table 3 also summarizes results from the multilevel analysis of factors associated with the receipt of minimally adequate depression treatment. Between-clinic variation in the likelihood of patients receiving at least one minimally adequate treatment was significant (p<0.05), with 3% of the variance being at the clinic level. In multilevel analyses, six practice characteristics and seven patient characteristics met criteria for entry into the fully adjusted model. This model revealed that the likelihood that patients received minimally adequate treatment was significantly higher when all or most GPs at the clinic used treatment algorithms for depression, when high importance was given to teamwork, when at least one GP at the clinic devoted significant time in their practice to patients with mental health problems, and when inadequate payment models were not perceived to be major barriers to depression care.

With respect to patient-level characteristics, a similar pattern of results was observed for the receipt of minimally adequate treatment as for depression recognition, with a few exceptions. As before, patients with chronic medical comorbidity only were less likely to receive minimally adequate treatment relative to patients with psychiatric comorbidities. However, lower odds of minimally adequate treatment were also found in age groups above the age of 45 and in patients working or studying full-time.
Table 3. Results of multilevel analysis of practice- and patient-level characteristics and associations with the recognition and minimally adequate treatment of depression

<table>
<thead>
<tr>
<th>Characteristics a</th>
<th>Recognition (N=810)</th>
<th>Minimally adequate treatment (N=818)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unadjusted OR (95% CI)</td>
<td>Adjusted OR (95% CI)</td>
</tr>
<tr>
<td>Practice characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of time dedicated for initial consultation of patients with depressive or anxiety disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 30 minutes (Ref)</td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>30 minutes or more</td>
<td>0.60 (0.40 – 0.91)*</td>
<td>0.76 (0.44 – 1.30)</td>
</tr>
<tr>
<td>Number of GPs using treatment algorithms with patients suffering from depression or anxiety disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some / None (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>All / Most</td>
<td>1.56 (1.11 – 2.19)*</td>
<td>1.77 (1.18 – 2.65)**</td>
</tr>
<tr>
<td>Importance given to GPs at the clinic working as a team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower / Solo provider (Ref)</td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>Higher</td>
<td>1.59 (0.93 – 2.69)</td>
<td>2.48 (1.40 – 4.38)**</td>
</tr>
<tr>
<td>Accessibility of mental health professionals limits optimal care for patients with depressive and anxiety disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highly (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Fairly / Slightly / Not at all</td>
<td>1.68 (1.23 – 2.29)**</td>
<td>1.61 (1.13 – 2.30)**</td>
</tr>
<tr>
<td>Clinic has an electronic medical records system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Yes</td>
<td>0.67 (0.46 – 0.97)*</td>
<td>0.90 (0.56 – 1.42)</td>
</tr>
<tr>
<td>Number of GPs who devote majority of time to patients with mental health problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>At least one</td>
<td>1.50 (1.08 – 2.07)*</td>
<td>1.54 (1.07 – 2.21)*</td>
</tr>
<tr>
<td>Lack of time for follow-up limits optimal care for patients with depressive and anxiety disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slightly / Not at all (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Fairly</td>
<td>0.80 (0.47 – 1.37)</td>
<td>0.88 (0.50 – 1.53)</td>
</tr>
<tr>
<td>Highly</td>
<td>0.51 (0.30 – 0.87)*</td>
<td>0.73 (0.40 – 1.32)</td>
</tr>
<tr>
<td>Inadequate payment models limit optimal care for patients with depressive and anxiety disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slightly / Not at all (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Fairly</td>
<td>0.77 (0.54 – 1.09)</td>
<td>0.76 (0.51 – 1.14)</td>
</tr>
<tr>
<td>Highly</td>
<td>0.59 (0.40 – 0.86)**</td>
<td>0.64 (0.40 – 1.02)</td>
</tr>
<tr>
<td>Patient characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 – 44 (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>18 – 24</td>
<td>0.48 (0.29 – 0.79)**</td>
<td>0.46 (0.26 – 0.80)**</td>
</tr>
<tr>
<td>45 – 64</td>
<td>1.12 (0.80 – 1.57)</td>
<td>1.11 (0.77 – 1.59)</td>
</tr>
<tr>
<td>65+</td>
<td>0.47 (0.26 – 0.84)*</td>
<td>0.54 (0.28 – 1.04)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Female</td>
<td>1.05 (0.74 – 1.49)</td>
<td>1.06 (0.73 – 1.56)</td>
</tr>
<tr>
<td>Employment:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not working or studying full-time (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Working or studying full-time</td>
<td>0.71 (0.53 – 0.96)*</td>
<td>0.75 (0.53 – 1.08)</td>
</tr>
<tr>
<td>Visits to usual clinic in past year (mean centered)</td>
<td>1.09 (1.05 – 1.14)***</td>
<td>1.07 (1.03 – 1.12)***</td>
</tr>
<tr>
<td>Has a family doctor:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Yes</td>
<td>1.99 (1.39 – 2.83)*</td>
<td>1.61 (1.08 – 2.25)*</td>
</tr>
<tr>
<td>Has supplemental private insurance:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (Ref)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Yes</td>
<td>1.44 (1.06 – 1.97)*</td>
<td>1.57 (1.10 – 2.25)*</td>
</tr>
<tr>
<td>Severity of depression (HADS – mean centered)</td>
<td>1.12 (1.08 – 1.16)***</td>
<td>1.11 (1.06 – 1.15)***</td>
</tr>
<tr>
<td>Comorbidity profile:</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Psychiatric comorbidity only (Ref)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical comorbidity only</td>
<td>0.50 (0.31 – 0.81)**</td>
<td>0.44 (0.25 – 0.76)**</td>
</tr>
<tr>
<td>Both psychiatric and medical comorbidity</td>
<td>0.91 (0.56 – 1.47)</td>
<td>0.72 (0.42 – 1.22)</td>
</tr>
</tbody>
</table>

* Only characteristics meeting inclusion criteria for entry into multivariate regression models (p < 0.10) are presented
* * p < 0.05  ** p < 0.01  *** p < 0.001
**Practice Characteristics and patients’ comorbidity profile**

To further illustrate the relationships between practice characteristics and patients’ comorbidity profile, we predicted the likelihood of depression recognition and minimal treatment adequacy for three virtual patients visiting two virtual clinics (Figures 1 and 2).

The probability of depression recognition varies between 54.7% and 90.2%, being lowest for virtual patient B (“chronic medical comorbidity only”) at Clinic B (“low enabling clinic”) and highest for virtual patient C (“psychiatric and medical comorbidity”) at Clinic A (“high enabling clinic”). A similar pattern of results was observed for minimally adequate depression treatment. However, while these latter probabilities ranged from 73.5% to 89.3% in Clinic A (“high enabling clinic”), they were substantially lower in Clinic B (“low enabling clinic”), ranging from 9.6% to 24.2%.

**Figure 1. Estimated probability of depression recognition for three virtual patients having different comorbidity profiles across two virtual clinics**

![Bar chart showing the estimated probability of depression recognition for three virtual patients across two clinics.](image-url)
Legend for Figure 1:

Patients

- Virtual patient A ("chronic psychiatric comorbidity only"): Female, aged between 25 and 44, working or studying full-time, has private insurance, has a regular family doctor, mean number of visits to usual clinic in past year = 5.4, mean HADS depression score = 7.8.

- Virtual patient B ("chronic medical comorbidity only"): Female, aged between 45 and 64, working or studying full-time, has private insurance, has a regular family doctor, mean number of visits to usual clinic in past year = 4.9, mean HADS depression score = 6.9.

- Virtual patient C ("chronic medical and psychiatric comorbidity"): Female, aged between 45 and 64, not working or studying full-time, has private insurance, has a regular family doctor, mean number of visits to usual clinic in past year = 5.8, mean HADS depression score = 8.5.

Clinics

- Virtual Clinic A ("high enabling"): Fewer limits to care due to the accessibility of mental health professionals, no electronic medical records system, few or no perceived barriers to care due to inadequate payment models.

- Virtual Clinic B ("low enabling"): Major limits to care due to the accessibility of mental health professionals, electronic medical records system, major perceived barriers to care due to inadequate payment models.

Figure 2. Estimated probability of receiving minimally adequate depression treatment for three virtual patients having different comorbidity profiles across two virtual clinics

<table>
<thead>
<tr>
<th></th>
<th>&quot;High enabling&quot; Clinic A</th>
<th>&quot;Low enabling&quot; Clinic B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient A</strong></td>
<td>89.1</td>
<td>23.8</td>
</tr>
<tr>
<td><strong>Patient B</strong></td>
<td>73.5</td>
<td>9.6</td>
</tr>
<tr>
<td><strong>Patient C</strong></td>
<td>89.3</td>
<td>24.2</td>
</tr>
</tbody>
</table>
Legend for Figure 2:

Patients
- Virtual patient A ("chronic psychiatric comorbidity only"): Female, aged between 25 and 44, working or studying full-time, has private insurance, has a regular family doctor, mean number of visits to usual clinic in past year = 5.4, mean HADS depression score = 7.8.
- Virtual patient B ("chronic medical comorbidity only"): Female, aged between 45 and 64, working or studying full-time, has private insurance, has a regular family doctor, mean number of visits to usual clinic in past year = 4.9, mean HADS depression score = 6.9.
- Virtual patient C ("chronic medical and psychiatric comorbidity"): Female, aged between 45 and 64, not working or studying full-time, has private insurance, has a regular family doctor, mean number of visits to usual clinic in past year = 5.8, mean HADS depression score = 8.5.

Clinics
- Virtual Clinic A ("high enabling"): Initial consultations for depression less than 30 minutes, all or most GPs using treatment algorithms for depression, high value given to GPs working as a team, at least one GP on site devoting significant time in practice to mental health, few perceived barriers to care due to lack of time for follow-up care and inadequate payment models
- Virtual Clinic B ("low enabling"): Initial consultations for depression 30 minutes or more, some or no GPs using treatment algorithms for depression, lower value given to GPs working as a team, no GPs on site devoting significant time in practice to mental health, major perceived barriers to care due to lack of time for follow-up care and inadequate payment models

Discussion
Organizational contexts are widely believed to have an influence on the quality of care that patients receive [25, 43, 44]. However, rarely do studies directly investigate associations between organizational characteristics and processes of care received by patients with psychiatric or chronic diseases. In the present study, we examined associations between selected primary care practice characteristics and the recognition and minimally adequate treatment of depression in patients having different comorbidity profiles. This is one of the broadest investigations into the role of organizational characteristics in depression care quality conducted to date and one of the very few studies examining these relationships in patients with co-occurring chronic conditions [45, 46].
Our results showed that several practice characteristics were associated with measures of depression recognition and minimal treatment adequacy after adjusting for patient-level characteristics and the clustering of patients within practices. With respect to depression recognition, we found that patients’ odds of having their depression recognized were significantly higher when they received care from clinics reporting fewer limits to care related to the accessibility of mental health professionals. While GPs often have little direct contact with mental health professionals [47], greater access is widely believed to improve rates of depression screening and recognition [48, 49]. Reports from several health systems suggest that initiatives to better integrate mental health services within primary care have indeed had positive effects on diagnosis rates for depression and other psychiatric disorders [50, 51]. Our study suggests that easier access to support from mental health professionals may be particularly important for primary care providers when patients present with comorbid chronic conditions that can complicate the process of recognizing their depression.

Regarding patients’ receipt of minimally adequate depression treatment, we found that greater use of treatment algorithms for depression, high importance given to GPs working as a team, the presence of at least one GP having a mental health focused practice, and fewer perceived barriers to care related to inadequate payment models were all associated with a higher likelihood of adequate treatment. A first implication of these findings is that they suggest that primary care practices can adopt a number of strategies to enhance the quality of depression care they provide. Indeed, with the possible exception of physician payment models, organizational characteristics such as the use of treatment algorithms, values related to teamwork, and the availability of expertise in mental health are amenable to change by providers and are further recognized as key elements of evidence-based collaborative care [52-54] and chronic care interventions [43, 55]. Initiatives emphasizing team-based, collaborative care may be particularly promising in the current context, as these have been associated with positive outcomes in patients with comorbid chronic conditions [56, 57] and are viewed as a central component of primary mental health care reforms ongoing in Quebec [58].
That said, our findings also reinforce the view that stakeholders external to primary care clinics have a role to play in depression care quality improvement, as depression treatment adequacy was half as likely in clinics reporting that inadequate payment models were a major barrier to optimal depression care. It is notable that only study clinics operating under fee-for-service arrangements reported that their physicians’ ability to deliver optimal depression care was highly limited by inadequate payment models. Limitations of fee-for-service models for chronic disease care have long been recognized [43, 59] and while patients with multiple chronic conditions may in theory be embraced under this system [59], in practice this payment model offers limited support for the effective management of these complex patients [60]. This has been further echoed in qualitative studies reporting GPs’ frustration with fee-for-service reimbursement systems that fail to acknowledge the complexities of care for patients with multiple chronic conditions [61, 62]. In Quebec, reforms to primary care have included a shift towards more blended models of payment and targeted incentive payments for vulnerable patients [27], though it remains unclear what impact these policies are having for patients with more than one chronic disease.

This study also identified several patient characteristics associated with the recognition and minimally adequate treatment of depression. Of particular interest was the influence of the type of comorbid chronic conditions that patients had. Unlike most previous studies that examined the roles of medical and psychiatric comorbidity separately, we characterized patients by their particular comorbidity profile, i.e. whether they presented with chronic medical comorbidity alone, psychiatric comorbidity alone, or both types of comorbidity. For both outcome measures, patients with chronic medical comorbidity alone were significantly less likely to receive high-quality depression care relative to patients with psychiatric comorbidity. Our pattern of results is consistent with two previous studies adopting similar procedures [15, 16] and points to the important role that other non-depressive psychiatric symptoms can play in facilitating the recognition and treatment of depression by primary care providers. We should note, however, that depression care quality is not always lower in
patients with chronic medical comorbidity but rather has been found to vary depending on the specific conditions investigated [14, 63, 64]. Future research should continue to explore how different chronic medical and psychiatric conditions interact with each other to generate clinical complexity and challenge care quality, referred to recently as “comorbidity interrelatedness” [65].

Finally, another notable patient characteristic associated strongly with depression recognition and treatment adequacy was patients’ access to a regular family physician. Current reforms in Quebec have targeted improved population access to GPs as a priority [27] and our findings emphasize the importance of this relationship in patients suffering from depression and comorbid chronic conditions. As Starfield has argued [66], family physicians clearly have a major role to play as case managers responsible for such patients’ overall health, coordinating care with other professionals depending on individual patient needs.

Limitations
This study has several limitations. First, our data was based on cross-sectional surveys, thus precluding inferences of causality. Second, the self-reported nature of the data also opens the possibility of recall and social desirability biases, though acceptable concordance between self-report and administrative data has been reported in the literature [67, 68]. Third, generalizability of our findings may be limited in that fewer than 25% of the clinics we initially approached ultimately contributed data to the study and some types of clinics, such as solo providers, were underrepresented in our sample. Such sampling results and variations are however consistent with previous studies examining organizational influences on care [39, 66]. Fourth, while we examined a broad range of practice characteristics, other features of primary care clinics not captured here may also influence depression care quality and should be explored. Post-hoc analyses with other potential organizational enablers of care quality, such as GP’s comfort with treating mental disorders and depression screening procedures in clinics, were not associated with depression recognition or treatment adequacy in our sample (results not shown). No data from individual physicians was
collected, however, meaning that an “in-between” level may have been missing in our multilevel models [67]. Previous studies have shown that physician characteristics can indeed influence depression care quality [22, 68] and that they likely interact with both organizational and patient factors [20, 69]. Finally, our models also revealed that clinic-level factors explained a relatively small amount of the variance with respect to depression recognition and minimal treatment adequacy. This should not be taken to mean that factors at this level are unimportant, however. Patients typically spend little time in medical settings [70] yet, as clearly illustrated in Figures 1 and 2, the features of these settings can dramatically influence the probabilities that they will receive high-quality care.

**Conclusion**

We identified several primary care practice characteristics associated with high-quality care for patients suffering from depression and comorbid chronic conditions. Primary care clinics could target several of these characteristics in organization-level quality improvement efforts, such as through organizational changes aiming to promote better access to expertise in mental health or the delivery of team-based care. There is no doubt that additional efforts to improve depression care quality are urgently needed, as we found that more than a quarter of patients had their depression go unrecognized and more than half failed to receive minimally adequate treatment. Also, special attention should be paid to patients presenting with chronic medical comorbidity only, as these patients may be at particular risk for suboptimal care. Appropriate recognition and treatment of such patients is critical, as benefits extend beyond mental health into physical health and overall quality of life [3]. Ensuring that patients with depression have strong relationships with family physicians supported by other partners in collaborative care is a promising approach that could lead to better care and health outcomes.
References


5.4. Primary care organizational supports for the care of people with mental–physical multimorbidity: a qualitative study

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\textsuperscript{2} CRCHUM, Montreal, Canada

Paper status
In preparation

Contribution of the first author
The first author conceived and designed the study, prepared study materials, recruited participants and performed the data collection, led the data analysis and interpretation of results, and wrote and revised the manuscript with support from co-authors.
Abstract

**Background:** Many primary care patients suffer from both mental disorders and chronic physical conditions, i.e. mental-physical multimorbidity. These patients can be challenging to manage and vulnerable to receiving suboptimal quality of care. Identifying factors that can support providers in caring for these complex patients is important for quality improvement efforts. The present study explored primary care providers’ perspectives on how their practice contexts facilitated or impeded their ability to provide quality care to patients with mental-physical multimorbidity.

**Methods:** We conducted an embedded, multiple case study involving 16 semi-structured interviews with primary care providers, non-participant observations, and an analysis of relevant documentation. The cases were two large primary care organizations in Quebec, Canada. Data collection and analysis was guided by a conceptual framework based on theory from the knowledge management literature. Analysis followed a thematic approach with deductive and inductive techniques.

**Results:** Primary care providers identified a number of challenges related to the management of patients with mental-physical multimorbidity. However, several characteristics of their practice settings facilitated the provision of care to these patients, including clinic norms of mutual support and teamwork, interdisciplinary meetings and practices, supports from mental health specialists, salaried payment models, clinical supervision, and electronic health records and decision support tools. These organizational characteristics exert an influence on quality of care in part through the way they facilitate the finding, sharing, storing and use of knowledge by professionals in clinics. Furthermore, characteristics of practice contexts do not work in isolation and impacts on quality of care are determined by how different characteristics interact with one another.

**Conclusions:** This study identifies several primary care organizational characteristics that influence the care provided to patients with mental-physical multimorbidity and sheds new light on the mechanisms through which these characteristics exert their effects. Our study
has important implications for the design of quality improvement initiatives for patients with both mental and chronic physical conditions.

**Keywords**
Mental health, Chronic diseases, Primary care, Multimorbidity, Organizational factors, Case study

**Introduction**
As the sector of care responsible for providing comprehensive, whole-person care across the life span [1], primary care has a vital role to play in the management of patients suffering from multiple co-occurring chronic diseases, i.e. multimorbidity [2-4]. Multimorbidity affects one third of primary care patients overall and more than half of those over the age of 65 [2, 5-7]. It takes a major toll on affected individuals, significantly interfering with valued social roles and impacting functioning and quality of life to a greater extent than single chronic conditions [8-11].

Patients with multimorbidity also present unique challenges for primary care providers and healthcare systems. Such patients may require complex, burdensome treatment regimens that make them particularly vulnerable to adverse effects of polypharmacy and non-adherence [12-15]. Providers are routinely challenged to prioritize and address their patients’ multiple conditions during short consultations and can feel overwhelmed when supports from other professionals are not available [14, 16, 17]. These patients are also often heavy users of health services and account for a disproportionate share of health care expenditures [18-21].

Difficulties in delivering and organizing care seem amplified when patients’ chronic physical illnesses are accompanied by mental health problems [22]. More than one-third of individuals with multimorbidity suffer from mental-physical multimorbidity, with two-thirds of this population being younger than 65 years [23]. The presence of comorbid mental
disorders in patients with chronic diseases has been linked to poor patient-physician communication and patient engagement in care and decreased adherence to self-care regimens [24, 25]. These patients are especially prone to experiencing problems related to accessibility and coordination of care [26, 27] and to receiving fragmented care due to insufficient integration of mental health and primary care services [25, 27-29]. Health outcomes for these patients are often poor [30-33] and health care costs associated with comorbid mental disorders are high [34, 35].

Over the past decade, major efforts have been made to transform primary care services and improve the quality of care provided to people with chronic diseases and mental disorders [36, 37]. For the most part, however, these transformations have been driven by single-disease models of chronic care management and improvement that fail to consider patients’ global care needs [11, 18, 38]. There is an urgent need to closely examine how services are organized for patients with mental-physical multimorbidity and identify strategies for improving the quality of care provided to these vulnerable patients.

This qualitative study aimed to explore primary care providers’ perceptions of the challenges of managing patients with mental-physical multimorbidity and how their organizational contexts could support (or impede) their ability to provide quality care to these patients.

**Conceptual framework**

The conceptual foundations for this study were drawn from the organizational sciences literature on knowledge management (KM). A central premise of KM is that an organization’s most valuable resource is the knowledge of its people [39]. As a discipline, KM aims to better understand how organizational actors capture, share and use knowledge and how such processes relate to learning, action and the achievement of organizational goals [40].
Our conceptual framework was inspired by the work of several authors [41-43] and comprised three main elements: KM enablers, processes, and outcomes. KM enablers represent the aspects of a clinician’s environment that create enabling conditions for the flow of knowledge in their practice setting [43]. Knowledge flows can be understood to be sequences of knowledge activities performed in support of some action or decision [44] and these flows are facilitated by four types of KM enablers, namely strategic/structural, social, epistemic, and informational enablers [43]. “Strategic/structural” enablers refer to the organizational structures or strategies that facilitate knowledge activities (e.g. work structures fostering collaboration, reward systems, training or mentorship programs, physical workspaces). “Social” enablers relate to the organizational attributes that foster social environments conducive to knowledge flows (e.g. norms of trust, respect and mutual support, attitudes encouraging relationships or teamwork). “Epistemic” enablers are the organizational attributes or practices that allow clinicians to be exposed to new ideas and diverse forms of knowledge while also helping to establish common knowledge and objectives (e.g. interdisciplinary meetings or inter-organizational projects, hiring practices promoting diversity, forums for establishing shared goals). Finally, “Informational” enablers relate to the information technologies that can support knowledge activities (e.g. Internet, email, electronic medical records or repositories).

The knowledge activities performed by clinicians are termed KM processes and include actions such as finding, sharing, storing or using knowledge [45]. The four interdependent KM enablers promote these processes, which in turn help clinicians make sense of complex situations, learn, take decisions, and ultimately produce outcomes consistent with organizational objectives [43, 46].

**Methods**

**Study design**

We conducted an embedded multiple case study [47]. Case study approaches have been used extensively to examine complex social phenomena and the real-life contexts in which
these phenomena occur [47]. Here, we explored in-depth issues related to the management of patients with mental-physical multimorbidity and the characteristics of primary care organizations that support care for these patients. This qualitative study was intended to help explain and expand on results generated from a previous quantitative study of the influence of primary care practice characteristics on the quality of care for depression in primary care patients with comorbid chronic conditions [48].

**Study settings**

This study took place in the province of Quebec, Canada. In Quebec, primary care clinicians practice in a variety of organizational settings. Public sector primary care services are delivered mainly by clinicians in local community health centres (or CLSCs). CLSCs provide a range of preventive and curative health services, as well as social services, home care services, and public health activities. Approximately 11% of the provinces’ front-line family physicians practice in CLSCs [49]. Physicians in CLSCs often work in multidisciplinary teams and are remunerated primarily through a salary [50]. A growing proportion of family physicians (44%) practice in Family Medicine Groups (or GMFs), which typically regroup six to ten full-time physicians working closely with nurses to provide care to registered patients (≈ 1000-2200 per full-time equivalent physician) [50, 51]. Remuneration of physicians practicing in GMFs is a blend of fee-for-service and capitation payment with additional sums awarded for care of vulnerable patients, extended hours, and administrative duties [50]. Most GMF physicians practice in community-based medical clinics and a minority practice in CLSC settings. Another large percentage of family physicians (34%) work in private clinics or polyclinics under fee-for-service payment schemes [49, 50].

In 2004, CLSCs merged with other local health care organizations (e.g. long-term care centres, community hospitals) to form 95 Health and Social Service Centres (or Centres de santé et de services sociaux – CSSSs) across the province [52]. CSSSs ensure a broad continuum of primary care services and coordinate access to secondary or tertiary care. They are responsible for creating local service networks in collaboration with other partners.
(e.g. family medicine clinics) in order to improve health and well-being in their local territories.

In the past several years, the province has also taken steps to improve both the accessibility and quality of mental health services in primary care. Supports for primary care providers in local service networks are being established in the form of “responding psychiatrists” that meet regularly with clinicians and share expertise usually following a consultation/liaison model of collaboration [53, 54]. In addition, new primary mental health care (PMHC) teams have been created within each CSSS serving a population of 50,000 inhabitants or more. PMHC teams are composed mainly of psychologists, social workers, and nurses and provide evaluation, psychotherapy, and follow-up services to patients with mental disorders. These teams are intended to be the gateway towards secondary or tertiary mental health care [54, 55].

The cases purposely selected for this study were two CSSSs in Montreal, Quebec (hereafter referred to as CSSSs A and B). Each of these CSSSs participated in the previous quantitative study phase. Two other CSSSs were also invited to participate but ultimately declined due to obligations towards other research projects.

Within each CSSS, we examined two embedded units of analysis, namely 1) family medicine teams working in CLSCs or medical clinics affiliated with the CSSS, and 2) PMHC teams. Family medicine teams and PMHC teams represent two important loci of care for patients with common mental disorders such as depressive or anxiety disorders. Often, patients will receive care from both teams, highlighting the importance of understanding these teams’ practice settings as well as how teams interact with one another when sharing responsibility for the care of patients with mental-physical multimorbidity.
Participants

Authorities within each CSSS helped identify key resource people (e.g. team directors) that provided assistance with participant recruitment. Participants were identified using a combination of snowball and maximum variation sampling techniques [56]. We sought a diversity of perspectives by recruiting clinicians from different teams, professions, and levels of experience. Recruiting clinicians representing diverse professions was considered necessary given the multidisciplinary nature of care for people with mental-physical multimorbidity and our desire to elicit views on a wide range of factors influencing care. Potential participants were contacted by email and provided with an information sheet describing the study and a copy of the consent form, which provided more detailed information about study procedures. A total of 16 clinicians agreed to participate in the study, including 9 from two sites in CSSS A and 7 from two sites in CSSS B (Table 1). Participants differed with respect to their sex (9 male, 7 female) and years of experience (ranging from 1 year to 39 years).

Table 1. Characteristics of study participants

<table>
<thead>
<tr>
<th>Health professional</th>
<th>Site</th>
<th>Profession</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP01</td>
<td>A1</td>
<td>Family physician</td>
</tr>
<tr>
<td>HP02</td>
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Data collection
A staple of case study methods is a reliance on multiple sources of evidence [47] and here we collected data through semi-structured interviews, non-participant observations and relevant documents. Interviews with participants took place at their workplace and were conducted by the first author (MM) from October 2013 through January 2014. Interview length ranged from 30 to 77 minutes and averaged 53 minutes. We used an interview guide informed by our conceptual framework that covered the following topics: description of participants’ practice settings, participants’ role in their organization(s), challenges of caring for patients with mental-physical multimorbidity, and characteristics of clinical practice settings that facilitate or impede care provided to patients with mental-physical multimorbidity (see Appendix 3). All interviews were audio-recorded and transcribed verbatim by the first author.

On the days of interviews, we conducted non-participant observations of study sites. We used a structured observation guide to capture information on physical settings and workspaces (e.g. clinic location, layout of office space, meeting rooms), information technologies available, and potential interactions between staff. At each site a study participant gave the first author a tour of facilities.

Relevant documentation (e.g. written descriptions of services, annual reports, newsletters) was also provided by participants or obtained by consulting the CSSS websites. A total of 18 documents were deemed relevant for inclusion in analyses. Finally, fieldnotes were taken throughout the data collection and analysis process to help reflect on expectations and biases and record impressions of interactions with participants and how study procedures were influencing results [57].

Analysis
Data analysis followed a thematic approach [56, 58] with both deductive and inductive techniques. We used our interview guide to develop an initial coding framework and two
authors (MM, AMC) independently performed a deductive analysis of two interviews guided by the themes of our conceptual framework (i.e. enablers, processes and outcomes). These same authors then carried out inductive analyses of these interviews in which emergent KM-related themes (e.g. losing knowledge) and themes outside the scope of the conceptual framework (e.g. challenges to caring for patients with mental-physical multimorbidity) were labeled and categorized. We then reworked our coding framework until consensus was achieved and the first author coded the remaining interviews. Case summaries were written and preliminary impressions of results were discussed among the research team. The preparation of case summaries involved creating matrices [59] to examine how different enablers (e.g. meetings with responding professionals) were linked to different processes (e.g. knowledge sharing) and outcomes (e.g. learning) across clinical teams and CSSSs. Data from non-participant observations and organizational documents were included in analyses and served to corroborate findings, provide reliable details (e.g. dates of events) and complement the data obtained through interviews [47]. NVivo 10 was used to facilitate data management and analysis.

**Rigour**

The first author is a non-physician doctoral student in public health experienced in qualitative methods, including case study methods [60]. The other members of the research team are also experienced in qualitative research and possess intimate knowledge of the organization of primary mental health care services in Quebec. Case discussion meetings between team members were important as a single team member collected data and led the analysis. Fieldnotes written by the first author promoted reflexivity and helped make assumptions explicit, such as our assumption that clinicians responsible for patients with mental-physical multimorbidity would face clinical uncertainty that triggered searches for additional sources of knowledge to support decision-making and care. We also triangulated multiple sources of data to provide rich descriptions of cases and shared preliminary case summaries with participants to help verify the accuracy of findings, update information, and validate our interpretations [57, 61]. Six participants, including at least one from every study site,
returned comments on case summaries, which included corrections to details about participants’ roles and clinic funding arrangements.

**Ethics**

Study procedures were approved by the research ethics committees of the University of Montreal, l’Agence de la santé et des services sociaux de Montréal, and both CSSSs involved in the study.

**Results**

**Descriptions of cases**

CSSS A serves a very socioeconomically and ethnically diverse population of over 130,000 inhabitants in the downtown area of Montreal. It consists of several CLSCs, a family medicine clinic, and several long-term care centres. In several of these CLSCs are family medicine clinics that had the status of GMF. Site A1 is one of these CLSC-GMFs and provides services with or without appointment to a largely disadvantaged clientele marked by high rates of poverty, homelessness, and addictions. Site A2, a large family medicine clinic in a neighbouring area, is also a GMF featuring family physicians, nurses, a psychologist and a social worker, the latter two at part-time. Formerly affiliated to a large hospital, the clinic relocated its offices and joined the CSSS in 2010. Given its former association with the hospital, the patients followed at the clinic are highly diverse in terms of clinical profile and many live in areas outside the immediate territory of the clinic. Both sites A1 and A2 are also family medicine teaching clinics (or Unités de médecine familiale - UMFs) affiliated with the family medicine department of one of the city’s universities. The PMHC team of CSSS A was established in 2009 and is physically located in two separate service locations, with half the team at site A1. The team is composed of over 20 clinicians and in contrast to many other teams also features a family physician that spends one day a week within the team.

CSSS B is located in the east of Montreal and serves a population of nearly 200,000 inhabitants characterized by a high proportion of older adults and high rates of chronic
diseases such as diabetes, hypertension, and chronic respiratory conditions. The CSSS consists of three CLSCs and several long-term care centres. In 2012, each of the CLSCs established partnerships with private clinics in the region to become GMFs. Site B1 is one of these CLSC-GMFs, though the human resources (e.g. nurses) normally found within GMFs had not been hired yet. As in site A1, patients with transient mental disorders or psychosocial problems can receive care directly from a psychosocial service team within the CSLC. For patients with more severe mental health problems, supports are available from the adult PMHC team located mainly at a separate, centralized location outside the CLSCs of the CSSS (site B2). Several members of this team arrived through a transfer of personnel in the late 2000s from a nearby psychiatric institute, with the remaining members consisting of new hires or transfers from CLSCs. At the time of the study there was no family physician within the team.

**Experiences with mental-physical multimorbidity**

All study participants reported encountering patients with mental-physical multimorbidity on a regular basis. For GPs, patients with mental disorders made up between 30-50% of their case loads and many of these patients also lived with comorbid chronic physical diseases. Several participants added that mental-physical multimorbidity was particularly evident among the older patients they cared for.

Well, comorbidity with either another mental health problem or a physical problem, for me it’s more the norm than the exception. (...) Let’s say we’re talking about patients who have a mental health problem, sometimes chronic schizophrenia or chronic depression, anxiety disorder with physical comorbidities. Here at the CLSC I have a lot of them. At the UMF I have a lot of them too. (HP05)

...what we see often is someone will present with a mental health problem and an addictions problem, poverty, other problems like diabetes or cardiac problems. (...) It’s
rarely a simple problem, a person experiencing a little depression or adjustment disorder. Often there are other things that come along with that. (HP04)

It happens, that people have diabetes but they’re depressed too or people who have advanced pulmonary disease and they’re depressed and they have trouble breathing, so I see that yes. Pretty often actually, in particular in older patients. (HP01)

Participants considered mental-physical multimorbidity challenging to manage for several reasons (Table 2). For GPs, the biggest challenge related to having to prioritize and manage multiple conditions within relatively short consultations, which was particularly challenging when one or more mental disorders were “active”. It would sometimes take multiple meetings with patients before they could adequately make sense of and address the patient’s mental health problems. GPs could sometimes feel alone in the care of these patients when supports from other professionals were not available. At the same time, several GPs were very experienced in managing patients with multiple chronic conditions and expressed confidence in their ability to treat comorbid mental disorders effectively, particularly disorders such as depression.

But to say, “Oh my goodness, my patient has a chronic disease and diabetes and on top of it has a depression, it leads me to have more difficulties…” In my choice of treatment and way of approaching it, I haven’t had as much difficulty. (HP10)

A mega depression, okay, if I’ve tried five types of treatment and it doesn’t work, fine I’ll ask for help. But generally we can manage pretty much anything. We’re pretty good in primary care. (HP06)
### Table 2. Challenges of managing patients with mental-physical multimorbidity

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| Managing multiple competing demands           | The challenges are... there’s always the challenge of prioritization. So I mean, we don’t have an unlimited time, right? We have 30 minutes with the patient, let’s say. If I’m going to manage his diabetes and his hepatic renal failure and the possibility of a cancer, well... mental health is never a priority. You know we say “physical first” all the time. (...) ...even the smallest mental health problem becomes super tough to manage when there are a lot of physical problems. I would say that it’s mostly the severity of physical problems that make it such that I feel overwhelmed or incompetent in mental health, because I want to fix them all first before getting to that. (HP06)  
  
  ...if the physical problems take up a lot of space because there are lots of things to manage (...) when the physical aspect takes up a lot of space and the patient is crying, I think what is not a winner is when the resident or the person in front of the patient feels even a bit impatient, saying “Look, I don’t have the time, it’s not time to cry, I need to manage this, this and this.” (HP09)  
  
  When they have a lot of things it’s to have the time in an interview... Or sometimes I notice that it’s been a few times that I see the patient and I haven’t, there’s a health problem that I haven’t treated yet. I treated their depression but... and sometimes it’s not a disease but for women we want to have them do pap tests and basic things like that you know or verify not only if the man is diabetic but whether he will be in the future but we can’t because each time he arrives depressed and we end up talking only about that. (HP01)  |
| Limited time during consultations              | The biggest challenge is time. How do you manage all those things in the context of a single medical consultation? For example, the patient is very depressed, so I provide a follow-up for their depression, which presents with symptoms of diabetes, for example, or which presents with symptoms of another disease. I have to decide how I attend to each of these problems, the pathology of the patient. And sometimes it’s pretty difficult. I sometimes get the impression that I’m neglecting either the mental health part or the chronic disease part because of time... (HP05)  
  
  For me I think that the difficulty is a lot in terms of, it takes time. And I think honestly that doctors in community clinics who have 10 minutes with a patient to consult, that’s where it’s problematic. (HP10)  
  
  ...when you see them, you want to take care of their diabetes but they also have depression, I want to take care of both but I don’t have a lot of time to do both, (GP01)  |
| **Ambiguity and uncertainty** | ...the reality is that they don’t present with a mental health problem most of the time. They present with a physical problem where, finally, the conclusion is after ten meetings is that there is a physical aspect but also an important psychological aspect and what causes what we don’t know and what is it called we don’t know. Usually we don’t even name what it is or we give it a name so that it fits into a DSM category, but it’s forced. I’ll call it a depression but his diabetes is completely out of balance and he’s anemic and he’s stressed at work and he just got divorced... Okay, he might have depression but I’m not sure so the challenge is being able to separate all that, which we’re rarely able to do. (HP06) |
| **Patient complexity** | Yes, yes. Multiple health problems. Sometimes as a result of accidents, a car accident or a work-related accident... health problems, recently a degeneration of their skeletal system, diabetes, obesity. Comorbidity also there are also health problems but there are also anxiety disorders linked to depression, personality disorder and I would add to that the multiple stressors, you know the Axis 4 of the DSM. The multiple stressors are really present. So it’s a cocktail of all that. (HP16)

Well one of the major challenges is poverty. For me, poverty is a precipitating, perpetual, aggravating factor for all medical conditions. Eighty percent of my patients are very, very poor. So they cannot have access to care that is not covered by the government. And on top of it all they are poorly educated... (...) so, it makes things even more complex. In terms of time, explanations, access to non-medical resources, access to physical activity... so it’s all that that complicates things in my opinion. (HP03) |
| Feeling powerless                                                                 | Yes. What’s really complicated about people who have mental-physical comorbidity it’s that it’s something that lasts and that people often feel powerless. They feel, for example, chronic pain, they have already gone to the pain clinic, they have gone to groups to help manage pain and they’ve already received treatment for their pain, facet blocks, injections for this or that, so they’ve already received that. They are treated for depression, for their chronic pain and a number of things have been tried. And so often people arrive and they’ve already tried a lot of things and so there’s a lot fewer things left to try. So it’s almost, how do you live like that? It must not be easy. (...) You know sometimes it’s about brainstorming with them, are there other things that they can ask their doctor, explore alternative medicine maybe if they are open to that, some soft exercise, swimming, relaxing, but people are powerless and often the tricky part for us as social workers it’s that we can also fall into this powerless, it’s really not easy. (HP16)  
...you know there are patients that at times you just don’t know what to do and they’re in our office and we feel powerless because we don’t know what to do with them. (HP07) |
| Increased service use                                                              | ...diseases like COPD, chronic respiratory diseases, we have that with panic attacks also and these are clients that use a lot of emergency services. We often find them at the emergency room and so we’re trying to find ways to help these people to stop using emergency services to those levels because they’re there almost every week. (HP11) |
| **Health care system level**                                                       | |
| Lack of service integration                                                       | If you look at diabetes, it plays on the management of emotions, right? It affects the way we live everyday and so the person is followed often by the diabetes clinic at the CLSC, it’s not their territory but that’s where the service is provided. So the person goes there. But we communicate little... little or not at all. (HP16)  
You know, sometimes I see a patient who has a depression and a chronic pain problem and she is followed at the pain clinic. The doctor gives her tons of pills and I’m left with a lifeless patient... so I write progress notes and I write that I wonder if there couldn’t be something that is done to reduce the medication the patient is taking for her physical problems, maybe the patient would be less weighed down and all that. I send the progress notes. He should be eager to speak with me? He should be eager to respond to that in writing? He may be interested in calling me? No answer. Doctors are very busy. (HP13)  
Often, people who have multiple diseases, several different diseases, they have several clinicians. So if there’s an occupational therapist in the case, a social worker or a nurse, we’ll then there’s division between the clinicians and between them and the doctor. And if the person has a cancer then there are people from oncology that are involved and so there’s this whole division that happens and people don’t know what to do. (HP11) |
...you know we’re talking about chronic diseases also, it’s not rare that we’ll have a patient with diabetes and I don’t know, a kidney disease and they’re followed by an endocrinologist and nephrologist on top of the family physician. And everyone is doing tons of things and no one is talking... (HP02)

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...let’s say we’re talking about patients who have a mental health problem, sometimes chronic, schizophrenia, chronic depression, anxiety disorder with physical comorbidities... Here at the CLSC, I have a lot of them. (...) and it’s a bit strange with the model of the CLSC, the first thing that surprised me when I arrived here was at what point I was alone with those patients, in the sense that I have my office, which is next to a lot, a lot of offices for nurses and the nurses have their own practice and they have their own list of appointments and I’m not quite sure how it functions if I want to provide collaborative care with them. I never got the sense that I could knock on the door of one of the nurses and say, oh for this patient, could you see them? People here change all the time, all the time. So it’s a lot more difficult to provide collaborative care with nurses and now we’re not even talking about psychologists or social workers. (HP05)

Because these are patients that are complex, that often have at least two or three active problems... (...) So when (the family doctor) is taking care of a mental health problem that’s not going well, a physical problem that’s not going well, the patient is taking drugs and it’s not controlled, it becomes very heavy for someone all alone in their office and often these are patients who are not always so organized and don’t respond how we’d like. (HP08)
For other clinicians, particularly those of the PMHC teams, these patients were considered complex because they often suffered from other health and social problems, such as personality disorders, poverty, or work or family problems. Most participants also emphasized that while access and quality of mental health services had improved in recent years, obstacles to care for patients with mental-physical multimorbidity remained due to barriers at the health system-level, notably the lack of service integration that continues to exist between mental health services and those for physical conditions.

I see that there is this wish for there to be a better relationship between the physical side and the mental side, that there is for each an awareness of the other disease and I was reading your paper (the consent form) and I found it interesting, it doesn’t work like that at all. (HP13)

Organizational supports for patient care
Despite the challenges associated with mental-physical multimorbidity, participants identified a range practice setting characteristics that facilitated the management of these patients.

Some of these characteristics were structural or strategic in nature. For example, their clinics’ GMF status allowed GPs at sites A1 and A2 to work closely with nurses hired specifically to share in care for patients with certain chronic diseases. This freed the GPs to spend additional time with patients addressing their mental or physical health problems.

We have two nurses in the GMF here, who are primarily specialized in cardiometabolic follow-ups, so diabetes, hypertension and all that. So particularly for patients with comorbid cardiometabolic problems, it’s helpful because we can collaborate with them and so they can do some patient education and adjust their medication and it allows me to spread out my appointments more and if the patient
has an active major depression and diabetes as well that needs to be followed, well she can look after the diabetes and it allows me to concentrate on other aspects, she just adjusts her insulin and things like that. (HP02)

For certain chronic diseases, our nurses can help us. At some point, we need someone to take charge of part of the patient’s problems. Otherwise it’s impossible. When they have several physical health problems and mental health problems, it happens, I’m thinking of a patient where all the axes were filled... From which end do we manage this? So I can say, well you’re going to take this end, the diabetes, so that when the patient comes to see me I don’t have to talk about it. (...) ...sometimes I give her the physical side and sometimes the mental side and it allows me to take care of the rest. Sharing things is really helpful in those cases. (HP08)

The presence of GMF nurses also provided GPs with opportunities to exchange knowledge with these professionals and provide what they perceived to be a higher quality of care to patients with mental-physical multimorbidity.

By sharing, for one it’s less heavy. So that’s a factor that is helpful, to have someone with whom I can share the load but also someone with whom I can define things as well because sometimes neither her or myself we have the impression that we’re doing something, and so to have someone with whom we can question what we’re doing and all that. So that’s really helpful. (HP08)

Well it’s clear that since we became a GMF and we got our GMF nurse, it improved a lot the quality of our care. She takes care of the physical side and I can continue to take care of the mental side and I work in collaboration with her on the physical side. When I talk about physical side I’m referring particularly to patients with diabetes. It’s the majority of her practice. But it’s something that was fairly complex that required that patients needed to be seen relatively frequently. (...) I can’t see many more
patients because of her but the patients that I do see are better treated. And it frees me up to better treat their mental health problems. (HP03)

Currently, a limit of the GMF nurses is that their practice tends to focus on a limited number of chronic diseases and their expertise for other chronic diseases (e.g. arthritis) and mental disorders is less developed. Other important structural/strategic characteristics included a notable increase in mental health training opportunities in the CSSSs and, for members of the PMHC teams, the presence of clinical supervision, which was perceived as helpful when managing patients with multiple conditions. In CSSS A, the UMF status of sites A1 and A2 also forced GPs to continuously update their knowledge about both mental disorders and chronic diseases given that they were responsible for training family medicine residents. Finally, while a lack of time was identified as an important obstacle to care for patients with mental-physical multimorbidity, all GPs participating in the study received salary-based payment and thus felt they could take more time with complex patients if they needed to, which was considered a major facilitator of care.

I would tell you that in the CLSC, first of all the type of payment model has a big influence. Here in the CLSC I’m paid by the hour. So from the beginning I have no pressure to be productive. So when I see a new patient, I can take an hour with a new patient. So a patient who presents with diabetes and a mental health problem, it’s rare that I’ll face a crisis situation with both problems at the same time. So often I’ll be able to prioritize, for example “Come into my office, I have diabetes, okay perfect, and we’ll do the follow-up for diabetes but at the same time things are not going well, things are not well at work, we’re going to talk about your mental health problems.” (...) So it’s pretty easy to do that because I have a resource that is very useful, which is time. (HP10)

We’re paid by a fixed rate. (...) Because you can take half an hour, you’re not obliged to take only 10 minutes with the patient. You can take half an hour when the patient
is complex and they’re depressed and they have two or three serious illnesses that you have to manage on top of that. (HP01)

With respect to social enablers, several clinicians identified that a culture promoting mutual support was helpful when encountering difficulties in the management of patients with mental-physical multimorbidity. This culture was particularly established within the family medicine teams of sites A1 and A2, partly due to the UMF status of their clinics.

In a general sense there is a very strong sense of mutual support. Whenever you have questions, if you’re not sure and all that, you can just knock on a colleague’s door and people are very open to that. (...) ...you never feel bad about asking a question or feel like your bothering people. So sometimes when you have patients that are more complex cases, having advice on treatment or a diagnosis, it’s really helpful. (HP02)

Well I would say all our infrastructure in mental health here is done for the residents. What we tell them in the beginning of the year and repeat often is that once you have a problem with a patient or you have a difficult patient, and you look at your list of patients in the morning and you say, oh no, not him... As soon as there’s a sign that there’s something that’s not 100% easy, harmonious, before you’re able to explain in clear words what the problem is, come and see us, we’ll help you. We can help you, we’ll look at together. (...) Because we know that the residents have a lot of problems in explaining that they have difficulties, it’s often perceived to be a sign of weakness, so we really try to help them around that. (HP06)

One difference between the family medicine teams and PMHC teams studied was that within family medicine teams, professionals seemed more open to seeking and sharing knowledge with peers regardless of their profession, compared with PMHC teams where members tended to seek formal and informal supports from peers of a similar profession. Indeed,
family medicine was described as a “disciplined defined by collaboration” and within family medicine teams teamwork and particularly interdisciplinary teamwork was highly valued.

The relevance of interdisciplinary teamwork when caring for patients with mental-physical multimorbidity was a recurring theme throughout the interviews. Perhaps more than ever before, opportunities for clinicians to engage in interdisciplinary care abounded given the increasingly multidisciplinary nature of both family medicine and PMHC teams as well as the arrival of responding psychiatrists in CSSSs. Strong epistemic characteristics were particularly present at site A2, where the psychologist and social worker have worked closely with clinicians to transform the mental health services delivered at this clinic. Notably, they established a weekly team activity in mental health involving the responding psychiatrist and the clinic’s physicians and residents. This activity brings together clinicians with diverse professional backgrounds and level of expertise in mental health and has greatly facilitated the finding, sharing and use of knowledge during the provision of care to patients with comorbid mental and chronic physical conditions. Interestingly, this activity has had clear impacts on clinician learning and practices with patients.

Here we work together, it’s on Thursday afternoons. (...) So that’s a real collaborative activity, as much in terms of teaching as caring, because they see the patient together. It’s always a psychiatrist and family doctor or the psychologist and family doctor. They all talk together and so it really allows the mental health part come out as well as the physical part and relational part, everything is there. (HP07)

...there is a meeting every Thursday afternoon for case discussions in mental health. (...) There are two doctors from the GMF, myself included, who participate in that meeting. There is the responding psychiatrist. There is the social worker. There’s the psychologist. There are residents of the psychiatrist. There are residents of the UMF. There’s a lot of people. And the other doctors at the GMF can have their patients seen during those meetings, can come and discuss as well. (...) We have a better sense of
each other’s expertise and there is really a good sharing of knowledge also, a good sharing of knowledge among others, between the psychologist and us. In my case it really helped me early in my practice to have worked closely with those people, their advice was really, really valuable. (HP05)

...I see some changes in the psychiatrist and even among us where each of us adopt different ways of doing things. So, for example I saw a R1 (family medicine resident) where his interview was coloured a bit more by the psychiatrist where it was really, one question after another, more like a questionnaire. There was a R6 (psychiatry resident) where in his way of intervening, in his way of asking questions, there were aspects a bit more like the psychologist would do and so it colours their practice and way of doing things and it’s really interesting. (HP09)

Responding psychiatrists also met with the clinicians of sites A1, B1 and B2 and participants reported similar experiences of helpful exchanges and improved decision-making. Importantly, it was the interactions between clinicians with different expertise and perspectives that made these meetings valuable.

...it’s a person who brings a case that is problematic and new and the psychiatrist brings the psychiatric point of view, which is an interesting point of view also. There are people who will bring a psychological point of view. There are people who will bring a social point of view. That’s an interdisciplinary practice in the end. (HP15)

We had already seen in the context of those meetings a patient who was depressed but who really also had a very advanced Parkinson’s disease and so it really helps to make sense of things sometimes. That everyone can be there to talk and that it’s not just for example about asking someone for a consultation, asking for advice and having them leave me a message in return... So asking for a consultation with the psychologist and the psychologist leaves me a little briefing of what they did or else
the psychiatrist telling the patient, “Well go see your family doctor” and then the family doctor writes something to the psychiatrist... there’s really an interaction that is possible. And it’s really that interaction that provides that meeting with added value. (HP05)

Only within the PMHC team of CSSS B were there feelings that interdisciplinary collaboration was not yet optimal. This could be due to the relative newness of this team, though some participants felt that the current leadership in the team placed less emphasis on interdisciplinary teamwork than did the previous leadership. This led some members to be reluctant to share more personal views or difficulties during case discussion meetings or meetings with the responding psychiatrist.

Many participants within family medicine teams also expressed frustration regarding their interactions with PMHC teams, which were described as “black boxes” that they would refer patients to with few standardized communications about patient progress in return. Participants within PMHC teams expressed similar frustration in their dealings with GPs; relationships with GPs were “difficult” and “non-existent” and linking with these busy and hard-to-reach clinicians necessitated being “very insisting” and “creative”.

One facilitator of exchanges between family medicine and PMHC teams were clinical information systems that allowed clinicians to share patient files. At sites B1 and B2, clinicians shared electronic patient files and this allowed GPs to find, store, and use information on interventions carried out by the PMHC team, and vice versa.

We have software, which is OACIS, which is our electronic files, our archives finally. In fact, all our files, our papers, all of that is all archived and digital, so I have access to that online on my computer. I can go and see what has been done, I can see what interventions have been done, become aware of the file from my office. (...) ...that’s very helpful because we can see when the client had consulted their doctor, well as
long as it’s in the CSSS, who intervened in this case. So that, we can see all that has happened at each of the meetings if we want to go that far, so that’s really the patient file if we want to study the case. (HP11)

Implementation of electronic patient files was underway in CSSS A and as such participants generally benefited from them to a lesser extent than what was observed in CSSS B. Moving towards electronic records was viewed as a difficult transition but an important one, as information in paper-based files was sometimes lost or hard to find, especially when providers practiced in multiple service locations.

Here in the organization we’re in a transition period. We have our archives and excuse the expression but it’s a total mess. Given that we’re in three service locations, a patient that comes to (location 1) may have been seen by a psychologist at (location 2) or I may see a patient in the walk-in service at (location 1) and the note will be sent to (location 2) and classed I’m not sure when. And the patient presents and they have a very large depression and I had scheduled them to come in five weeks but things are not going well so they come before and the note will be lost, we’re not sure where it is and we’re not sure what was prescribed... So things are not filed away properly or within a reasonable time, the lab results are filed away poorly and all that. Well now the CSSS is trying to implement a (clinical information system) and all the progress notes, in fact everything, will be made digital and will be accessible online. So that should solve a part of the problem. (...) So for sure it’s a barrier in terms of follow-up and you don’t have your notes, it’s irritating. And it’s a little bit less optimal in terms of quality of care. (HP02)

Another notable technological enabler included Internet-based decision support resources that were useful for patients with mental-physical multimorbidity because they could be consulted to help find reliable and up-to-date information on clinical recommendations, diseases that were more rare, or drug-drug interactions. Such online resources were
consulted far more frequently than clinical practice guidelines, which participants used rarely in cases of mental-physical multimorbidity.

A summary of our results are presented in Table 3.

<table>
<thead>
<tr>
<th>Table 3. Summary of findings for enablers, processes and outcomes</th>
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<tbody>
<tr>
<td><strong>Organizational KM enablers</strong></td>
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<tr>
<td><strong>Structural/strategic</strong></td>
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<tr>
<td>• Status of clinics as GMF or UMF</td>
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<tr>
<td>• Salary-based physician payment</td>
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<tr>
<td>• Education and training in mental health</td>
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<td>• Clinical supervision</td>
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<tr>
<td>• Physical workspaces</td>
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<tr>
<td><strong>Social</strong></td>
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<tr>
<td>• Norms of mutual support</td>
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<tr>
<td>• Values of teamwork</td>
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<tr>
<td>• Values of professional autonomy</td>
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<tr>
<td>• Informal relationships and friendships between clinicians</td>
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<tr>
<td><strong>Epistemic</strong></td>
</tr>
<tr>
<td>• Case discussion meetings</td>
</tr>
<tr>
<td>• Interdisciplinary meetings with responding psychiatrists</td>
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<tr>
<td>• Interprofessional care and activities</td>
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<tr>
<td><strong>Informational</strong></td>
</tr>
<tr>
<td>• Electronic health records with note sharing capabilities</td>
</tr>
<tr>
<td>• Electronic decision support resources</td>
</tr>
<tr>
<td>• Internet (e.g. Google Scholar)</td>
</tr>
<tr>
<td>• Electronic communications with pharmacists for patients’ drug information</td>
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</table>

**Knowledge processes**

Finding, sharing, storing (or losing), and using knowledge

**Intermediate outcomes**

Sensemaking, problem solving, decision-making, learning

**Organizational performance**

Appropriate care processes for patients with mental-physical multimorbidity
Discussion

In this study we aimed to better understand how the organizational contexts of primary care providers influenced the care they provided to patients with comorbid mental and chronic physical conditions. Guided by a conceptual framework based on the knowledge management literature, our study has three main findings that have implications for quality improvement efforts targeting the care provided to these vulnerable patients.

First, in both CSSSs we found that several types of primary care organizational characteristics could facilitate (or impede) care for patients with mental-physical multimorbidity. Characteristics related to the type of clinic or team providers practiced in, as well as the human resources and educational supports available within practice settings, were important structural foundations for the care of these patients. Similarly, social (e.g. settings valuing teamwork and mutual support), epistemic (e.g. interdisciplinary meetings and practices), and informational (e.g. clinical information systems and decision support resources) characteristics were each regarded as important organizational supports for patient care. These findings shed important light on a topic that has received scant attention to date and differ from those reported in previous studies on mental-physical multimorbidity, which have focused mainly on barriers to care for patients with mental-physical multimorbidity [25, 28] or investigated few organizational characteristic types [62-64]. Our findings also reinforce those of our previous study, in which several different types of organizational characteristics were found to be associated with the quality of care for depression among patients with comorbid chronic conditions [48].

Second, our study identifies some of the processes through which organizational characteristics influence care decisions and quality for these patients. For example, a strong culture of openness and mutual support within teams (a social KM enabler) was critical when managing patients with mental-physical multimorbidity because clinicians didn’t hesitate to seek out and use their colleague’s knowledge to help them when they experienced problems with a patient. Similarly, interdisciplinary meetings involving responding psychiatrists and
other professionals (an epistemic KM enabler) allowed teams to share knowledge, problem solve and learn collectively, resulting in improved decision-making, changed practices, and more interdisciplinary care for complex patients. Our findings thus go beyond examinations of statistical associations between organizational structures and clinical care processes and begin to shed needed new light on the mechanisms linking organizational characteristics and care processes together [65, 66].

Thirdly, and perhaps most interestingly, our findings suggest interdependencies between the various organizational enablers under study and the KM processes that lead to actions affecting the quality of care delivered to patients with mental-physical multimorbidity. For instance, interdisciplinary meetings involving multiple professionals had the potential to promote sharing and use of knowledge and support decision-making, but these meetings also depended on the presence of a social environment that fostered trust, respect and teamwork. When these social enablers were less present, the benefits of such interdisciplinary activities were lessened. Similarly, technologies such as electronic patient files greatly facilitated patient care by allowing clinicians to more easily find, share, store and use information about patients and clinical interventions. However, clinicians from both CSSSs benefited much less from such systems when resources were not invested to make them more functional, when services were not formally integrated (thus precluding access to data), or different teams’ or organizations’ information systems were not linked. Even interactions with patient characteristics were noted, as knowledge flows surrounding care for patients with comorbid depression and diabetes could differ greatly from those surrounding care for patients with comorbid depression and Parkinson’s disease or arthritis, even within the same practice setting.

These latter findings are important and highlight the need to further improve our understanding of the complex nature of practice settings and their influence on clinical practice and patient care. Such findings also have relevance for quality improvement initiatives. Indeed, many organization-level improvement initiatives for mental disorders or
chronic diseases emphasize structural/strategic changes within practice contexts (e.g. educational interventions, case management) [67-70] but often provide fewer details about how such changes influence and are influenced by social, epistemic or technological features of these contexts. For instance, interdisciplinary team-based interventions such as collaborative care have produced promising results for patients with mental-physical multimorbidity [71, 72] but implementation and successful team functioning can be challenged by the absence of leadership and norms promoting supportive and productive relationships, opportunities for interprofessional exchanges and learning, and information technologies facilitating team-based communications [73, 74]. Greater attention to these features of organizations and their interaction in different contexts is thus critical for optimizing future quality improvement efforts.

Our study had several strengths, including the diversity of participants involved, the use of multiple data sources to support findings, the steps taken to achieve rigour, and our use of a conceptual framework to guide data collection and analysis. Several limitations of our study are worth noting, however. The two cases we selected were located in highly populated urban areas and it is difficult to know to what extent the organizational dynamics within these CSSSs resembles those within CSSS in surrounding areas or more rural regions. Similarly, all of the participants in our study practiced mostly within the public system, which was noted to be different from an organizational and clientele standpoint than the experience of practicing within private medical clinics. Given that a substantial amount of primary care services are provided by private clinics and solo practices [36], it would be important to explore the influence of organizational characteristics on complex patient care in these settings. Our recruitment procedures also led to the participation of many clinicians that were highly experienced in care for patients with mental and chronic conditions. As such, it is possible that the knowledge activities of these clinicians differ from those of practitioners in private practice settings where care for patients with mental-physical may be less common. Finally, we were unable to recruit more than one participant each from the family medicine team at site B1 and the PMHC team at site A1. We have thus reported the
findings we were most confident in, but additional perspectives from these teams would have further strengthened our results.

**Conclusion**

This study revealed that several types of characteristics of primary care providers’ practice settings can support care provided to patients with mental-physical multimorbidity by influencing providers’ ability to find, share and use knowledge needed to make decisions and solve problems related to the care of these complex patients. Organizational characteristics do not work independently but rather together to create contexts that are conducive (or not) to effective patient care.

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Chapter 6: Discussion

6.1. Summary of key findings
During time that this thesis has been carried out, major efforts to strengthen primary care and also the delivery of mental health services within primary care have been undertaken in Quebec and many other parts of the world. The results of this thesis confirm the need to continue these efforts, as many people with depression that seek help in primary care continue to receive care that is suboptimal.

This is illustrated clearly in the results of our systematic review, presented in articles 1 and 2. Based on syntheses of 53 studies, we observed important deficits in the recognition, treatment, and follow-up care of depression in primary care. Article 1 presents results from 13 studies that provided data on relationships between chronic physical comorbidity burden and the recognition of depression. In 9 of the 13 studies, overall rates of depression recognition were reported to be below 50% and in 4 studies patients with higher burden of chronic physical comorbidity were found to have lower rates of recognition than patients with less comorbidity burden. In article 2, we present results related to the treatment and follow-up care of depression received by patients with differing burdens of chronic physical comorbidity. Once again, across a wide range of quality indicators, most studies report that fewer than half of patients receive appropriate treatment and follow-up care for their depression in primary care settings. A particularly worrisome finding is that while performance on certain simple indicators of quality was sometimes high, performance lowered considerably when indicators considered multiple aspects of depression treatment (e.g. providing medication at an appropriate dosage with an appropriate medical follow-up).

Results from the third article presented in this thesis lend further support to these findings. In this article, data from Project Dialogue were used to examine relationships between patient characteristics, primary care organizational characteristics, and the recognition and adequate treatment of depression. With respect to the quality of depression care,
approximately 68% of the over 800 patients with depression and comorbid chronic conditions reported that their depression had been recognized, yet only 51% reported receiving a diagnosis for their disorder. Similarly, more than half of these patients failed to receive depression treatment that could be considered minimally adequate according to the standards of care available at the time.

Taken together, what these findings suggest is that despite the longstanding appreciation for the prevalence of depression and the significance of the burden it imparts on individuals and on us all, it remains to this day a largely under-recognized and inadequately treated condition in primary care settings.

Turning our attention now to the factors that influence the quality of depression care, another main finding of this thesis is that patients’ comorbid chronic conditions do seem to have an influence on care quality but not consistently and not in an easily predictable fashion. The results of our systematic review show that higher burden of chronic physical comorbidity was at times associated with higher levels of depression care quality, at times associated with lower quality of depression care, and at other times not associated with depression care quality after controlling for important confounding factors. Adding to the complexity are findings from several studies that examined the effects of multiple chronic conditions separately, which revealed that certain conditions could positively influence quality whereas others could lower likelihood of the receipt of appropriate depression care. The findings from Project Dialogue presented in article 3 further illustrate that the combination of conditions that patients have is important, as we found that the recognition and minimally adequate treatment of depression differed across patients with different profiles of comorbid chronic conditions. More specifically, patients who only had comorbid psychiatric conditions were most likely to have their depression recognized and treated adequately whereas patients having only chronic physical comorbidity were half as likely as this first group to receive a similar level depression care quality.
It seems to be the case then that the nature of the relationship between patient comorbidity and the quality of care for depression is more complex than is widely thought. One likely reason for this is that while patients’ comorbid conditions may be an important factor that influences care quality, many other patient attributes and features of clinical settings are also influential. Evidence presented in the first 3 articles supports this view, as we identified a number of other patient-level and organizational-level characteristics that were associated with depression care quality and we also showed how recognition rates and rates of adequate treatment could vary between patients with different comorbidity profiles that received care in different clinical settings.

Our findings related to the role of primary care organizational characteristics in the care of people with depression and comorbid chronic conditions, presented in articles 3 and 4, are especially novel. Indeed, these findings indicate that the contexts in which patients receive their care matter and that some primary care clinic characteristics are more supportive to the delivery of high-quality depression care to patients with comorbid chronic conditions than others. This topic was explored in-depth in article 4, which shed light on primary care providers’ perspectives of the influence of their organizational settings on the care they provide to patients with mental-physical multimorbidity. A related and central finding, discussed in article 4, is that primary care organizational characteristics do not usually exert their influence in isolation from one another. Instead, organizational influences are interdependent and as such their influence must be assessed in a more holistic fashion. Taken together, these results have important implications for the design of quality improvement initiatives for depression, and particularly those directed at patients with comorbid chronic conditions.

In the next two chapter sections, we expand on our findings and place them within the context of existing literature. After that, we discuss how our findings may inform future primary care quality improvement efforts in Quebec and more generally.
6.2. Depression recognition and treatment in patients with different comorbidity profiles

More than 15 years ago, Klinkman stated that elements of the different domains of his framework – the patient, provider and practice ecosystem – may “interact in complex ways to influence identification and treatment of depression” [30]. Yet, most studies of depression care quality conducted over the years have investigated the influence of factors from a single domain while ignoring factors from other domains and how these may interact. In this doctoral thesis, we examined the influence of both patient- and organizational-level factors on the quality of depression care but also began to explore how factors interacting within and across levels may impact depression care processes.

In the next paragraphs, we will discuss the influence of comorbid chronic conditions on the quality of depression care provided in primary care. This will be followed by a discussion of how the organizational factors and other patient-level factors we assessed affect depression care quality.

**Influence of comorbid chronic conditions**

This thesis began with a systematic review addressing a longstanding debate in the literature around the influence of patients’ comorbid chronic conditions on the quality of care they receive for depression in primary care. The prevailing view is that comorbidity of chronic physical illness interferes with depression recognition and treatment because these illnesses compete with depression – usually successfully – for patients’ and providers’ attention during brief primary care consultations. To investigate this we undertook a review that specifically compared the quality of depression care received by patients with higher burdens of chronic physical comorbidity to the quality of depression care received by patients with lower burdens of chronic physical comorbidity.

What our review showed is that the prevailing view is likely only partially correct. There was indeed some evidence that when patients had a new episode of depression, their comorbid
chronic conditions decreased the likelihood that their depression would be recognized or treated appropriately during their initial visits with primary care providers or in the early stages of treatment. For instance, studies by Tylee et al. [397] and Rost et al. [323] found that untreated but currently depressed patients with higher chronic physical comorbidity burden (a higher number of conditions or more severe conditions) were significantly less likely to be recognized as depressed during index visits with their GP than patients with less chronic physical comorbidity burden. In a similar vein, studies by Nuyen et al. [282], Kendrick et al. [398], and Sewitch et al. [399] each provided strong evidence that initiation of treatment for new depressive episodes was several times less likely in patients with higher chronic physical comorbidity burden than in patients with no or lesser comorbidity burden.

Studies by Akincigil et al. [313] and Pirraglia et al. [400] further reveal that chronic physical comorbidity can also negatively influence the provision of an appropriate duration of treatment during the first months of treatment. In these studies, authors calculated the proportion of days covered by prescriptions in the acute phase of treatment and found that patients with certain conditions (COPD) or combinations of conditions (cardiovascular and diabetes conditions) had approximately 33% lower odds of having an appropriate treatment duration compared with patients without these conditions.

It is interesting to interpret these findings in light of patients’ service use patterns. In particular, patients with higher numbers of chronic diseases have been shown to use more services than those with fewer chronic diseases [401]. Additionally, results from our systematic review showed that patients with greater chronic physical comorbidity burden were often more likely to have an appropriately intense acute-phase follow-up (e.g. achieving a minimum number of visits in the 3 months following treatment initiation) than patients with lower comorbidity burden. Such findings illustrate that while clinicians may be seeing patients with depression and chronic physical comorbidity more often, they are not necessarily recognizing depression more often or treating it appropriately in the early stages of illness.
Findings from previous studies provide potential explanations for these results. In their qualitative study of the diagnosis of depression by primary care clinicians, Baik and colleagues found that the diagnostic process proceeded according to three steps: (a) “ruling out”, (b) “opening the door”, and (c) “recognizing the person” [187]. The first step involved ruling out a broad range of potential organic causes for the patients’ symptoms. Even when clinicians suspected depression, they still performed an extensive ruling out process to avoid missing a physical illness. The next step involved giving the patient the opportunity to discuss emotional issues that were bothering them, a process that was dependent on clinicians’ comfort with mental health problems, their familiarity with the patient, and on the time available to them during the consultation. In the last step, clinicians learned to “know” their patient and recognize functioning or behavioural changes indicative of depression.

When patients present with other chronic diseases, each of these steps in the recognition process can be prolonged or disrupted. For instance, Coventry et al. [306] and Stanners et al. [309] both explored primary care clinicians’ experiences in the management of patients with depression and comorbid chronic conditions. They found that clinicians often perceived the need for many (e.g. up to ten) visits with patients over the first months of care in order to become familiar with patients’ physical and emotional problems, test hypotheses as to the origins of problems, and build a rapport with patients before being able to arrive at a confident diagnosis of depression. The differential diagnosis process for depression in these patients is thus complex and seemingly requires more visits than what might be needed for patients without comorbid conditions. While this indicates a potential role for depression screening tools, it should be noted that systematic screening for depression in patients with chronic health problems has not been recommended by the Canadian Task Force on Preventive Health Care [402]. However, Canadian and international guidelines do recommend that clinicians use a simple two-question detection approach involving questions about loss of pleasure and low mood or hopelessness to facilitate earlier recognition of depression in this vulnerable patient population [3, 15]
Even after arriving at a diagnosis, however, optimal acute-phase treatment of depression can be challenged by the presence of other chronic conditions, even when patient visits are frequent. Patients with more chronic physical comorbidity frequently use more medications overall [403] and clinicians may hesitate to initiate new antidepressant drugs when patients are already exposed to polypharmacy [309]. Stanners also reported that clinicians could even forego referring patients for psychological treatments when they perceived that their chronic conditions would limit the benefits and effectiveness of psychotherapy [309].

Helping patients achieve an appropriate duration of depression treatment (i.e. adhering to treatment) is widely regarded as an important means for promoting treatment effectiveness and preventing relapse and recurrence of depression [404]. Yet, the specific mechanisms through which chronic physical comorbidity interferes with acute-phase treatment duration or adherence are not well understood. Clinicians have been shown to be very sensitive to the side effects and potential drug interactions of antidepressants prescribed to patients with comorbid chronic diseases [309] and this could lead them to discontinue treatment in some patients to address potential or experienced adverse effects [405]. Another possibility relates to the burden of illness that patients experience. Iosifescu and colleagues showed that patients having higher chronic physical comorbidity burden also had greater severity of depression and poorer acute-phase response to antidepressant treatment and rates of remission than patients with lower chronic physical comorbidity burden [406]. Decreased depression treatment adherence may thus be the result of impairments associated with higher burdens of physical and mental illness, or possibly patient or provider perceptions that depression treatment is simply not working [405].

Interestingly, evidence from our review suggests that patients with higher chronic physical comorbidity burden sometimes receive a higher quality of depression care over longer periods of time (e.g. six months or more after initial consultations) than patients with less physical comorbidity burden. This finding runs contrary to prevailing views of the effects of
physical illness on depression care but is consistent with the notion that clinicians rely on multiple contacts with patients in order to build relationships with them and make diagnostic and treatment decisions. It’s important to note however that the majority of studies observing higher burden to be associated with higher quality of care did not control for patients’ use of primary care services in their analyses. Among those that did, most observed either a negative relationship between comorbidity and quality or else no significant relationship between these aspects. Indeed, in at least two studies [281, 407], some positive associations observed in unadjusted analyses became insignificant when service use was controlled for.

Nevertheless, several strong studies controlling for a wide range of other potential confounders revealed that certain comorbid chronic conditions, or combinations of conditions, facilitated the recognition, treatment or follow-up care of depression whereas other conditions had negative or little effects on depression care quality. Such findings may reflect a novel concept recently introduced to the multimorbidity literature, i.e. the concept of “comorbidity interrelatedness” [408]. This concept, described by Zulman and colleagues, is defined as “the degree to which conditions interact with one another in ways that generate clinical complexity” and was informed by a similar review of relationships between multimorbidity and care quality showing that quality could vary depending on patients’ specific combinations of conditions [408].

A simple example of comorbidity interrelatedness provided by Zulman relates to diagnosing the cause of ankle swelling. In patients with no chronic illness, identifying the cause of swelling is relatively straightforward for clinicians. Even when conditions such as migraine headache or epilepsy are present, clinicians will typically have little difficulty identifying the source of the problem given that these conditions are usually unrelated to ankle swelling. However, patients presenting with heart failure, arthritis, or some combination of these present greater challenges to clinicians. Ankle swelling from build-up of excess fluid is a common symptom of heart failure and ankle inflammation is routinely observed in people
suffering from arthritis. Hence, specific combination of conditions can generate more clinical complexity than others, in this case leading clinicians to experience greater diagnostic uncertainty. Other challenges posed by comorbidity interrelatedness include a reduction in management options, altered treatment benefit/risk profiles, and the decreased relevance of clinical practice guidelines [408].

While Zulman did not discuss the role of depression in the context of comorbidity interrelatedness, it seems likely that the concept has high relevance for this disorder and its relationship with quality of care. This was recognized by Harman and colleagues, who examined the influence of four comorbid chronic diseases (heart disease, diabetes, arthritis and hypertension) on treatment adequacy in older adults [325]. These authors found that older adults presenting with comorbid diabetes or hypertension were significantly more likely than respondents without these conditions to receive adequate depression treatment, a relationship that was not observed in patients with comorbid heart disease or arthritis. As Harman reasoned, clinicians could perceive elevated blood pressure to be a symptom of depression and thus be more inclined to explore and treat depression in those circumstances. However, the same clinician facing a patient with arthritis may view depressive symptoms to be a natural reaction to this painful disorder, impeding appropriate depression treatment.

Similarly, in our study we found that patients that presented with psychiatric comorbidity only – which consisted mostly (> 96%) of comorbid anxiety disorders – had a significantly higher likelihood of receiving high quality depression care than patients that had chronic physical comorbidity but no psychiatric comorbidity. A similar pattern of results has been found in two other studies [289, 388] and suggests that the combination of depression and anxiety facilitates depression recognition and treatment adequacy, especially when no comorbid physical conditions are present. This finding may be due to patients with depression and anxiety experiencing greater overall psychological distress, which may be interpreted by GPs as depression given their familiarity with this disorder [289]. Patients
with both anxiety and depression may also be more likely to express needs for mental health care during their visits with GPs [409]. Furthermore, both major depression and anxiety disorders can be treated effectively by antidepressant pharmacotherapy [410] and the combination of disorders has been shown to increase odds of receiving psychotherapy [318]. When non-depressive psychiatric symptoms or disorders are not present, however, clinicians seem to have a harder time detecting the presence of depression and ensuring that it is treated appropriately. We should note that while we did not test the influence of combinations of specific comorbid anxiety disorders (e.g. generalized anxiety disorder, panic disorder) and chronic physical conditions (e.g. diabetes, cancer, chronic back pain), other authors have provided evidence that different anxiety and chronic physical conditions may interact to affect depression care in different ways [289].

In sum, depression care quality seems to vary according to specific diseases or combinations of diseases being studied, which lends credence to the idea of comorbidity interrelatedness in this context and identifies this concept as an important one to explore further in future research.

That being said, other factors likely also contributed to the heterogeneous findings observed within and across studies in our review. Notably, there was wide variation in the methods used by authors and particularly the choices of measures used for chronic physical comorbidity and depression care quality. Furthermore, several studies [282, 288, 289, 411, 412] adopting multiple definitions of these concepts within the same study showed that results could vary significantly depending on the definitions used in quality indicators and measures of comorbidity.

However, it is unlikely that methodological factors explain all observed divergences in the review, as studies adopting similar methods still reported different results and no clear patterns emerged among studies examining the same comorbid chronic physical conditions. Rather, it is likely that a variety of other factors contributed to the observed pattern of
results in and across studies. Unfortunately, only a minority of studies in the review measured or analyzed the effects of factors beyond the patient-level. For instance, only four studies [277, 279, 411, 413] assessed – albeit minimally – clinician characteristics, with none of these reporting significant influences of such characteristics on depression care in multivariate analyses. Two studies by Sewitch did show however that the prescribing of guideline-recommended antidepressants was significantly more likely (odds ratios > 3) when patients were diagnosed and treated by the same physician [399, 411], highlighting the important but often underappreciated role of continuity in depression care [414]. In five studies, the impact of site of care on the quality of depression care was examined [288, 398, 415-417]. In all five, the site of care was shown to have a strong, significant influence on depression care quality. Of note is that patients receiving at least some of their depression care from mental health providers were several times more likely to receive appropriate depression care relative to patients being treated exclusively in primary care settings, which underscores the need to adequately integrate mental health and primary care services.

Finally, only one study in the review examined the influence of different organizational characteristics on depression care quality and explored interactions between organization-level factors and patients’ comorbidity profiles. It is our own study (article 3) and our findings are discussed in the next paragraphs.

**Influence of organizational characteristics**

The quantitative phase of our mixed methods study revealed that several primary care organizational characteristics were associated with the recognition or adequate treatment of depression in patients with comorbid mental and/or chronic physical conditions. Authors have previously argued that health care organizational factors have an important impact on the delivery of care to patients with mental disorders and comorbid chronic conditions [26, 305]. However, we could only identify two previous studies that directly examined relationships between organizational factors and the quality of care provided to these patients [298, 418].
In a study by Jordan and colleagues [418], the influence of care setting on guideline-consistent acute phase treatment was investigated in a large sample (n = 5517) of American veterans with COPD and comorbid depression. Guideline consistent treatment consisted of receiving an adequate duration of antidepressant treatment over the first 114 days of treatment and an appropriate medical follow-up (i.e. 3 visits within the first 84 days of treatment). Care setting was categorized into six mutually exclusive groups: (a) primary care only, (b) mental health only, (c) primary care and mental health, (d) primary care and pulmonary care, (e) primary care, mental health and pulmonary care, and (f) other. In multivariate analyses, the authors found that relative to patients cared for exclusively in primary care, patients receiving care exclusively in the mental health settings (odds ratio ≈ 17) or in multiple settings (odds ratios ranging from 2.7 to 8.2) had significantly higher odds of receiving guideline-consistent treatment. Effects of care setting on treatment were driven particularly by adequacy of follow-up care, as no influence of setting was observed on odds of antidepressant treatment duration adequacy. Similarly, in a recent study by Sambamoorthi et al. [298], the relationship between level of care integration and diagnosis of depression was assessed in a very large population (n = 27,972) of women veterans with depression and comorbid diabetes, heart disease and/or hypertension. Authors examined whether women received services in: (a) primary care clinics specifically targeting women that provided mental health services, (b) primary care clinics specifically targeting women that did not provide mental health services, (c) primary care clinics that did not specifically target women, and (d) mental health clinics specifically targeting women. They found that women were more likely to be diagnosed as depressed in primary care clinics for women with integrated mental health services (odds ratio = 1.12, 95% CI = 1.01 – 1.25). Sambamoorthi also examined whether the presence of electronic reminders to screen for depression facilitated depression diagnosis, but these characteristics did not improve odds of diagnosis.
Taken together, these studies provide evidence that patients with chronic illness that receive depression care from both primary care and mental health providers have a higher likelihood of receiving high-quality care than those cared for exclusively by providers in primary care. It thus seems important that primary care clinicians have access to supports from mental health professionals (and vice versa) in order to share in patient care and provide better depression care to patients with comorbid chronic conditions.

This view is supported by the findings from our own study. We observed that the odds of depression recognition were higher when patients received care from primary care clinics with fewer perceived barriers to optimal care related to the accessibility of mental health professionals. Several reports by Fleury and colleagues provide a vivid picture of the interactions that Quebec primary care providers have with mental health professionals [319, 320, 419, 420]. These authors administered surveys in close to 400 GPs in nine local service networks across five regions of the province of Quebec and later conducted follow-up interviews with 60 GPs to discuss the delivery of mental health care in primary care and interactions with mental health professionals. Their studies revealed contact between GPs and mental health professionals was often quite limited. Specifically, 45% of GPs had no contacts with psychologists in private practice, 49% had no contacts with mental health professionals working in CLSCs, 52% had no contacts with psychiatric services, and 94% had no contacts with community-based mental health organizations or crisis centres. Up to 14% of GPs had no contact with mental health professionals whatsoever [319]. Aside from those GPs working in the more multidisciplinary practices within CLSCs and a small number of medical clinics, many GPs felt isolated from supports from mental health professionals [420]. However, GPs that did perceive themselves to have good relationships with mental health professionals were more likely to take on these patients as regular clients [419] and GPs considered access to diverse mental health resources to be an important enabler of care [420]. Building on these findings, our own results suggest that easier access to mental health professionals is an important facilitator when diagnosing depression within the context of
comorbid chronic mental and/or physical conditions, possibly because physicians can more easily consult other professionals and clarify complex diagnostic situations.

Our study also suggests that the presence of GPs that devote significant time to patients with mental health problems within clinics can similarly facilitate depression care in patients with comorbid chronic conditions. When such GPs were reported as present, the likelihood that patients received minimally adequate treatment increased by 54%. Studies have reported that approximately 20% or more of primary care patients have common mental disorders such as depression or anxiety [24, 186, 420], yet in our sample (which admittedly may not be representative of all primary care clinics) more than half of the clinics featured at least one GP that devoted the majority of their time to mental health problems. Interestingly, these GPs were not concentrated within a single type of primary care clinic (i.e. CLSC, GMF, large or small clinic, solo providers). Rather, about half of the clinics of each type featured GPs with a mental health-focused practice. Fleury has reported that some GPs have a keen interest in mental health issues [420] and it is possible that these GPs act as an important source of knowledge and support to their peers with respect to the appropriate treatment of depression.

The strongest organizational predictor of minimally adequate treatment in our study was the value accorded to teamwork by GPs in clinics. In clinics where the importance of teamwork was highest, patients were almost 2.5 times more likely to receive minimally adequate depression treatment. That team-based care is critical for patients with multimorbidity generally and mental-physical multimorbidity specifically is now widely recognized [26, 250, 305, 421]. Indeed, the most recent and promising interventions for patients with multiple chronic conditions have revolved around the implementation of multidisciplinary teams [214]. That said, few studies have actually evaluated how interventions impact professionals’ values and behaviours surrounding teamwork and there has been relatively limited research on the relationships between teamwork and quality of care for chronic conditions in routine primary care settings. Some evidence does show that multidisciplinary care or a better team
climate is associated with a higher quality of care for single chronic diseases such as diabetes or heart disease [380, 422, 423]. The results of our study thus extend these findings and highlight the importance of teamwork in the treatment of depression in patients with comorbid chronic conditions.

Another predictor of minimally adequate depression treatment was a greater use of treatment algorithms for depression or anxiety disorders within clinics. Though clinical practice guidelines are considered an important source of decision support for clinicians caring for patients with chronic diseases [327, 424], their applicability towards patients with multiple chronic conditions is controversial. Some authors have argued that adherence to guidelines in patients with multimorbidity is at best unhelpful and at worst harmful because it can lead clinicians to deliver complex and sometimes contradictory drug or self-care regimes [425, 426]. Treatment algorithms, on the other hand, may be more appropriate in the care of patients with multimorbidity. Algorithms are explicit treatment protocols that provide specific therapeutic pathways and decision options at critical decision points throughout the treatment process [427]. They are essentially decision aids for clinicians designed to optimize both treatment implementation and the appropriateness of treatment strategies [427]. As opposed to clinical practice guidelines, which may be hundreds of pages in length, algorithms are usually brief and can be illustrated as figures or graphs. They are typically designed based on guideline recommendations and have been shown to be an important component of effective multifaceted interventions for depression [428]. More recently, algorithms have been used developed as part of quality improvement initiatives for patients with both depression and chronic diseases such as diabetes [421]. Though reliance on treatment algorithms may be challenged by the sheer number of combinations of comorbid conditions that are possible [358], they may improve treatment quality by resolving some of the clinical uncertainty that commonly arises when caring for more complex patients with depression [50, 304]. In addition, algorithms can be particularly useful to facilitate a closer monitoring of patients’ treatment response and outcomes [428], which our quality indicator for treatment adequacy would have been sensitive to.
The only primary care organizational characteristic in our study that had an influence on both the recognition and minimally adequate treatment of depression was perceived barriers to care stemming from physicians’ payment models. Specifically, patients visiting clinics that rated such barriers to be highly limiting to care were approximately half as likely to receive minimally adequate treatment relative to patients from clinics where inadequate payment models were seen as less problematic. A similar pattern of results was observed for depression recognition, though results just fell short of significance in multivariate models.

The influence of payment models on the quality of care for chronic diseases has generated much debate. It has been argued that none of the models traditionally used to pay physicians – fee-for-service, capitation, or salaried payment models – provide the adequate incentives for high-quality chronic disease care [27, 250, 327, 429]. Meanwhile, new approaches to physician payment, such as pay-for-performance schemes and blended models that mix salaried approaches with incentive payments for the care of certain patient subpopulations, have been proposed as alternative models that may be more suited for the care of patients with chronic conditions [250, 429]. However, a recent Cochrane review found that there was insufficient strong evidence to judge whether any of these models has a consistently positive effect on the quality of care provided in primary care [430].

In our study, only clinics in which physicians were paid primarily through fee-for-service payment schemes reported that depression or anxiety care was highly limited by inadequate payment models, suggesting that this payment model may be more problematic than others. In a recent study by Beaulieu and colleagues also conducted in Quebec, the technical quality of care provided for episodic and chronic illnesses in primary care was similarly predicted by physician remuneration method – with salaried/hourly models strongly associated with higher quality of care relative to fee-for-service models [380]. Other studies have also shown that primary care organizations relying on salaried models can achieve higher quality in various aspects of chronic disease care than organizations relying on other models of
physician payment [46, 379, 431]. The influence of payment models was also a topic of discussion during the qualitative phase of our mixed-methods study and so we will explore this factor’s role in care for patients with depression and comorbid chronic conditions further in the next chapter section.

Finally, in article 3, we also present findings related to how these various organizational characteristics interact with patient comorbidity to influence rates of depression recognition and treatment adequacy. We presented two virtual clinics – Clinic A with several enabling characteristics of depression care and Clinic B without these enabling characteristics – as well as three virtual patients characterized by their comorbidity profile (psychiatric comorbidity only, chronic physical comorbidity only, or both types of comorbidities). What our analyses illustrate is that while clinics may be well organized to support the delivery of high-quality depression care, patients with certain combinations of characteristics (e.g. late middle-aged adults with only chronic physical comorbidity) can still challenge providers to recognize and treat depression appropriately. Conversely, from the patient’s perspective the setting from which they seek out care can have a determining impact on the quality of care they will ultimately experience.

Influences of other patient characteristics

Before exploring further the organizational results of this thesis, we will briefly discuss a few other findings related to notable patient-level factors shown to influence depression care quality in patients with comorbid chronic conditions.

First, several of our results were consistent with previous studies examining depression care quality in primary care. As has been reported elsewhere [190, 280, 281, 284], factors such as age, access to insurance, and depression severity were all significantly associated with both depression recognition and treatment adequacy. Similarly, higher levels of service use have been shown to positively influence rates of depression recognition [277, 289]. Our study thus suggests that these factors apply in a similar way in patients with comorbid chronic
conditions. Importantly, they also identify young and elderly adults, those without insurance, and those with lower depression severity and service use as patient subgroups at risk of receiving suboptimal care.

For both recognition and treatment adequacy, patients that were employed or in school full-time were less likely to receive high quality care than patients that were not working or studying full-time. This result is at first glance surprising since full-time employment or studies would be expected to provide patients with greater access to supplementary health insurance [284], shown to be associated with higher quality care. However, our findings are consistent with those in previous studies [285, 417, 432] that found unemployed or retired patients to have higher odds of depression recognition and treatment adequacy than patients that were employed or in school. It could be that patients without a full-time occupational status were more likely to have a higher burden of depression or chronic disease and thus more likely to receive care from their providers, or else they might have had more time available to seek services or faced less stigma doing so.

Finally, patients’ access to a regular family doctor was among the strongest predictors of depression care quality in our study. This result is consistent with results found by other authors [190] and seems to highlight once again how important it is that patients build strong relationships with their primary care providers in the context of care for their depression. That said, patients with regular doctors may also demonstrate greater needs for care and thus present providers with more opportunities to discuss, recognize and treat their depression [190].

6.3. Caring for patients with depression and comorbid chronic conditions and the influence of organizational contexts

An important advantage of mixed-methods approaches is that they provide opportunities to go beyond research findings generated by a single source of data by enriching these findings with different but complementary data, providing new explanations for results (or non-
results), and improving overall understanding of a phenomenon of interest [369]. This was our rationale for complementing our analysis of quantitative data from Project Dialogue with a new qualitative analysis of primary care clinicians’ perceptions of how their organizational settings affect the care they provide to patients with mental disorders and comorbid chronic physical conditions.

Two initial points are worth making. First, our quantitative analysis identified patients with depression and comorbid chronic physical illness as a patient subgroup that was particularly vulnerable to suboptimal depression care and clinicians participating in the qualitative phase of the study confirmed that such patients were frequently encountered but still challenging to manage. In some cases the challenges stemmed from various patient characteristics, such as the severity of their comorbid physical conditions or the additional social or psychosocial problems they presented with. Often, however, the difficulties lay more in how services within clinics or the broader health care system were organized. This included the lack of time to address patients’ multiple problems during clinical visits, a lack of support from other professionals, and the lack of service integration between primary care, mental health, and other services.

Second, rather than focus on a limited number of organizational domains (e.g. structural or technological) as many other studies have done, we focused our quantitative analysis on a broad range of characteristics covering four critical organizational domains. This choice was validated by our qualitative phase, as clinicians were able to identify a number of characteristics within each domain that they believed impacted the care they provided to patients with mental-physical multimorbidity. Moreover, our analysis of each case revealed that organizational factors were often inter-dependent and that high-quality care was often the product of multiple forces working in unison.
In the next paragraphs, we discuss findings related to the influence of each organizational domain, as well as interactions between domains, considering both phases of the mixed-methods study.

**Structural/Strategic enablers**
Contrary to what might be expected, our multilevel analyses revealed that the amount of time clinics dedicated to initial consultations with patients with depressive or anxiety disorders was not associated with measures of depression care quality. Findings from the qualitative study phase suggest however that this should not be so surprising. Several GPs stated that while 10- or 15-minute consultations were clearly inadequate when caring for patients with mental-physical multimorbidity, even longer consultations of 30 to 45 minutes could be insufficient to gather information about patients’ mental health problems when comorbid chronic physical conditions were also present. Clinicians confirmed that patients commonly emphasize their physical ailments in meetings with them and some GPs admitted to systematically addressing these issues first before attending to patients’ psychological problems. When mental health problems were recognized, clinicians did not typically force patients into treatment but worked to persuade them of its importance over the course of several meetings.

GPs in particular also perceived there to be a close relationship between the time they dedicated to patients and the payment model they operated under. All GPs we interviewed were remunerated primarily through a salary, which was considered advantageous because it offered them the flexibility of taking more time with vulnerable patients if this was judged necessary – which it often was for patients with mental-physical multimorbidity. That salary models are linked to longer consultation lengths has been firmly established [433] and was similarly observed in Quebec by Fleury [420]. Interestingly, one participant, the GP from site B1 (a CLSC-GMF), had actually recently begun working part-time at another medical clinic in which physicians were paid mainly through fee-for-service. This GP explained that his peers in that clinic did not easily take on patients having psychiatric comorbidities and that such
patients would often be redirected towards the services of CLSCs. This speaks to the time-consuming nature of mental health problems and the obstacles to optimal care posed by certain payment models [433].

Chronic disease management programs have become increasingly common in primary care and a number of such programs for depression have also emerged [332, 434]. Disease management programs have been described as “a multidisciplinary, dynamic care model that strives for continuous quality improvement” [434]. Its main component is an increased use of clinical practice guidelines, which can be complemented by a range of other interventions such as provider or patient education, routine screening, clinician feedback or reminder systems, patient monitoring, and collaborative practices [434]. Ensuring that clinicians have access to a high level of information is a central idea underpinning these programs [434]. In our quantitative analyses, we observed no effect of programs for depression on depression care quality. In the two CSSSs participating in the qualitative study phase, formal programs existed for chronic diseases such as diabetes or hypertension but not for depression. In addition, several clinicians reported that guidelines were rarely used in mental health care, especially when patients presented with comorbid chronic conditions. In contrast, collaborative practices with nurses were perceived by GPs as very helpful as it allowed them to share the burden of caring for more complex patients and free up time to devote to patients’ mental health problems. Nurses were also a source for support to GPs during the process of making sense of patients’ problems and played a valuable role in patient follow-up care.

The qualitative phase of the study also helped to identify several other structural or strategic enablers that were perceived to influence care for patients with mental-physical multimorbidity. These included educational and decision supports such as training opportunities in mental health (available through the CSSS or other authorities) and, for non-physicians, clinical supervision. Supervision was considered especially helpful in the context of caring for patients with mental-physical multimorbidity, as it provided opportunities to
exchange with experienced clinicians, resolve uncertainties, and make better decisions regarding the care of their patients.

An unexpected finding related to how the status of some clinics as family medicine units (UMFs – sites A1 and A2 in CSSS A) helped to create an environment that could facilitate care for patients with mental-physical multimorbidity. For instance, the role of UMFs as training sites for residents in family medicine meant that professional staff at these sites had to constantly maintain and improve their knowledge base in order to support residents in their training. This included knowledge related to care for mental disorders, chronic diseases, and even how these conditions interacted. As UMFs, the clinics also dedicated funding to professionals (e.g. psychologists, social workers) whose primary mandate was to support residents and other clinicians in the more psychosocial aspects of care. These professionals were highly valued resources within the clinics and were pivotal in supporting access to information, sharing and use of knowledge, and learning. They also played an active role in promoting teamwork within their clinics and facilitating links between professionals and organizations. Whether clinics had a status as UMF or not was not an item in the questionnaire used in our organizational survey but our findings suggest that this is an important topic to evaluate in the future. This idea is echoed by two large studies in the US showing that medical clinics’ teaching status was associated with higher depression care performance [302, 435].

**Social enablers**

In our quantitative analyses, we examined the influence of the value accorded to teamwork, perceived barriers to accessing mental health professionals, the sharing of clinical duties (i.e. group practice), and the involvement of GPs in the medical-administrative management of clinics. Our results pointed to accessibility to mental health professionals as having an important influence on depression recognition while the value of teamwork was relevant to the provision of minimally adequate treatment.
In the qualitative phase of the study, the issues of teamwork and of relationships between primary care providers and mental health professionals were frequent topics of conversation. By all accounts, relations between primary care providers and mental health professionals attached to CSSSs have improved considerably since the introduction of the province’s mental health action plan in 2005. In both CSSSs, GPs reported that access to psychotherapy had previously been poor but that access improved following the arrival of the primary mental health care teams. Access to psychotherapy from psychologists outside the CSSS in private practice was more variable and often harder to access. However, clinicians now had relatively easy access to advice and support from responding psychiatrists that visited with family medicine teams and primary mental health care teams on a regular basis. At the time of the organizational survey, however, these new mental health supports had not yet been implemented and relationships with mental health providers were more informal and uneven across clinics. The uneven nature of relationships with these providers, combined with the consistently poor access to psychotherapy, may help explain why depression recognition, but not depression treatment adequacy, was more sensitive to issues related to the accessibility of mental health professionals.

Conversely, it is likely that our indicator for minimally adequate treatment was sensitive to teamwork issues because it captures both the pharmacological and psychotherapeutic elements of depression treatment. In the qualitative study phase, GPs admitted that their training in psychotherapy was very limited and that their schedule did not allow them to deliver this form of treatment to patients. As such, collaboration with other professionals was needed when psychotherapy was warranted and a higher value placed in teamwork could have supported the provision of high quality depression treatment.

Team norms of mutual support between peers were also identified as important enabling characteristics in the care of patients with mental-physical multimorbidity. In fact, when this feature of clinics was present, it impacted many other activities ongoing at the clinic and facilitated a range of knowledge processes and outcomes. Several participants within the
primary mental health care team of CSSS B also mentioned that the value accorded to professional autonomy within their clinic helped them care for patients with mental-physical multimorbidity since their peers trusted them to occasionally approach or treat these patients in less conventional but more adapted ways.

**Epistemic enablers**

In the qualitative study phase, epistemic characteristics of organizations that allowed clinicians to be exposed to new forms of knowledge and also build common knowledge were seen as highly relevant in the context of caring for people with mental-physical multimorbidity. Opportunities to exchange with and learn from clinicians with different professional backgrounds were appreciated and widely believed to contribute to better patient care. Such opportunities presented themselves during case discussion meetings between professionals, meetings with the responding psychiatrist, and episodes of interdisciplinary care.

Given these findings, it was somewhat surprising that few of our epistemic enablers were found to be associated with depression care quality in the quantitative phase of the study. One likely explanation is that these factors may be particularly sensitive to the presence of other social enablers such as values and norms related to respect, trust and teamwork, which may be highly variable across settings. Indeed, these values and norms are argued to be at the heart of interdisciplinary collaboration [436, 437]. To illustrate these relations clearly, we can contrast the social and epistemic environments of the primary mental health care team of CSSS B and the family medicine team at site A2 within CSSS A.

Within CSSS B’s primary mental health care team, norms of teamwork and feelings of trust were not yet fully established given that the relative newness and heterogeneity within the team. Some participants mentioned that attending case discussion meetings or meetings with the responding psychiatrist was not a priority because they were not forums where they were willing to openly discuss their difficulties and needs for help with others. This was
confirmed by the psychiatrist, who noticed seeing “lots of hesitation to describe certain clinical situations or share problems that they’ve faced in their practice.” Within this team, clinicians often worked relatively independently, practicing multidisciplinary as opposed to interdisciplinary care. In multidisciplinary care, several different professionals work with the same patient but independently or in parallel, thus interacting on a more limited or transient basis [436]. In contrast, interdisciplinary care involves efforts to integrate and translate schemes shared by other professionals [436]. Teams share a common vision and there is an integration of knowledge and expertise of each professional so that solutions to complex problems can be identified and implemented [436]. While a multidisciplinary approach may be appropriate for patients with single disorders of milder severity, primary mental health care team members reported maintaining this style of practice for patients with mental-physical multimorbidity, who often require more interdisciplinary approaches [421, 438].

In contrast, the social and epistemic environment established within the family medicine team at site A2 was highly conducive to interdisciplinary teamwork, mutual support, knowledge exchange, and learning. This was partly due to this clinic’s status as a UMF and the desire to provide support for young family physicians in training. However, it was also a fundamental feature of the vision espoused by clinic leaders and notably its director, who stated: “We want to be more in interaction. We are in an interprofessional approach here. We work in an interprofessional approach with the nurses and we said that we wanted to do it also with the psychosocial.” This team’s weekly interdisciplinary meeting with the responding psychiatrist was a key place where true knowledge exchange and application of knowledge from different professionals took place and where multiple perspectives were combined to form shared care plans for patients. Importantly, these meetings tapped into both clinicians’ “explicit” knowledge (i.e. codified or articulated knowledge consisting of facts, written procedures, best practices, or video selections) and their “tacit” knowledge (i.e. implicit and hard to verbalize knowledge rooted in actions, experience and specific contexts) [352, 439], making them an ideal forum for the promotion of personal and organizational learning and the emergence of new practices [439].
Informational enablers

As was the case with several of the epistemic enablers, informational enablers did not significantly predict the receipt of high quality depression care in our quantitative analyses. In fact, the presence of electronic medical records (EMRs) in clinics was actually negatively associated with depression recognition in unadjusted analyses.

The non-significant, and even potentially negative, impact of EMRs is curious given that such systems are usually considered to be important enablers of high quality care [389, 440]. However, implementation of EMRs is at lower levels in Quebec than in other provinces [441] and in our quantitative sample only 8 of 61 clinics had such systems. Furthermore, our organizational survey did not assess to what extent EMR systems featured different system capabilities (e.g. problem lists, electronic reminders, specialist notes, lab results, etc.). This is an important limit as some EMR features (e.g. reminder systems) seem more related to high quality chronic disease care than others [442] and multifunctional EMRs have also been linked to better chronic disease care than EMRs with fewer features [302]. Several previous studies also suggest that EMRs systems may not affect depression care to the same extent as they do care for other chronic conditions [302, 440], perhaps because depression care requires different capabilities than is commonly used for chronic physical conditions.

Participants in our qualitative study offered mixed views of the electronic systems at their disposal. In CSSS B, clinicians described working with electronic health records that provided them with information normally found in a patient’s file but also allowed them to receive notes and see the interventions of other clinicians involved in a patient’s care. As such, these systems were valuable tools to find, store, exchange and use information and were viewed as critical for decision-making in the care of patients with mental-physical multimorbidity. In CSSS A, electronic health records had only recently been implemented at site A2 and these took mostly the form of “electronic paper files” that possessed few functionalities considered
helpful to clinicians. In both CSSSs, clinicians had limited access to patient data from organizations or providers outside of the CSSS, which was considered a barrier to caring for patients with mental-physical multimorbidity that often received care in multiple locations.

With respect to Internet use, most clinicians reported consulting the Internet for various reasons and on numerous occasions, sometimes together with patients present in their offices. However, the strategy perceived relevant to care for patients with mental-physical multimorbidity was to consult online decision support resources, an example being Up to Date® [443]. These online resources – essentially evidence summaries – substituted for clinical practice guidelines and provided clinicians with easy access to information and treatment recommendations for more uncommon illnesses as well as software for assessing drug-drug interactions. Given the longstanding challenges of promoting uptake of clinical guidelines by busy primary care clinicians [444, 445], these online decision support resources offer a new and innovative means to promote evidence-based care for patients with multiple conditions.

6.4. Implications of findings for the organization of primary care and mental health care services

Results from our systematic review and mixed-methods study suggest that patients with depression and comorbid chronic conditions present important quality of care challenges to primary care providers and health care systems. Improving quality of care for these patients will be no easy task and our findings indicate that actions will likely be needed at multiple levels. For instance, at the level of patients and communities there remains a strong need for education about the risk of depression in people with chronic diseases and also for combating stigma that may prevent some individuals from seeking help or disclosing their mental health problems to providers. At a provider level, clinicians have increasing access to training in mental health but there remains a need for education and training in interdisciplinary teamwork and care, particularly among mental health professionals. Efforts
are needed to help clinicians improve the recognition and treatment of depression when it is in its early stages and major improvements are needed in the quality of follow-up care that clinicians provide. At an organizational level, there is an urgent need to improve relationships between primary care and mental health care providers and surround these clinicians with structural, social and technological supports needed to provide effective care to patients with depression and comorbid chronic conditions. Lastly, at a system level thought should be given to how different models for reimbursing clinical care align with the care needs of patients with multimorbidity and especially mental-physical multimorbidity. Actions to promote mental and physical health and prevent chronic mental and physical conditions in the general population and specific vulnerable patient subgroups are also important.

To date, there have been several quality improvement initiatives targeting organizational changes and barriers to care quality that have had positive, though relatively modest, effects on depression care processes and outcomes [34, 35, 41]. Some of the shortcomings of these initiatives however are that they have been undertaken without strong theoretical foundations or an understanding of the specific organizational factors or domains to target in order to positively affect depression care [446].

In the next paragraphs, we briefly present two organizational models that may be useful for informing quality improvement initiatives targeting patients with common mental disorders and chronic physical conditions. An important attribute of both of these models is that they emphasize changes to key organizational attributes (e.g. access to mental health care, teamwork) but also stimulate changes to all four organizational KM domains (i.e. structural/strategic, social, informational, epistemic), thus creating environments for enhanced knowledge flows and organizational performance.
**Collaborative care**

In Quebec, increasing collaboration between primary care providers and mental health care providers was a central objective of reforms triggered by the 2005 mental health action plan. The action plan did not formally prescribe a specific form of collaboration for implementation, but the model that has emerged in the province to date largely reflects the “consultation-liaison” model, a model fundamentally concerned with improving the skills of primary care professionals [447]. It is a model designed to ensure that primary care providers remain in the forefront of care and is based on mental health providers (i.e. primary mental health care teams or responding psychiatrists) taking on primarily a consultant role [447].

“Collaborative care” models, on the other hand, have emerged internationally as an effective strategy for improving the quality of mental health care in primary care [47, 448, 449]. Collaborative care has been defined as “a range of models of practice in which consumers, their families and caregivers, together with health care providers from a variety of primary health care and mental health settings – each with different experience, training, knowledge and expertise – work together to promote mental health and provide more coordinated and effective services for individuals with mental health needs” [450]. Recent systematic reviews demonstrate that interventions based on this model are effective in improving a range of outcomes for patients with depression and other mental disorders [47, 451], while recent randomized controlled trials show that collaborative care can be effective in patients with mental-physical multimorbidity as well [452-454].

As its definition implies, collaborative care interventions can take many forms. What makes collaborative care different from the consultation-liaison model is that collaborative care not only emphasizes closer relationships between primary care and mental health care providers but involves a redefinition of professional roles, the introduction of the new role of “care manager”, and additional organizational changes [447].
Previous studies [47, 447-450, 455] have identified the main components of collaborative care (see Table VI).

<table>
<thead>
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<th>Table VI. Organizational and process components of collaborative care</th>
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<tr>
<td><strong>Organizational components</strong></td>
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<tr>
<td>➢ Use of a care manager (e.g. an allied professional such as a nurse, psychologist or social worker)</td>
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<tr>
<td>➢ Access to psychiatric consultation</td>
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<tr>
<td>➢ Enhanced interprofessional communication (e.g. team meetings, shared medical records)</td>
</tr>
<tr>
<td>➢ Enhanced access to psychological therapies</td>
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The role of care managers identified in the literature resembles the role that the Quebec Ministry of Health and Social Services intended for professionals working within primary mental health care teams [346, 447]: (a) regular patient evaluation and assessment of needs, (b) development of a shared care plan that reflects treatment indications and patient preferences, (c) support for self-management, (d) therapeutic treatment in collaboration with patients’ general practitioner, (e) proactive follow-up, and (f) care coordination over time and facilitation of communications and transitions between providers. Currently, however, our findings suggest that professionals within primary mental health care teams are not fully playing this role. Treatment plans were not developed in collaboration with other primary care clinicians, self-management was not consistently supported, treatment and follow-up care was provided in parallel to GP care, and communications between primary mental health care teams and other providers were not systematic in nature.

With respect to psychiatrists, there is now much potential for them to practice in collaborative, interdisciplinary approaches with primary care clinicians and we observed
examples of this within CSSS A. Indeed, within the family medicine teams of this CSSS, the
responding psychiatrists were actively engaged in patient care and very much viewed as
“part of the team”. However, in other sites (e.g. B2) the responding psychiatrist supported
the primary mental health care team strictly in the consultant sense, providing only
diagnostic advice or making recommendations for pharmacotherapy. Evidence suggests that
when psychiatrists adopt exclusively this consultant role, services do not improve outcomes
[456].

In Quebec, a shift from consultation-liaison to collaborative care will likely require that
professionals within primary mental health care teams reconsider their current roles and
take on an expanded role more aligned with collaborative care models and the guiding
principles of primary care. This implies moving beyond their current role as an evaluation
and primarily short-term psychotherapy “service” to a team of care managers that build
sustained partnerships with patients and primary care clinicians and that play a more active
role in the coordination and follow-up of care of patients. GPs and care managers should also
have the support of responding psychiatrists that engage more consistently with teams,
including getting involved in patient education and monitoring, supporting evidence-based
mental health care, and routinely helping clinicians build their knowledge and skills.
Recently, collaborative care intervention have also begun to rely heavily on supports from
information technologies, including electronic patient registries and shared care plans, EMR
systems supporting exchanges between professionals, and clinical monitoring systems (e.g.
monitoring the evolution of depressive symptoms) built in to EMRs [421]. Each of these
elements should be reinforced by a commitment to teamwork and mutual support and by
efforts to foster trust between providers.

Patient-centred medical home
Another model that has received support from the College of Family Physicians of Canada
[457] and professional organizations in the United States [458] is the Patient-Centred
Medical Home. A patient’s “medical home” is the family practice identified by patients as the
place that serves as the home base or central hub for the timely provision and coordination of all their health and medical care needs [457]. The medical home model has been proposed as a guide that may inspire practices to deliver high-quality, patient-centred care, provide optimal teaching environments for family medicine and other health professions, and engage in practice-based research and quality improvement activities [457].

Many of the defining principles of patient-centred medical homes resemble the key components of collaborative care models, e.g. engagement of patients in care, team-based care, strong uptake of information technologies such as EMRs, enhanced coordination of care [457, 458]. What distinguishes the medical home model from collaborative care is (a) an emphasis on family physicians as being the main coordinators of care that build strong, ongoing relationships with patients, (b) an emphasis on both access to care, such as through same-day scheduling, and continuous quality improvement, (c) a “whole-person” orientation, such that comprehensive care for all patients’ health needs at all stages of life is provided or coordinated from a single family medicine practice, (d) en emphasis on teaching and research relevant to family medicine and other primary care professions, and (e) an emphasis on aligning governance and payment structures to the delivery of high-quality, patient-centred care [457, 458]. This latter principal in particular was intended to address an important shortcoming of many improvement models involving organizational re-design without complementary changes to governance and physician reimbursement [459].

Whereas in collaborative care integration of primary care and mental health care may occur at the level of the CSSS, in medical home models the hope is that integration occurs at the level of individual family medicine practices. Such integration of services, supported from a common governance and payment structure, is particularly intriguing and relevant for patients with co-occurring mental and chronic physical conditions. In our study, the services within the family medicine team at site A2 were organized in a way that was very consistent with the medical home model, with the exception that the psychologist and social worker in this team provided only limited direct care to patients. The enabling nature of the
environment at this site suggests that the medical home concept can indeed be a useful model that guides primary care transformations in the near future.

However, as is the case with collaborative care and other quality improvement initiatives, it is important to consider how changes to one organizational domain can be complemented by changes to other domains and also how improvement strategies may differentially impact different members of clinics’ clientele, as inequities in care can persist even when enabling supports are in place.

6.5. Strengths and limitations

Systematic review
A number of steps were taken to ensure the rigour of this doctoral research and increase its validity. For the systematic review, methods adhered to guidance and standards established by the Centre for Reviews and Dissemination in the UK [374]. A comprehensive search was designed using multiple databases and multiple review authors were involved in study selection and quality appraisal. Our reporting was consistent with Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) standards [460].

The main limits of our review were that our initial search did not include search terms related to specific chronic diseases due to the large number of citations retrieved using this strategy, thus some studies relevant to the review may have been missed. In addition, we also focused exclusively on studies examining chronic diseases (as opposed to simply co-occurring physical symptoms) and only on two main care processes (as opposed to other aspects of quality important to patients such as access to care, continuity of care and comprehensiveness of care).
Mixed-methods study

Our mixed-methods study had several strengths. In the quantitative phase, our organizational survey was completed by providers in diverse organizational settings and in different territories of the province by the person most knowledgeable about the functioning of each clinic. Patients were recruited from these same clinics by trained research personnel at diverse times of day and on different weekdays to increase the representativeness of our patient sample. We used validated data collection tools as well as a validated, standardized diagnostic tool (the CIDIS) to assess the presence of major depressive episode. Our measure of depression recognition was based on previous systematic reviews [27, 28] and our measure of minimally adequate treatment was shown to predict depression outcomes [242]. Another major strength of this study phase was our use of multilevel logistic analyses to examine relationships between primary care organizational characteristics, patients’ comorbidity profile, and the quality of care for depression – all the while controlling for several potential confounding factors. We were thus able to take into consideration the hierarchical nature of our data and improve our effect estimations while avoiding problems of inference that can occur in non-hierarchical approaches [390, 461].

The quantitative study phase was limited however by the fact that we conducted our study in only 15 of the 95 local service networks of Quebec and we had a low rate of participation of primary care clinics in the organizational survey. Fewer than 25% of the clinics we approached ultimately contributed data to the study and it is possible that participating clinics had different characteristics or clienteles than those clinics within the same local service network or in different service networks that did not participate in our study. In a similar vein, among our participating clinics there was an overrepresentation of CLSCs relative to other clinic types. Thus, caution is warranted with respect to the generalization of our results to other clinics and clinic types.

The organizational and patient surveys captured a large amount of information about both primary care clinic characteristics and patient characteristics that could affect the quality of
care provided to patients with depression and comorbid chronic conditions. An important limit of our organizational survey however was that questions related to mental health care services or practices were not subject to a formal validation process, such as through site visits or concordance with other sources of data (e.g. clinico-administrative data). Organizational survey results are also not easily comparable with those from previous studies. More formal validations of future organizational surveys are needed to ensure the accuracy of data collected by them. Our organizational survey also did not assess a number of other structure-related factors, such as the characteristics of the individual providers that delivered care to patients or characteristics referred to in previous surveys, such as the academic teaching status of clinics.

At the patient-level, we did not take into consideration the preferences of patients, a factor which has been shown to influence the quality of depression care [31, 287]. We also focused our quantitative analyses exclusively on patients with comorbid chronic conditions, leading to the possibility that the relationships we observed do not apply to patients without comorbidity. With respect to our measures of comorbidity, we did not examine comorbidities related to alcohol or drug abuse or dependence. Our measures also did not take into account the severity of individual chronic physical or mental illnesses. Scores on validated comorbidity indices such as the Charlson Comorbidity Index [462] or Chronic Disease Score [463] have been shown to be strong predictors for a range of outcomes [464], though we observed mixed results related to their influence in our systematic review.

It should also be noted that our patient survey collected data that was self-reported by patients and as such our data is subject to recall bias. It would have been ideal to verify and complement our data with data from medical charts or insurance databases, but this was not done. However, we did use strategies to limit the effects of this potential bias, for example asking patients to seek out their medication bottles to provide accurate information about antidepressant prescriptions, and studies on depression care quality have shown acceptable concordance between self-report and administrative data [465, 466]. We can also not
exclude the possibility that some patients were misclassified as unrecognized or receiving (or not) receiving minimally adequate treatment because of issues related to temporality, a common problem in cross-sectional studies. More specifically, it is possible that some patients had been diagnosed or treated for their depression just prior to when our observation period started, which could have led to measurement errors that impacted our estimates of effect. Similarly, some patients may have initiated antidepressant or psychological treatment just before our observation period started or just before it ended, which would have led them to not satisfy our criteria for visits in our measures of adequate treatment. Finally, the organizational and patient surveys were cross-sectional in nature, precluding us from making inferences about causal relations between the variables we studied.

A strength of our qualitative study phase was that it relied on and adhered to a clear qualitative methodology, i.e. a case study approach [393]. A defining feature of case studies is the use of multiple data sources to provide in-depth information about the case(s) being investigated [393]. In our study, we collected data from semi-structured interviews, non-participant observations, and relevant documentation. Our interviews and observations were supported by structured guides. Throughout the course of the study, the first author took fieldnotes to make explicit his biases, record impressions of participants and of interactions during interviews, and other observations over the course of data collection and analysis. Two analysts contributed to the development of our coding framework and case discussion meetings were held to discuss themes related to our conceptual framework as well as themes emerging from the data. Our data sources were triangulated to provide a rich description of dynamics within each unit of analysis and CSSS in the study and preliminary case summaries were shared with participants to verify the accuracy of findings, update information, and validate our interpretations [467, 468].

However, several limits of this study phase should be noted. First, we aimed to achieve a rich description of our two cases (i.e. CSSS A and B) and the dynamics of knowledge management
and patient care within them. However, our analysis is based on a limited number of sites within each CSSS and it is unclear how what we learned about organizational enablers and processes within participating sites transfers to the other service locations (e.g. other CLSCs) in the two CSSSs. Similarly, a substantial amount of primary care services are delivered by GPs and other clinicians in small or solo private practices [48] and the organizational dynamics within these organizations is likely to be very different than what we observed within our two CSSSs. It is also possible that our more cross-sectional qualitative approach was less suited to studying process-based relationships than other qualitative approaches [249]. In future studies on this topic, researchers should consider alternative approaches such as ethnography to shed further light on the interrelationships between organizational settings, knowledge processes, and the quality of care provided to patients with mental-physical multimorbidty.

Finally, we adopted several strategies to enhance the validity of the overall mixed-methods study. Notably, both phases of our study were guided by the same conceptual framework that drew from concepts in the knowledge management literature. This is a very novel aspect of our study that distinguishes it from most other studies examining the influence of organizational characteristics on health care quality [249]. Studies of knowledge management in health care have led to several new insights, such as the value of knowledge networks and communities of practice [469, 470], the interplay of tacit and explicit knowledge in clinical practice [471, 472], and the challenges of information overload faced by clinicians [473]. Our findings advance this literature and shed new and important light on mechanisms between organizational KM enablers, knowledge processes and quality of health care.

We also made efforts to recruit clinics to the qualitative study phase that had already participated in the quantitative phase of the study. However, only two of 15 CSSSs participated in the qualitative study phase. Furthermore, our organizational survey had been completed several years before the beginning of our qualitative data collection and
important changes had taken place within both CSSSs in the interim. At the time of the organizational survey, primary mental health care teams and responding psychiatrists had not yet been implemented within the CSSSs and some CLSCs and clinics later undertook important structural or strategic changes (e.g. becoming a GMF, hiring new personnel, implementing new electronic health records, etc.). Thus, the dynamics within organizations at both points in time were likely quite different.
Conclusion

In the introduction of this thesis, we presented the scenario of Dr. Roger and her patient Mr. Tremblay, a 56-year old man with depression and several other comorbid chronic diseases. Patients like Mr. Tremblay are common in primary care settings but, as shown in this thesis, they are also vulnerable to receiving care for depression that fails to meet minimum accepted standards. We thus sought to understand how the characteristics of primary care organizations (such as Dr. Roger’s practice settings) influence the care she provides to patients living with depression and comorbid chronic conditions (such as Mr. Tremblay).

We can conclude that several characteristics of primary care clinics do indeed influence the care provided to these patients. In the quantitative phase of our study, we identified values related to teamwork, the use of treatment algorithms, access to mental health professionals or GPs with mental health expertise, and physician payment models as factors that have an influence on the quality of depression care received by patients with comorbid chronic conditions. In the qualitative phase of the study, we discovered that additional factors are also perceived by primary care clinicians to be influential: norms of mutual support and teamwork, interdisciplinary practices, supports from responding psychiatrists, clinical supervision, electronic health records and decision support tools, and links between primary care and mental health services.

These organizational characteristics influence quality of care in complex ways but one of their mechanisms is to facilitate or impede the finding, sharing, storing, and using of knowledge by clinicians and consequently the learning and decision-making that routinely occurs over the course of patient care. While different types of characteristics support different knowledge processes, the impacts on quality of care seem to result from the interaction of organizational features and how these in turn interact with the characteristics providers and patients seeking care.
In the current context of Quebec, Canada and internationally, efforts are currently underway to improve quality of care for depression and other chronic diseases in primary care and there is growing interest in developing strategies to better organize care for people with multimorbidity. Based on the findings in this thesis, we can conclude that initiatives will be most successful if they target multiple organizational domains and remain vigilant to how interventions affecting one domain (e.g. new structures) are influenced by realities or changes within another domain (e.g. the social environment of clinics). Initiatives emphasizing integrated or interdisciplinary team-based approaches to care are most ideally suited for patients with multimorbidity, particularly those suffering from common mental disorders such as depression. However, attention should also be devoted to ensuring that these initiatives actually support new flows of knowledge, and barriers to knowledge flows within and across clinics should be identified and resolved.

Finally, primary care organizations should also be aware that even after undertaking changes to improve the quality of their services, patients with certain characteristics or profiles might still not benefit to the same extent as others. We identified patients with depression having chronic physical comorbidity only as one such group whose care was consistently lower than levels observed in patients with other comorbidity profiles. As Mercer notes, it is when patients present with both physical and mental health problems that “the poorly stitched seams of professional care are at their most threadbare” [305]. It is likely that improvements to care for these vulnerable patients will demand that we look beyond changes to individual practices to changes in the larger organization of health care and in policies for health system funding and professional development. Realigning our system of care to better meet the needs of patient with comorbid chronic conditions – who are increasingly common in the health care system – will make a major difference in the lives of patients and contribute to improved population health.
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Appendices

Appendix 1 – Medline search strategy for systematic review

Database: Ovid MEDLINE(R), Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid OLDMEDLINE(R) <1946 to Present>

Search Strategy:

1  Ambulatory Care/ [ Primary Care ]
2  exp General Practice/
3  General Practitioners/
4  Health Maintenance Organizations/
5  Occupational Health Physicians/
6  Physicians/
7  Physicians, Family/
8  Physicians, Primary Care/
9  Primary Healthcare/
10 (ambulatory adj2 care).mp.
11 (community adj practice$).mp.
12 (community adj doctor?).mp.
13 (community adj physician?).mp.
14 (community adj practitioner?).mp.
15 (family adj practice$).mp.
16 (family adj medicine).mp.
17 (family adj doctor?).mp.
18 (family adj physician?).mp.
19 (family adj practitioner?).mp.
20 (group adj practice$).mp.
21 (general adj practice$).mp.
22 (general adj doctor?).mp.
23 (general adj physician?).mp.
24 (general adj practitioner?).mp.
25 (physician$ adj practice$).mp.
26 (primary adj2 care).mp.
27 or/1-26
28 Depression/ [ Depression ]
29 Depressive Disorder/
30 Depressive Disorder, Major/
31 Depressive Disorder, Treatment-Resistant/
32 Dysthymic Disorder/
33 depression.mp.
34 (depressive adj disorder$).mp.
(dysthymic adj disorder$).mp.
or/28-35
Comorbidity/ [ Comorbidity ]
Chronic Disease/
(chronic adj2 illness$).mp.
(chronic adj2 condition$).mp.
(chronic adj2 disease$).mp.
(coexist$ adj illness$).mp.
(coexist$ adj2 condition$).mp.
(coexist$ adj2 disease$).mp.
(co-exist$ adj2 illness$).mp.
(co-exist$ adj2 condition$).mp.
(co-exist$ adj2 disease$).mp.
(coincident$ adj2 illness$).mp.
(coincident$ adj2 condition$).mp.
(coincident$ adj2 disease$).mp.
(longterm adj2 illness$).mp.
(longterm adj2 condition$).mp.
(longterm adj2 disease$).mp.
(long-term adj2 illness$).mp.
(long-term adj2 condition$).mp.
(long-term adj2 disease$).mp.
(multiple adj illness$).mp.
(multiple adj2 condition$).mp.
(multiple adj2 disease$).mp.
(multiple adj morbidit$).mp.
(physical adj morbidit$).mp.
(physical adj problem$).mp.
(somatic adj illness$).mp.
(somatic adj condition$).mp.
(somatic adj disease$).mp.
comorbid$.mp.
co-morbid$.mp.
multimorbid$.mp.
multi-morbid$.mp.
or/37-72
27 and 36 and 73
exp Animals/ not (Humans/ and exp Animals/)
Appendix 2 – Project Dialogue conceptual framework

[Diagram showing flow from Contexte to Impact sur la santé through Modèles organisationnels and Expérience de soins]

- **Contexte**: géographique, socio-économique, historique, structurel, organisationnel
- **Modèles organisationnels**: Vision, Ressources, Structures, Pratiques
- **Expérience de soins**: Accessibilité, Continuité, Globalité, Réactivité
- **Impact sur la santé**: Symptomatologie, Fonctionnement social, Incapacités
Appendix 3 – Organizational survey
ORGANISATIONAL QUESTIONNAIRE
PRIMARY HEALTHCARE CLINIC

Address of the clinic

Please make any necessary corrections.

Name of the clinic

Number
Street

Office number
City

Province
Postal code

Telephone
Extension
Fax

Identification of the person answering the questionnaire (if different from the name on the label).

Last name:

First name:

Email address:

Position:

- Team leader/Medical director
- Physician-in-charge
- Member of the team of general practitioners
- Other Specify: ........................................................................................................
INSTRUCTIONS

This is a questionnaire about the organisation of primary healthcare services offered in medical clinics, physician offices, polyclinics, Family Medecine Group (GMF) and CLSC.

WHO SHOULD ANSWER THIS QUESTIONNAIRE?

The questionnaire must be filled in by the person who is most familiar with how the clinic is organised and operates; typically this is the physician-in-charge. The questionnaire should not be completed by each physician at the clinic even when, in some clinics, physicians rarely work together.

HOW SHOULD THE QUESTIONNAIRE BE COMPLETED?

The use of the expression “your clinic” refers strictly either to the primary health care medical team (general practitioners and nurses) of which you are a part, or to yourself, if you are a “solo practice physician” according to the criteria stated below. The answers must as closely as possible reflect the views and practices of the primary health care medical team (general practitioners and nurses).

WHAT IS A “SOLO PRACTICE PHYSICIAN”?

The term “solo practice physician” refers to a physician who practices alone in his own clinic and who shares no services (such as receptionist, technical platform, etc.) with any other physicians. Shared office premises however are not considered to be shared services.

Some questions are not applicable to the situation of “solo practice physician”. Instructions are indicated where necessary to this effect (e.g. if you are a “solo practice physician”, skip to the next question).

Most questions are also formulated for a situation involving more than one physician. The “solo practice physician” is in these cases asked to adapt the questions/answer choices to his specific situation (for example, where the response choices show “all/most” “some”, “none”, the “solo practice physician” would be requested to answer “all/most” if he wished to indicate an affirmative answer).

The questionnaire covers the following areas:
- general questions related to your clinic
- more specific questions related to mental health

Please note that when mental health is not mentioned in the question, the answer should reflect the overall client base in a general manner.

Please also note that in the questionnaire, the masculine gender is used in the text for simplicity and to reinforce the anonymous nature of the respondents providing the information, but refers equally to males and females.

Si vous préférez recevoir ce questionnaire en français, veuillez contacter:

Isabelle Doré
Institut national de santé publique du Québec
Projet Dialogue
Téléphone : (514) 864-1600, poste 3630
RESOURCES AND ORGANISATIONAL STRUCTURE

1. a) As defined on the previous page, do you meet the criteria of “solo practice physician”?  
   1. Yes  → Go to question 1 c)  
   2. No

b) In all, how many general practitioners work at your clinic?  ___  

c) How many general practitioners work at your clinic in the following categories:  
   a) Less than 10 hours a week:  ___  
   b) 10 to 25 hours a week:  ___  
   c) 26 to 40 hours a week:  ___  
   d) More than 40 hours a week:  ___  

d) How many of these general practitioners have been working at your clinic for more than 5 years?  
   1. All or most  
   2. Some  
   3. One  
   4. None

e) How many nurses work at your clinic?  ___  

2. What’s the main mode of payment of the general practitioners for activities conducted at your clinic?  
   Choose one answer only:  
   1. Fee-for-service  
   2. Sessional fees (Vacation)  
   3. Fixed honorarium  
   4. Mixed modes of payment

   If you are a “solo practice physician”  → Go to question 6

3. At your clinic, who…  
   Circle only one answer per statement  

<table>
<thead>
<tr>
<th></th>
<th>A physician-in-charge or designated physician</th>
<th>The physician group collectively</th>
<th>Administrator/manager</th>
<th>Does not apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) sets up on-call lists, schedules, vacations, etc.?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) organises meetings for case discussions?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) looks after recruitment of physicians and assigns practice privileges?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) ensures that the quality of medical acts is evaluated?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) organises continuing medical education activities?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) represents the clinic on committees?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

4. How many general practitioners at your clinic share...  

<table>
<thead>
<tr>
<th></th>
<th>All/Most</th>
<th>Some</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) rooms (offices or examination rooms)?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) operating costs for the clinic?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) support staff (secretary and receptionist)?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) an appointment management system?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) medical records system?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) pooled income?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
5. How many general practitioners at your clinic share...

<table>
<thead>
<tr>
<th>Activity</th>
<th>All/Most</th>
<th>Some</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) coverage of walk-in clinic periods?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) coverage of scheduled appointments periods?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) in-hospital care for the clinics’ patients?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) patient follow-up?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) replacement for physician absent from the clinic?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

6. To what extent do general practitioners at your clinic feel accountable towards...

<table>
<thead>
<tr>
<th>Accountability</th>
<th>Highly</th>
<th>Fairly</th>
<th>Slightly</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) the population of the neighbourhood, village or territory where the clinic is located?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) the RAMQ?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) the Collège des médecins du Québec?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) colleagues at work?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) clinic managers?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) CSSS managers?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>g) managers of the Agence de la santé et des services sociaux?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

7. Does the financing for the operating costs of your clinic come from ...

a) fees charged to physicians or contributions by physicians? .................................................. □: Yes □: No
b) private enterprises (e.g. companies, pharmacies, donations, foundations)? .......................... □: Yes □: No
c) fees charged to patients (e.g. fees to open or manage files)? ............................................ □: Yes □: No
d) an institutional operating budget (e.g. CLSC, hospital)? .................................................... □: Yes □: No

8. Do you have at your clinic...

a) computer software to manage appointments? ................................................................. □: Yes □: No
b) an electronic medical records? ......................................................................................... □: Yes □: No
c) Internet (Web) access for physicians? ............................................................. □: Yes □: No
d) Internet (Web) access for transmission of results (e.g. lab results)? ............................. □: Yes □: No
e) access to the health and social services telecommunication network (RTSS)? .................. □: Yes □: No
f) an appointment system for patients on the Internet (Web)? ........................................... □: Yes □: No
g) an electronic system to transmit prescriptions to pharmacies? ........................................ □: Yes □: No

9. At your clinic, where do you send patients for the following services: Circle all that apply.

<table>
<thead>
<tr>
<th>Service</th>
<th>On site</th>
<th>To another primary healthcare clinic</th>
<th>To a CLSC</th>
<th>To a private laboratory/Private radiology clinic</th>
<th>To a hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Laboratory tests</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) Radiology</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
SERVICES AND PRACTICES

10. At your clinic, do you offer...
    a) services by appointment during weekends (Saturday and/or Sunday)? ☐ 1. Yes ☐ 2. No
    b) walk-in services during weekends (Saturday and/or Sunday)? ☐ 1. Yes ☐ 2. No
    c) services by appointment during weekday evenings (after 6:00 p.m.)? ☐ 1. Yes ☐ 2. No
    d) walk-in services during weekday evenings (after 6:00 p.m.)? ☐ 1. Yes ☐ 2. No

11. Among all consultations at the clinic, what percent are walk-ins?
    ☐ 1. 0 % ☐ 2. 1 to 25 % ☐ 3. 26 to 50 % ☐ 4. 51 to 75 % ☐ 5. 76 to 100 %

12. At your clinic, is there an on-call procedure outside of clinic hours for regular patients of the clinic?
    ☐ 1. Yes ☐ 2. No

13. During clinic hours, is it possible for a regular patient of the clinic to communicate by telephone with a physician or a nurse?

14. At your clinic, while taking the appointment, how much time is scheduled for...
    a) visits for a complete examination or evaluation of a new patient? Check one only.
        ☐ 1. Less than 10 minutes ☐ 2. 10 minutes ☐ 3. 15 minutes ☐ 4. 20 minutes ☐ 5. 30 minutes ☐ 6. Over 30 minutes
    b) for follow-up visits or emergency consultations? Check one only.
        ☐ 1. Less than 10 minutes ☐ 2. 10 minutes ☐ 3. 15 minutes ☐ 4. 20 minutes ☐ 5. 30 minutes ☐ 6. Over 30 minutes

15. At your clinic, how much time do physicians generally dedicate for...
    a) the initial evaluation of individuals consulting for anxiety or depressive disorders? Check one only.
        ☐ 1. Less than 10 minutes ☐ 2. 10 minutes ☐ 3. 15 minutes ☐ 4. 20 minutes ☐ 5. 30 minutes ☐ 6. Over 30 minutes
b) a follow up consultation for individuals with anxiety or depressive disorders? *Check one only.*

- Less than 10 minutes
- 10 minutes
- 15 minutes
- 20 minutes
- 30 minutes
- Over 30 minutes

16. At your clinic, to what extent are the following services available:

<table>
<thead>
<tr>
<th>Service</th>
<th>Very much</th>
<th>Moderately</th>
<th>A little</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Medical or nursing care and services at a patient’s home</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) Medical or nursing care and services in homes for seniors, nursing homes, long term care facilities</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) Palliative care</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) Hospital care</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

17. Are the following diagnostic and therapeutic procedures available on-site?

- a) Electrocardiogram *(ECG)*
- b) Capillary glycaemia and capillary cholesterol
- c) Strep test
- d) Skin biopsy
- e) Simple radiological exams
- f) IUD insertion
- g) Musculoskeletal injection/Aspiration
- h) Casting/Splinting
- i) Suture/Minor surgery
- j) Spirometry
- k) Alternative medicine *(e.g. acupuncture, chiropractic, osteopathy)*
- l) Psychotherapy
- m) Diagnostic evaluation by a psychiatrist

18. Are the following preventive services part of your clinic’s usual clinical practices?

- a) Screening for hypercholesterolemia
- b) Check one only.
b) Clinical breast examinations ................................. 1. Yes  2. No

c) Mammography for women ........................................ 1. Yes  2. No

d) Cervical smear (Pap test) ..................................... 1. Yes  2. No

e) Screening for STD and blood born pathogens ............... 1. Yes  2. No

f) Postnatal screening ............................................. 1. Yes  2. No

g) Fecal occult blood test (FOBT) ................................ 1. Yes  2. No

h) Osteoporosis screening .......................................... 1. Yes  2. No

i) Childhood vaccination ........................................... 1. Yes  2. No

j) Influenza vaccination ............................................. 1. Yes  2. No

k) Smoking cessation counselling .................................. 1. Yes  2. No

l) Maintaining a healthy weight counselling ...................... 1. Yes  2. No

m) Safe-sex practices counselling .................................. 1. Yes  2. No

n) Fall prevention for seniors ...................................... 1. Yes  2. No

o) Screening for alcohol and drug related problems .......... 1. Yes  2. No

p) Screening for anxiety or depressive disorders ............... 1. Yes  2. No

q) Screening for violence and abuse .............................. 1. Yes  2. No

19. At your clinic, how many general practitioners devote the majority of their clinical practice time to patients with mental health problems?

1. None  2. One  3. Some  4. All or most
20. At your clinic, are there chronic disease management and systematic follow-up services for patients suffering from...

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) chronic illness (e.g. COPD, diabetes)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>b) anxiety disorders?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>c) depressive disorders?</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

21. In their practice with individuals suffering from anxiety or depressive disorders, to what extent does or do the general practitioner(s) of your clinic...

<table>
<thead>
<tr>
<th>Activity</th>
<th>All/Most</th>
<th>Some</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) use manuals and/or clinical practice guidelines?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) use treatment algorithms?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) use standardized screening instruments?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) use standardized scales to monitor mental health status of the patient?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) involve the patient in the clinical decision-making process?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) distribute pamphlets or written information about the symptoms and treatment of anxiety or depressive disorders?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>g) encourage patients to participate in educational or self-management programs?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>h) refer patients to support or self-help groups?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

22. To what extent does or do the physician(s) at your clinic feel comfortable in dealing with anxiety or depressive disorders with regards to...

<table>
<thead>
<tr>
<th>Activity</th>
<th>Highly</th>
<th>Fairly</th>
<th>Slightly</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) screening (identifying patients with anxiety or depressive disorders)?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) counselling and education of these patients?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) diagnostic evaluation?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) pharmacological treatment?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) referral to other resources?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

23. Over the past 3 years, has or have the physician(s) of your clinic participated in continuing education activities related to...

<table>
<thead>
<tr>
<th>Activity</th>
<th>All/Most</th>
<th>Some</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) anxiety disorders?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) depressive disorders?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) alcohol or drug related disorders?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) comorbid disorders?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) other topics related to mental health?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
24. What organisations offer continuing medical education related to mental health that is accessible to the physicians of your territory? Check all that apply.

- Le Ministère de la Santé et des Services sociaux
- CSSS
- Regional Health Authority
- Le Collège des médecins du Québec
- Medical associations
- Pharmaceutical companies
- Other Specify:

25. In addition to practicing at your clinic, how many general practitioners provide care...

<table>
<thead>
<tr>
<th>Activity</th>
<th>All/Most</th>
<th>Some</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) In the emergency room of a general and/or specialized care hospital</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) In a short-term care unit of a general and specialized care hospital</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) In a long-term care facility (CHSLD)?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) In a CLSC home care programme?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) Obstetrical services in a hospital?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) Medical services in a specialized mental health clinic?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

26. In addition to practicing at your clinic, how many general practitioners engage in activities in these other health settings:

<table>
<thead>
<tr>
<th>Activity</th>
<th>All/Most</th>
<th>Some</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Private medical clinics</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) CLSC</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

27. What are the roles and functions of the nurses who are members of your medical team?

If there are no nurses in your team Go to question 29

- a) Initial assessment of walk-in clinic patients
- b) Prevention, promotion and screening activities
- c) Patient education
- d) Systematic follow up of specific clienteles
- e) Liaison and coordination with CLSCs, CHSLDs, hospitals and other clinics
- f) Support for medical activities (e.g. blood pressure, weight, injections)
- g) Participation in clinical decisions
- h) Other Specify
28. Are there any nurses whose practice is mainly directed towards clients with mental health problems?

☐ 1: Yes   ☐ 2: No

29. More specifically, for patients suffering from anxiety or depressive disorders, is there a healthcare provider (case manager) in your clinic who is responsible for the following functions?

a) Prevention, promotion and screening activities ............................................. ☐ 1: Yes ☐ 2: No
b) Patient education ............................................................................................. ☐ 1: Yes ☐ 2: No
c) Systematic follow-up (e.g. compliance with medication) .................................. ☐ 1: Yes ☐ 2: No
d) Liaison and coordination with CLSCs, CHSLDs, hospitals and other clinics .......... ☐ 1: Yes ☐ 2: No
e) Participation of the healthcare provider in clinical decisions .................................... ☐ 1: Yes ☐ 2: No
f) Involvement of patients in the clinical decision-making process ............................ ☐ 1: Yes ☐ 2: No
g) Other \(\rightarrow\) **Specify**

29A. If you answered YES to any of the items in question 29, indicate the type of healthcare provider involved: **Check all that apply.**

☐ a) Nurse
☐ b) Psychologist
☐ c) Social worker
☐ d) Other \(\rightarrow\) **Specify** :

If you are a “solo practice physician” \(\rightarrow\) **Go to question 32**

30. How is care coordinated between the professionals in your clinic?

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Informal or ad hoc exchanges</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) Pre-established care protocols for specific client groups or problems</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) Case discussion meetings <em>(statutory meetings)</em></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) Continuing medical education sessions</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

31. More specifically, regarding patients suffering from anxiety or depressive disorders, how is care coordinated between the professionals in your clinic?

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Informal or ad hoc exchanges</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) Pre-established care protocols for specific client groups or problems</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) Case discussion meetings <em>(statutory meetings)</em></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) Continuing medical education sessions</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) Other (\rightarrow) <strong>Specify</strong> : .........................................................</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
### INTERORGANISATIONAL COLLABORATION

32. Where are patients sent when they need to see specialists?

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) To specialists’ private offices</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) To hospitals or hospital out-patient clinics</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) To hospital emergency rooms</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

33. Where are referrals made for patients suffering from anxiety or depressive disorders for complementary mental health services?

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) To private psychiatrist offices</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) To hospitals or out-patient psychiatric clinics</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) To hospital emergency room</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) To private psychologist offices</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) To a centralised access point at a CLSC</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) To community mental health organisations <em>(e.g. self-help groups, crisis centres, suicide prevention centers)</em></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>g) Other → Specify :</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

34. In general, appointments with specialists are made by...

- ☐ 1. The patient
- ☐ 2. The support staff
- ☐ 3. The nurse
- ☐ 4. The physician

35. Indicate whether your clinic has formal or informal agreements for collaborating with other primary healthcare clinics, CLSC or hospitals for the following activities. *Check all that apply.*

<table>
<thead>
<tr>
<th></th>
<th>YES, with one or several primary healthcare clinic(s)</th>
<th>YES, with one or several CLSC(s)</th>
<th>YES, with one or several hospital(s)</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Planning services offered <em>(e.g. on-call activities, clinic office hours, walk-in services)</em>?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b) Access to technical platform <em>(e.g. radiology, laboratory)</em>?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c) Resources exchanges <em>(e.g. loan of professionals)</em>?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d) Referral or transfer of patients to general practitioners, specialists or other professionals?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e) Follow-up for hospitalised patients or patients seen at the clinic?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>f) Other → Specify :</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
36. Indicate whether your clinic has formal or informal agreements for collaborating with other primary healthcare clinics, CLSC or hospitals (including out-patient clinic) for the following activities. Check all that apply.

<table>
<thead>
<tr>
<th>Activity</th>
<th>YES, with one or several primary healthcare clinic(s)</th>
<th>YES, with one or several CLSC(s)</th>
<th>YES, with one or several hospital(s)</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) diagnosis evaluation and advice?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b) follow-up of patients hospitalized or seen at the clinic?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c) joint follow-up?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d) transfer of clientele?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e) Other + Specify :</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

37. Does your clinic participate in a health care access network to ensure that your clinic’s office hours are coordinated with those of other clinics (evenings, weekends, etc.)?
   - [ ] Yes
   - [ ] No

38. How many of the general practitioners at your clinic participate in the following activities:

<table>
<thead>
<tr>
<th>Activity</th>
<th>All/Most</th>
<th>Some</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Local committees of the Direction régionale de médecine générale (DRMG) ?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) Committees for the implementation of Family Medicine Groups (GMF) ?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) Committees to alleviate congestion in emergency room ?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) Committees on CSSS clinical project ?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) Committees on mental health clientele?</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

VISION / VALUES

39. Which statement best represents the population that your clinic aims to reach? Check one only.
   - [ ] Anyone who needs services and shows up at the clinic.
   - [ ] Regular clinic patients or patients registered at the clinic.
   - [ ] The population in the neighbourhood, village or territory served by the clinic.

40. Indicate how important the following goals are for your clinic:

<table>
<thead>
<tr>
<th>Goal</th>
<th>Extremely important</th>
<th>Very important</th>
<th>Fairly important</th>
<th>Not very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Accessibility of services offered by the clinic</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) Ongoing relationship with patients</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) Services that meet patients overall healthcare needs (physical, psychological and social)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) Delivery of preventive and health promotion services</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) Care in agreement with established clinical guidelines</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) Respect, courtesy and confidentiality</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>g) Equity in health care service delivery and absence of discrimination towards individuals</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
41. What is your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Totally agree</th>
<th>Partly agree</th>
<th>Partly disagree</th>
<th>Totally disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Physicians see the clinic as a business for which financial return is</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>important.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Clinic physicians’ should consider environmental or occupational</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>causes when assessing patients’ health problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Clinic physicians’ should consider social problems in their clinical</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>interventions (e.g. poverty, violence, substance dependence). If you are</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a “solo practice physician” → Go to question 42</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) Clinic professionals share common values regarding the clinics’</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>mission and objectives.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) It is important for the clinic’s general practitioners to work as a</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>team.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

42. Choose the statement that corresponds best to your clinic’s medical team’s views of...

   a) “responsibility for health” : Check one only.

      1. Health is an **individual responsibility**
         It is up to each individual to maintain his or her health or do what it takes to improve his or her health.

      2. Health is a **collective responsibility**
         It is up to society to create conditions that help maintain or improve health.

   b) the “right to services” : Check one only.

      1. Access to care is an **absolute right**
         Everyone should have the same access to health care, based on need, regardless of financial ability to pay.

      2. Access to care is a **relative right**
         Everyone should have access to health care but people who can afford it could pay for better access to health care.

43. Choose the one statement that corresponds best to your clinic’s priority regarding service organisation. Check one only.

   1. **Service accessibility** is a higher priority
   2. **Continuity of care** for patients is a higher priority

44. To what extent does or do the general practitioner(s) of your clinic feel accountable towards...

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Highly</th>
<th>Fairly</th>
<th>Slightly</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) clients suffering from anxiety</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>disorders?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) clients suffering from</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>depressive disorders?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) clients suffering from alcohol</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>or drug related disorders?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) clients suffering from serious</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>mental disorders?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) clients with more than one of</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>the above disorders?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
45. To what extent does or do the general practitioner(s) of your clinic find the following different aspects of mental health practice important?

<table>
<thead>
<tr>
<th></th>
<th>Highly</th>
<th>Fairly</th>
<th>Slightly</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) promotion of mental health (e.g. healthy lifestyle) ?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) prevention of mental health disorders (risk factors, family history, stressful events) ?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) screening of anxiety or depressive disorders ?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) treatment of anxiety or depressive disorders ?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) short or medium term follow-up of anxiety or depressive disorders (up to 9 months) ?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) long term follow-up (more than 9 months) ?</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

46. The following factors have been identified by clinics as barriers to the detection and treatment of anxiety and depressive disorders. To what extent do you consider that the following factors limit the physician(s) of your clinic to offer an “optimal level” of care for patients suffering from these disorders?

<table>
<thead>
<tr>
<th></th>
<th>Highly</th>
<th>Fairly</th>
<th>Slightly</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) reticence on the part of the patient or the family to accept diagnosis or treatment</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) more urgent medical problems</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) lack of accessibility to mental healthcare professionals</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) limited duration of consultation for counselling or education</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) lack of time for follow-up</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) inadequate mode of remuneration</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>g) Other Specify: .................................................</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

47. There are recognized practice guidelines in Canada for anxiety and depressive disorders. Is or are the physician(s) of your clinic aware of these guides?

- 1: All/most
- 2: Some
- 3: One only
- 4: None ➔ Go to question 49

48. What does or do the general practitioner(s) of your clinic think of these practice guidelines for anxiety or depressive disorders?

<table>
<thead>
<tr>
<th></th>
<th>Totally agree</th>
<th>Partly agree</th>
<th>Partly disagree</th>
<th>Totally disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) They are useful clinical information tools</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) They contribute to improve quality of care</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) They restrict professional autonomy</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) Their scientific value is well grounded</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) They do not take into account the full range of client characteristics</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) Using them is difficult and time consuming</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>g) Other Specify: .................................................</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
49. With regards to clients with anxiety or depressive disorders, how would you rate the importance given in your clinic to the contribution of other professionals such as…

<table>
<thead>
<tr>
<th>Professional</th>
<th>Extremely important</th>
<th>Very important</th>
<th>Fairly important</th>
<th>Not very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) a primary care nurse practitioner (private clinic, GMF or CLSC)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) a nurse trained in psychiatry</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) a social worker</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) a case manager (e.g. education, patient follow-up)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) a psychologist from the CLSC</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>f) a psychologist working in private practice</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>g) a consulting psychiatrist (advisory)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>h) a psychiatrist (evaluation only)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>i) a psychiatrist (evaluation and joint follow-up)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

50. For individuals suffering from anxiety and depressive disorders, to what extent does or do the physician(s) of your clinic consider the following important?

<table>
<thead>
<tr>
<th>Consideration</th>
<th>Extremely important</th>
<th>Very important</th>
<th>Fairly important</th>
<th>Not very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) allowing patients enough time</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>b) being adequately remunerated</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>c) having access to the resources offered by the CLSC</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>d) having access to the specialized resources in mental health (2nd and 3rd line)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>e) knowing and having access to existing community resources</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

CLINIC LOCATION

51. In the building in which your clinic is located, are there any services offered by…

<table>
<thead>
<tr>
<th>Professional</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) medical specialists?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) other health professionals?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you answered NO to these two questions ➔ END OF QUESTIONNAIRE

52. In the building in which your clinic is located, are there any services offered by…

<table>
<thead>
<tr>
<th>Professional</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) psychiatrist(s)?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) psychologist(s)?</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you answered NO to these two questions ➔ END OF QUESTIONNAIRE

53. Does your primary healthcare medical team refer patients to these other health professionals? (psychiatrists and psychologists)?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
THANK YOU FOR YOUR COLLABORATION!

If you have any additional comments, please write them down in the space provided below.
We will consider your comments with great interest.

DATE: __________/________/_______
        (day / month / year)
Appendix 4 – Interview and observation guides used in qualitative study

Guide d’entretien (version française)

Introduction:
Merci d’avoir accepté de me rencontrer aujourd’hui. Le but de cette entrevue est de mieux comprendre comment les caractéristiques de votre milieu de pratique influence les soins que vous offrez aux personnes atteintes de troubles mentaux (la dépression en particulier) qui ont aussi des maladies physiques chroniques comorbidées (par exemple, des maladies cardiaques, le diabète, l’arthrite). Je suis intéressé à entendre parler de votre point de vue et vos expériences dans la gestion de ces patients.

Comme mentionné dans le formulaire de consentement, vous devriez vous sentir libre de parler ouvertement étant donné que notre conversation restera confidentielle et des mesures seront prises pour s’assurer que votre anonymat est protégé. Notre entrevue devrait durer entre 45 et 60 minutes, mais n’hésitez pas à mettre fin à l’entrevue à tout moment.

Avez-vous des questions avant de commencer?

Caractéristiques du site et de l’intervenant (5 minutes):
- Historique du site
- Profession de l’intervenant et son rôle à la clinique
- Années d’expérience à sa pratique et à cette clinique
- Ses activités cliniques à l’extérieur de la clinique (par exemple, CLSC, hôpital, autre)

Expériences générales en lien avec la gestion des patients ayant la multimorbidité mentale-physique (5 minutes) :
- Prévalence des patients avec ce profil de comorbidité dans leur pratique quotidien
- Attitudes envers ces patients et expériences générales

Caractéristiques de leur milieux de pratique qui facilitent/entravent les soins (30-45 minutes) :
- Caractéristiques structurelles ou stratégiques (ex : type de clinique ou sa structure organisationnelle, milieux physique de travail, utilisation ou utilité des guides de pratique ou algorithmes de traitement, activités de formation, accès au mentorat, systèmes d’incitatifs, le leadership clinique, des projets collaboratifs – ex : le projet clinique d’un CSSS)
• Caractéristiques sociales (ex : relations et interactions avec collègues à l’intérieur et à l’extérieur de la clinique, degré de collaboration à la clinique, climat de respect et de confiance, opportunités d’échanges entre collègues, valeur accordé au travail d’équipe)

• Caractéristiques informationnelles (ex : les technologies en place à la clinique – ex : téléphone, Internet, dossier médicale informatisé, RTSS, systèmes électronique de rappel, etc.)

• Caractéristiques épistémiques (ex : caractère interdisciplinaire des soins, opportunités d’échange avec des expériences et points de vues divergents, implication des patients dans les décisions cliniques, opportunités pour créer des connaissances communes dans l’équipe à la clinique)

Note:

Pour chaque type de caractéristique, poser des questions sur les façons dont elles peuvent influencer les processus de gestion des connaissances qui soutiennent la prise de décision et ultimement les soins offerts aux patients ayant la multimorbidité physique-mentale (utiliser les fiches d'information):

• L’acquisition des connaissances et des informations utiles
• Le partage des connaissances et de l’information avec d’autres personnes
• L’utilisation des connaissances dans les décisions cliniques et dans la gestion des soins
• La création de nouvelles connaissances sur les soins offerts aux patients ayant la multimorbidité physique-mentale

Dernières questions (5 minutes):

• Selon eux, est-ce qu’il y a d’autres aspects de leur milieu de pratique qui influencent la qualité des soins offerts à ces patients
• Quels autres facteurs (autre que des facteurs organisationnels) peuvent influencer la qualité des soins offerts à ces patients?
Appendix 5 – Quality assessment for systematic review
Table 2. Quality assessment results for included studies (n=13)

<table>
<thead>
<tr>
<th>Author/date</th>
<th>Selection bias</th>
<th>Study design</th>
<th>Confounders</th>
<th>Gold standard</th>
<th>Data collection methods</th>
<th>Blinding</th>
<th>Analyses</th>
<th>Global rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ani et al (2009)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
</tr>
<tr>
<td>Aragones et al (2007)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Borowsky et al (2000)</td>
<td>Weak</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
</tr>
<tr>
<td>Kamphuis et al (2012)</td>
<td>Weak</td>
<td>Moderate</td>
<td>Weak</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
<td>Weak</td>
</tr>
<tr>
<td>Licht-Strunk et al (2009)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Weak</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Weak</td>
<td>Weak</td>
</tr>
<tr>
<td>Menear et al (2014)</td>
<td>Weak</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Nuyen et al (2005)</td>
<td>Weak</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Piek et al (2012)</td>
<td>Weak</td>
<td>Moderate</td>
<td>Weak</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Weak</td>
</tr>
<tr>
<td>Rost et al (2000)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Tylee et al (1993)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Weak</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
<td>Weak</td>
<td>Weak</td>
</tr>
<tr>
<td>Volkers et al (2004)</td>
<td>Weak</td>
<td>Moderate</td>
<td>Weak</td>
<td>Strong</td>
<td>Weak</td>
<td>Moderate</td>
<td>Weak</td>
<td>Weak</td>
</tr>
</tbody>
</table>

*a* Selection bias: Based on assessment of representativeness of study population (very likely to be representative, somewhat likely to be representative, not likely to be representative, can’t tell) and on study participation rates (80-100%, 60-79%, less than 60%, not applicable, can’t tell).

*b* Study design: Rated Moderate for observational studies that were well described and appropriate and Weak for studies that were not well-described (design unclear) or that featured significant flaws in design.

*c* Confounders: Based on assessment of percentage of relevant categories of confounders controlled for in study design or analysis (80-100%, 60-79%, less than 60%, can’t tell). Categories were socio-demographic characteristics (e.g. age, sex, ethnicity), depression characteristics (e.g. severity, history, suicidality), comorbid condition characteristics (e.g. comorbid psychiatric conditions, physical illness severity), healthcare characteristics (e.g. service use, clinician characteristics, primary care clinic characteristics), and other characteristics (e.g. acceptability of care, patient-provider relationship).
d Gold standard: Based on assessment of use of an appropriate gold standard to establish the presence of depression (yes: diagnostic psychiatric interview, disease codes supplemented by other data such as medication or service use; somewhat: validated rating scale, disease codes, physician self-report; no; can’t tell).

e Data collection methods: Based on assessment of appropriateness and validity of approach used to collect data on chronic physical comorbidity (e.g. clear indication of chronicity, use of single versus multiple data sources, use of a valid comorbidity index/system) and depression recognition (e.g. single criterion versus multiple criteria indicators of recognition, description of the indicator).

f Blinding: Based on an assessment of whether providers were blind to the depression status of study participants as determined by study authors through the use of a gold standard (yes, no, not applicable, can’t tell).

g Analyses: Based on an assessment of the appropriateness of analyses (yes: well described multivariate analyses; somewhat: well described bivariate analyses or analyses carried out by the review team; no: inappropriate analyses; can’t tell: poorly described analyses) and of the study sample size (likely satisfactory, not likely satisfactory, can’t tell).

h Global rating: Studies were categorized as providing strong, moderate or weak evidence (strong: studies rated strong on at least three dimensions and no dimensions rated as weak; moderate: studies with fewer than three dimensions rated as strong and either no or one dimension rated as weak; weak: studies with at least two dimensions rated as weak).
Table 5. Quality assessment results for included studies (n=46)

<table>
<thead>
<tr>
<th>Author/date</th>
<th>Selection bias</th>
<th>Study design</th>
<th>Confounders</th>
<th>Gold standard</th>
<th>Data collection methods</th>
<th>Blinding</th>
<th>Analyses</th>
<th>Global rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akincigil et al (2007)</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Ani et al (2009)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
</tr>
<tr>
<td>Aragones et al (2007)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
<td>Strong</td>
<td>Moderate</td>
</tr>
<tr>
<td>Bonnewyn et al (2009)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Weak</td>
<td>Strong</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Chen et al (2010a)</td>
<td>Strong</td>
<td>Moderate</td>
<td>Strong</td>
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\[a\] Selection bias: Based on assessment of representativeness of study population (very likely to be representative, somewhat likely to be representative, not likely to be representative, can’t tell) and on study participation rates (80-100%, 60-79%, less than 60%, not applicable, can’t tell).

\[b\] Study design: Rated Moderate for observational studies that were well described and appropriate and Weak for studies that were not well-described (design unclear) or that featured significant flaws in design.

\[c\] Confounders: Based on assessment of percentage of relevant categories of confounders controlled for in study design or analysis (80-100%, 60-79%, less than 60%, can’t tell). Categories were socio-demographic characteristics (e.g. age, sex, ethnicity), depression characteristics (e.g. severity, history,
suicidality), comorbid condition characteristics (e.g. comorbid psychiatric conditions, physical illness severity), healthcare characteristics (e.g. service use, clinician characteristics, primary care clinic characteristics), and other characteristics (e.g. acceptability of care, patient-provider relationship).

d Gold standard: Based on assessment of use of an appropriate gold standard to establish the presence of depression (yes: diagnostic psychiatric interview, disease codes supplemented by other data such as medication or service use; somewhat: validated rating scale, disease codes, physician self-report; no; can’t tell).

e Data collection methods: Based on assessment of appropriateness and validity of approach used to collect data on chronic physical comorbidity (e.g. clear indication of chronicity, use of single versus multiple data sources, use of a valid comorbidity index/system) and depression treatment and follow-up care (e.g. use of systematic development and validation process, use of guidelines or expert consensus, face/content validity, description of the indicator).

f Blinding: Based on an assessment of whether providers were blind to the depression status of study participants as determined by study authors through the use of a gold standard (yes, no, not applicable, can’t tell).

g Analyses: Based on an assessment of the appropriateness of analyses (yes: well described multivariate analyses; somewhat: well described bivariate analyses or analyses carried out by the review team; no: inappropriate analyses; can’t tell: poorly described analyses) and of the study sample size (likely satisfactory, not likely satisfactory, can’t tell).

h Global rating: Studies were categorized as providing strong, moderate or weak evidence (strong: studies rated strong on at least three dimensions and no dimensions rated as weak; moderate: studies with fewer than three dimensions rated as strong and either no or one dimension rated as weak; weak: studies with at least two dimensions rated as weak).
Appendix 6 – Tables 3 and 4 from systematic review article 2
<table>
<thead>
<tr>
<th>Author (year) and country</th>
<th>Study population</th>
<th>Treatment quality indicators</th>
<th>Comorbidity variables</th>
<th>Results and covariates</th>
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<tr>
<td>Akincigil et al. (2007)</td>
<td>4312 adults aged 18 years and over with newly diagnosed depression and newly initiated depression care</td>
<td>M(3): Antidepressant possessed ≥ 75% of the time during first 16 weeks following treatment initiation (i.e. acute phase)</td>
<td>Categorical: (G1) DEP + No cardiovascular / diabetes conditions (G2) DEP + 1 cardiovascular / diabetes conditions (G3) DEP + ≥ 2 cardiovascular / diabetes conditions Comorbidity pairings: (1) DEP +/- Cancer (2) DEP +/- Headache/Migraine</td>
<td>For acute phase treatment duration, patients with 2 or more cardiovascular/diabetes conditions had lower odds of adequate acute phase treatment duration relative to patients with no comorbid conditions (aOR = 0.65, 95% CI = 0.49-0.86) No other comorbidity groups were associated with acute phase treatment duration. No differences between comorbidity groups on continuation phase treatment duration Covariates: Sociodemographic, depression (antidepressant type), comorbid condition (e.g. anxiety, medications), health care (e.g. service use) and other characteristics</td>
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<td>Ani et al. (2009)</td>
<td>315 mostly Hispanic and African-American adults aged 18 years and over with new diagnosis of depression that were receiving care in three inner-city safety net primary care clinics</td>
<td>C(1): Counseling/Education for patients with PHQ-9 score = 10-14 OR Antidepressant and/or Psychotherapy for patients with PHQ-9 score ≥ 15 at time of clinic visit</td>
<td>Categorical: (G1) DEP + No medical comorbidity (G2) DEP + Mild/Moderate medical comorbidity (G3) DEP + Severe medical comorbidity *Based on Charlson Comorbidity Index</td>
<td>No differences between comorbidity groups with respect to percentage or likelihood of patients receiving depression treatment Covariates: Sociodemographic, depression (severity) and healthcare (service use) characteristics</td>
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<tr>
<td>Aragones et al. (2007)</td>
<td>120 primary care patients between ages of 18 and 70 with major depression and/or dysthymia</td>
<td>M(1): Patient receiving antidepressant medication at time of study interview</td>
<td>Categorical: (G1) DEP + No/Mild comorbidity (G2) DEP + Moderate/Severe comorbidity *Based on Duke Severity of Illness Checklist</td>
<td>No difference between comorbidity groups with respect to rates of antidepressant use (G1=35%, G2=32%, p=0.68) Covariates: none</td>
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<tr>
<td>Study</td>
<td>Sample Description</td>
<td>Measurement</td>
<td>Categorical</td>
<td>Findings</td>
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<td>Bech et al. (2003)</td>
<td>942 primary care patients between ages of 18 and 75 with clinically significant depressive symptoms * CIDI interview</td>
<td>M(4): Antidepressant use at adequate dose for at least one month over a period of 6 months</td>
<td>Categorical: (G1) Mild DEP + No CMCs (G2) Moderate/Severe DEP + No CMCs (G3) Moderate DEP + ≥ 1 CMCs</td>
<td>Patients with severe/moderate depression and no comorbid CMCs had significantly higher rates of antidepressant use compared with the two other comorbidity groups (G1=11.9%, G2=22.8%, G3= 14.1%; p &lt; 0.01) Covariates: none</td>
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<td>Boenisch et al. (2012)</td>
<td>776522 adults between ages of 18 and 100 diagnosed with depressive episode having statutory health insurance * ICD-10 codes for mild, moderate, severe or other depressive episode</td>
<td>C(2): Antidepressant with ≥ 4 visits with physician over 3 month period AND/OR Psychotherapy with ≥ 8 sessions over 3 month period</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ≥ 1 CMCs Comorbidity pairings: (1) DEP +/- Diabetes (2) DEP +/- Cerebrovascular disease (3) DEP +/- Heart disease (4) DEP +/- Cancer</td>
<td>Patients with comorbid diabetes, cerebrovascular disease, and heart disease had higher rates of minimally adequate treatment than patients without these disorders (ps &lt; 0.001). Patients with comorbid cancer had lower rates of minimally adequate treatment than patients without comorbid cancer (p &lt; 0.001) Having one or more comorbid CMCs was associated with a lower likelihood of receiving minimally adequate depression treatment (aOR=0.97, 95% CI=0.96-0.98, p &lt; 0.001) Covariates: Sociodemographic, depression (severity), comorbid condition (psychiatric comorbidity) and healthcare (contact with mental health specialist) characteristics</td>
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<td>Bogner et al. (2006)</td>
<td>340 older primary care patients between the ages of 65 and 92 with clinically significant depressive symptoms * CES-D scale (score ≥ 16)</td>
<td>C(1): Prescription of psychotropic medication in previous 6 months AND/OR Counseling for depression in previous 6 months AND/OR Referral of patient to mental health specialist in previous 6 months</td>
<td>Categorical: (G1) DEP + 0-2 cardiovascular conditions (G2) DEP + ≥ 3 cardiovascular conditions Comorbidity pairings: (1) DEP +/- Heart attack (2) DEP +/- Heart failure (3) DEP +/- Angioplasty (4) DEP +/- Angina (5) DEP +/- Stroke</td>
<td>Significant association between heart failure comorbidity and likelihood of depression treatment (aOR = 0.33, 95% CI = 0.14-0.76). However, this association did not remain significant after controlling for effects of covariates. No relationships between other cardiovascular conditions and depression treatment Covariates: Sociodemographic, depression (e.g. symptoms), comorbid condition (medications), and healthcare (service use) characteristics</td>
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<td>Study</td>
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<td>Bonnewyn et al. (2009)</td>
<td>6 countries (Belgium, France, Germany, Italy, Netherlands, Spain)</td>
<td>128 adults aged 65 years and older with major depressive episode</td>
<td><strong>M(1):</strong> Antidepressant used in previous year</td>
<td><strong>Categorical:</strong> (G1) DEP + No chronic pain (G2) DEP + Chronic pain</td>
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<td>Chen et al. (2010)</td>
<td>United States</td>
<td>4102 adults aged 18 and over with newly diagnosed depression that were enrolled in large national health plan and recently initiated depression care</td>
<td><strong>M(3):</strong> Antidepressant for at least 72 days out of first 90 days since index prescription (MPR ≥ 80%) AND No gaps in treatment of more than half of the days of supply since the end of the last antidepressant prescription’s supply (i.e. acute phase treatment completion)</td>
<td>Weighted comorbidity score: (score range not reported)</td>
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<td>DeVaugh-Geiss et al. (2010)</td>
<td>United States</td>
<td>573 primary care patients aged 18 years and over with depression that were initiated on one of three antidepressant medications</td>
<td><strong>M(2):</strong> Antidepressant dosage above the minimum recommended dose at time of study visit</td>
<td><strong>Categorical:</strong> (G1) DEP + No pain (G2) DEP + Mild pain (G3) DEP + Moderate pain (G4) DEP + Severe pain</td>
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<td>Dew et al. (1997)</td>
<td>United States</td>
<td>44 male primary care patients with depressive disorders</td>
<td><strong>M(1):</strong> Psychotropic medication use (mainly antidepressants) during 12-month follow-up period</td>
<td><strong>Comorbidity pair:</strong> (1) DEP +/- HIV positive</td>
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<tr>
<td>Study</td>
<td>Sample Description</td>
<td>Key Definitions</td>
<td>Results</td>
<td>Covariates</td>
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| Duhoux et al. (2008) Canada      | 831 adults aged 15 and over with major depression in the previous 12 months and at least one visit for mental health reasons | **P(2):** At least 4 visits with a professional for mental health reasons (definition B)  
**C(2):** Prescription for an antidepressant from a physician with at least 4 visits to the same type of provider AND/OR At least 12 visits to a professional trained in psychological counseling or therapy (definition A) | Patients with 1, 2 and 3 or more comorbid CMCs were all more likely to have at least 4 visits for mental health reasons than patients without comorbid CMCs (1 CMC: aOR=3.09, 95% CI=1.06-9.03; 2 CMCs: aOR=3.73, 95% CI=1.42-9.83; 3+ CMCs: aOR=4.08, 95% CI=1.64-10.14) | Patients with comorbid CMCs were more likely to receive minimally adequate treatment compared with patients with no comorbid CMCs (definition A: aOR=3.11, 95% CI=1.36-7.09; definition C: aOR=5.51, 95% CI=2.11-14.36; definition D: aOR=2.68, 95% CI=1.15-6.23). Patients with 2 comorbid CMCs were more likely to receive minimally adequate treatment according to definition C (aOR=2.87, 95% CI=1.21-6.77) |
<p>| Dunn et al. (1999) United Kingdom| 16204 primary care patients aged 18 and over with a newly initiated depression medication and receiving care from 99 general practices (in DIN-LINK Network) | <strong>M(4):</strong> At least 120 days of antidepressant medication at adequate dosages within the first 180 days following treatment initiation | None of the medical conditions included in the study were associated with differences in the likelihood of receiving adequate pharmacotherapy following treatment initiation | Covariates: Sociodemographic, depression (e.g. diagnosis), comorbid condition (e.g. anxiety), healthcare (sector of care) and other characteristics |
| Ettner et al. (2010) United States| 1835 adults aged 21 years and over with new depression diagnosis or newly initiated depression treatment receiving care in a large | <strong>M(4):</strong> Antidepressant within 6 months at index date and lasting at least 6 months AND Antidepressant at adequate dosages                                                                 | No differences between comorbidity groups in probability of receiving adequate pharmacotherapy | For adequate psychotherapy, patients with |</p>
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<th>Depression Criteria</th>
<th>Treatment Adequacy Criteria</th>
<th>Comorbidity Criteria</th>
<th>Results</th>
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<tr>
<td>Fernandez et al. (2010)</td>
<td>Spain</td>
<td>339 primary care patients aged 18 and over with major depression or dysthymic disorder diagnoses as determined by the SCID psychiatric interview</td>
<td>* SCID interview</td>
<td>C(2): Antidepressant above minimum daily dosage with ( \geq 4 ) visits to the prescribing general practitioner in past 12 months AND/OR ( \geq 8 ) visits to a general practitioner</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ( \geq 1 ) CMCs</td>
<td>No association between CMC comorbidity and treatment adequacy in patients identified as depressed by SCID interview. In patients identified as depressed by a general practitioner, those with comorbid CMCs had higher likelihood of receiving minimally adequate treatment compared with those without comorbid CMCs (aOR=3.21, 95% CI=1.00-10.26, p&lt;0.05). This was true however only when the data was self-reported by patients and not when it was extracted from the medical chart. Covariates: Sociodemographic, depression (severity), comorbid condition (psychiatric) characteristics</td>
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<td>Fortney et al. (1999)</td>
<td>United States</td>
<td>106 adults with clinically significant depressive symptoms</td>
<td>* Burnam screening tool</td>
<td>C(2): Antidepressant use for 8 weeks at or above minimum recommended dose for at least 75% of days within this period AND/OR ( \geq 8 ) visits with specialty mental health provider over a 12-week period (both over a six month period)</td>
<td>Unweighted comorbidity count: (count range not specified)</td>
<td>Higher number of comorbid CMCs was associated with a lower likelihood of receiving minimally adequate treatment (aOR=0.66, 95% CI=0.47-0.92). Covariates: Sociodemographic, depression (severity), comorbid condition (psychiatric) characteristics</td>
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| Gill et al. (2008) United States | 185029 adults aged 18 years and over with an active diagnosis of depression (the “prevalent” population) and 29768 adults aged 18 years and over with a new episode of depression (the “incident” population), both receiving care in a national network of outpatient medical offices | **M(1):** Antidepressant use by the diagnosis date (prevalent group) or within 1 year of diagnosis (incident group) | **Comorbidity pairings:** (1) DEP +/- Diabetes (2) DEP +/- Heart disease (3) DEP +/- Cancer (4) DEP +/- Stroke | In the prevalent population, patients with comorbid diabetes were more likely to be treated with antidepressants than patients without comorbid diabetes ($aOR=1.07, 95\% CI=1.03-1.11$). Patients with comorbid heart disease were less likely to be treated with antidepressants than patients without heart disease ($aOR=0.94, 95\% CI=0.90-0.99$).

In the incident population, patients with comorbid diabetes, heart disease and stroke were all more likely to receive antidepressants than patients without these conditions (diabetes: $aOR=1.14, 95\% CI=1.04-1.26$; heart disease: $aOR=1.23, 95\% CI=1.08-1.39$; stroke: $aOR=1.21, 95\% CI=1.04-1.42$).

Despite these significant differences in odds of treatment between comorbidity groups, absolute differences were small and authors questioned clinical significance of findings.

Covariates: Sociodemographic characteristics |

| Gill et al. (2010) United States | 1513 primary care patients aged 18 years and over with new diagnosis of depression receiving care from 209 providers in family medicine and general internal medicine offices | **M(1):** Prescription of antidepressant during one year study period | **Categorical:** (G1) DEP + No CMCs (G2) DEP + 1 CMC (G3) DEP + ≥ 2 CMCs | No differences in antidepressant use when comparing patients with or without specific comorbid conditions. Patients with 2 or more comorbid CMCs were less likely to be prescribed antidepressants than patients without comorbid CMCs ($aOR=0.58, 95\% CI=0.35-0.96$).

No differences between comorbidity groups with respect to likelihood of receiving antidepressant dosages above the minimum recommended dose.

With respect to full doses of antidepressant medication, only patients with |
| Study | 2444 primary care patients aged 18 years and over with new diagnosis of depression during the five-year study period that received care from physicians with subspecialization in anthroposophic medicine  * ICD-10 codes for depressive episode or recurrent depressive disorder | M(1): Antidepressant prescribed during 5 year study period | Categorical: (G1) DEP + 0-1 CMCs (G2) DEP + ≥ 2 CMCs  
Comorbidity pairings: (1) DEP +/- Heart disease (2) DEP +/- Cerebrovascular disease (3) DEP +/- Diabetes (4) DEP +/- Cancer (5) DEP +/- Heart failure (6) DEP +/- COPD | Patients with comorbid cerebrovascular disease, congestive heart failure and COPD were more likely to receive antidepressants than patients without these comorbid CMCs (cerebrovascular: aOR=1.76, 95% CI=1.12-2.76; heart failure: aOR=1.65, 95% CI=1.08-2.52; COPD: aOR=1.95, 95% CI=1.19-3.20)  
Patients with comorbid cancer were less likely to receive antidepressants than patients without comorbid cancer (aOR=0.75, 95% CI=0.57-0.97)  
No difference in antidepressant prescribing between 0-1 vs 2+ comorbidity groups  
Covariates: Sociodemographic, depression (type of depression) and healthcare (physician specialization) characteristics |
|---|---|---|---|---|
| Jeschke et al. (2006) Germany | 2178 veterans aged 18 years and over with new episode of depression and newly initiated depression treatment  * ICD-9 codes for major depression, dysthymia or depression not otherwise specified | M(3): Antidepressant for at least 68 days out of 84 days during acute phase of treatment (medicationpossession ratio of ≥ 80%)  
*Based on Elixhauser Comorbidity Index  
Comorbidity pairing: (1) DEP +/- Diabetes | Comorbidity count (count of 0-29 conditions) | Higher number of comorbid CMCs associated with higher likelihood of receiving adequate duration of depression treatment (aOR=1.09, 95% CI=1.01-1.18)  
No difference between patients with or without comorbid diabetes with respect to adequacy of treatment duration  
Covariates: Sociodemographic, depression (e.g. diagnosis, history), comorbid condition (psychiatric comorbidities), healthcare (location of diagnosis), other (adequate follow-up care) characteristics |
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</table>
| Joo et al. (2005)             | United States                    | 389 adult primary care patients with depression receiving care in community-based private practices | **M(2):** Antidepressant at adequate daily dose  
**O: Adequate DEP management:** Antidepressant continued for medication trial of less than 4 weeks OR Medication switch due to side-effects OR Depression symptoms absent or almost absent OR Increase in medication dosage or addition of new medication or referral to mental health specialist after medication trial of more than 4 weeks  | Categorical:  
(G1) DEP + No CMCs  
(G2) DEP + ≥ 1 CMCs  
No difference between comorbidity groups with respect to adequate antidepressant dosage (G1=72%, G2=70%, p=0.74)  
Trend for fewer patients with comorbid CMCs receiving adequate depression management relative to patients without comorbid CMCs (G1=83%, G2=74%, p=0.06)  
Covariates: none |
| Jordan et al. (2007)          | United States                    | 5517 older veterans diagnosed with COPD and depression that newly initiated depression treatment and received care from Veteran Affairs (VA) health services | **M(3):** Antidepressant for at least 84 days out of 114 days after prescription index date  
**M(4):** Antidepressant for at least 84 days out of 114 days after index date AND ≥ 3 visits with physician in 84-day period after date of diagnosis | Comorbidity pairings:  
(1) DEP + COPD +/- Heart disease  
(2) DEP + COPD +/- Lung cancer  
(3) DEP + COPD +/- Colon cancer  
(4) DEP + COPD +/- Stroke  
(5) DEP + COPD +/- Hypertension  
(6) DEP + COPD +/- Arthritis  
(7) DEP + COPD +/- Diabetes  
No differences between comorbidity groups with respect to likelihood of receiving an adequate duration of antidepressant treatment or adequate pharmacological treatment  
Covariates: Sociodemographic, comorbid condition (e.g. anxiety, COPD hospitalizations) and healthcare (e.g. mental health care before index date) characteristics |
| Kendrick et al. (2009)        | United Kingdom                   | 1658 adult primary care patients with newly identified depression as determined by the PHQ-9 and 584 adult primary care patients with newly identified depression as determined by the HADS, both receiving care from general practices within three primary care trusts | **M(1):** Antidepressant prescription during 3-month study follow-up period | Comorbidity pairings:  
(1) DEP +/- Diabetes  
(2) DEP +/- Heart disease  
(3) DEP +/- Other CMCs  
In patients identified as depressed using the PHQ-9, patients with comorbid diabetes and heart disease were less likely to receive antidepressants than patients without these comorbid conditions (diabetes: aOR=0.57, 95% CI=0.37-0.87; heart disease: aOR=0.54, 95% CI=0.35-0.83)  
In patients identified as depressed using the HADS, patients with comorbid heart disease were less likely to receive antidepressants in bivariate analyses but this association did not remain significant in multivariate logistic regression |
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<tr>
<td>Koike et al. (2002) United States</td>
<td>443 primary care patients aged 18 years and over with major depression and/or dysthymia</td>
<td>* CIDI interview</td>
<td>M(1): Antidepressant use in previous 6 months (assessed at 6 months and 12 months after baseline interview) P(1): Counseling from mental health specialist in previous 6 months (assessed at 6 months and 12 months after baseline interview) C(1): Antidepressant use in previous 6 months AND/OR Counseling from mental health specialist in previous 6 months (assessed at 6 months and 12 months after baseline interview)</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ≥ 1 CMCs</td>
<td>Patients with comorbid CMCs had higher adjusted rates of antidepressant use after 12 months than patients without comorbid CMCs (G1=12%, G2=27%) No differences between comorbidity groups with respect to adjusted rates of receiving counseling or any depression treatment Covariates: Sociodemographic, depression (severity, history) and other characteristics (recruitment center)</td>
</tr>
<tr>
<td>Kurdyak et al. (2004) Canada</td>
<td>278 adults between ages of 18 and 64 years with major depression in previous 12 months</td>
<td>* University of Michigan-CIDI interview</td>
<td>M(1): Antidepressant received in previous year M(4): Antidepressant received in previous year AND ≥ 4 follow-up visits with a physician for mental health reasons in previous year</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ≥ 1 CMCs</td>
<td>Adults with comorbid CMCs had higher rates of antidepressant use and adequate pharmacotherapy than did patients without comorbid CMCs (AD use: G1=14%, G2=26%, p &lt; 0.05; adequate AD: G1=9%, G2=21%, p &lt; 0.01) Adults with comorbid CMCs were more likely to receive adequate pharmacotherapy than adults without comorbid CMCs (aOR=1.46, 95% CI=1.12-1.90) Covariates: Sociodemographic, depression (diagnosis), comorbid condition (anxiety) and other (treatment status) characteristics</td>
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<tr>
<td>Lagomasino et al. (2005) United States</td>
<td>1175 white and Latino primary care patients aged 18 years and over with major depression or dysthymia</td>
<td>* CIDI interview</td>
<td>C(1): Antidepressant received in previous 6 months AND/OR Counseling from a mental health specialist in previous 6 months C(2): Antidepressant received above minimum recommended daily dosage for at least 25 days out of previous 30 days</td>
<td>Categorical: (G1) DEP + &lt; 3 CMCs (G2) DEP + ≥ 3 CMCs</td>
<td>Patients with 3 or more comorbid CMCs were more likely to initiate depression treatment and receive minimally adequate depression care compared with patients with fewer comorbid CMCs (treatment initiation: aOR=1.50, 95% CI=1.08-2.11; treatment adequacy: aOR=1.58, 95% CI=1.12-2.26) Covariates: Sociodemographic, depression (e.g. suicidality) and other characteristics</td>
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<td>Study</td>
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<td>Sample Characteristics</td>
<td>Measures</td>
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<tr>
<td>Licht-Strunk et al. (2004)</td>
<td>Netherlands</td>
<td>406 older adults between the ages of 55 and 85 years with clinically significant depressive symptoms</td>
<td>AND/OR ≥ 4 visits with a mental health specialist for psychotherapy with an active cognitive-behavioral therapy component</td>
<td>Sociodemographic and comorbid condition (e.g. anxiety) characteristics</td>
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<tr>
<td>Menear et al. (2014)</td>
<td>Canada</td>
<td>824 primary care patients aged 18 years and over with major depressive episode in previous year receiving care in 61 primary care clinics</td>
<td>M(1): Antidepressant use at baseline</td>
<td>No difference between comorbidity groups with respect to use of antidepressants at baseline (no vascular disease: 7%, vascular disease: 2%, p=0.11)</td>
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<td>Comorbidity pair: (1) DEP +/- Vascular disease</td>
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<td>Covariates: none</td>
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<tr>
<td>Nutting et al. (2000)</td>
<td>United States</td>
<td>92 adult primary care patients with significant depressive symptoms receiving care from 6 primary care practices</td>
<td>C(1): Use of guideline-recommended antidepressant in previous 6 months AND/OR ≥ 1 visit with a mental health specialist in previous 6 months</td>
<td>No relationship between comorbidity scores and initiation of depression treatment and minimally adequate depression treatment</td>
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<td>Weighted comorbidity score (Score ranging from 0-100)</td>
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<td>*Score based on combination of three components: (1) functioning levels as measured by the 36-Item Short-Form subscale, (2) the number of bed-days plus restricted activity due to physical problems, and (3) a comorbidity count from a list of 14 conditions</td>
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<td>Covariates: Sociodemographic, depression (severity of emotional problems) and other (acceptability of therapy) characteristics</td>
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| Nuyen et al.      | Netherlands | 991 primary care patients aged between 18 and 93 years with new episode of depression | **M(1):** Prescription for antidepressant or lithium within 4 weeks of diagnosis  
**M(3):** Antidepressant for at least 144 days out of 180 days after first prescription date in study period (medication/possession ratio of ≥ 80%)  
C(1): ≥ 1 prescription for antidepressant or lithium AND/OR ≥ 1 referral to mental health specialist for depression AND/OR ≥ 1 follow-up contact with a general practitioner (all within 4 weeks after diagnosis) | Categorical:  
(G1) DEP + No CMCs  
(G2) DEP + ≥ 1 CMCs  
(G3) DEP + Thyroid conditions  
(G4) DEP + Colon conditions  
(G5) DEP + Stomach/Duodenal conditions  
(G6) DEP + Skin conditions  
(G7) DEP + Chronic lung conditions  
(G8) DEP + Osteoarthritis / Rheumatoid arthritis conditions  
(G9) DEP + Neurological conditions  
(G10) DEP + Diabetes  
(G11) DEP + Hypertension  
(G12) DEP + Migraine  
(G13) DEP + Heart disease  
(G14) DEP + Cardiac arrhythmia  
(G15) DEP + Any other chronic condition | The mean rate of antidepressant prescriptions in the sample was 81.5%, with patients with comorbid arrhythmia and heart disease having the lowest rates (59.3% and 67.4% respectively) and skin and stomach conditions having the highest rates (84.0% and 83.6% respectively) No differences between comorbidity groups with respect to receiving an adequate duration of antidepressant medication Patients with comorbid arrhythmia and heart disease were less likely to initiate any depression care compared with patients without these comorbid CMCs (arrhythmia: aOR=0.17, 95% CI=0.07-0.42; heart disease: aOR=0.35, 95% CI=0.16-0.80). There was a trend for patients with comorbid migraine to have lower likelihood of initiation of depression care (aOR=0.39, p=0.08). No other significant relationships between comorbidity groups and initiation of depression care were observed Covariates: Sociodemographic, depression (severity) and comorbid condition (e.g. anxiety) characteristics |
| Ohayon et al.     | 4 countries (France, Italy, Germany, United Kingdom) | 569 adults aged 18 years and over with depressive disorders * SLEEP-EVAL diagnostic system | **M(1):** Antidepressant use at time of study interview  
**M(2):** Antidepressant at adequate dosage at time of study interview | Categorical:  
(G1) DEP + No CMCs  
(G2) DEP + ≥ 1 CMCs  
(G3) DEP + Thyroid conditions  
(G4) DEP + Colon conditions  
(G5) DEP + Stomach/Duodenal conditions  
(G6) DEP + Skin conditions  
(G7) DEP + Chronic lung conditions  
(G8) DEP + Osteoarthritis / Rheumatoid arthritis conditions  
(G9) DEP + Neurological conditions  
(G10) DEP + Diabetes  
(G11) DEP + Hypertension  
(G12) DEP + Migraine  
(G13) DEP + Heart disease  
(G14) DEP + Cardiac arrhythmia  
(G15) DEP + Any other chronic condition | Adults with comorbid CMCs had higher rate of antidepressant use than adults without comorbid CMCs (G1=5%, G2=11%, p<0.05) and were more likely to receive antidepressants at an adequate dosage (uOR=1.60, 95% CI=1.00-2.50) Covariates: none |
| Pirraglia et al.  | United States | 778 predominantly male adult veterans with new diagnosis of depression and newly initiated depression treatment * ICD-9 codes for major | **M(3):** Antidepressant use ≥ 80% of time during 3-month acute treatment phase | Comorbidity pairings:  
(1) DEP +/- COPD  
(2) DEP +/- Heart disease  
(3) DEP +/- Diabetes  
(4) DEP +/- Osteoarthritis | In multivariate regression analyses, patients with comorbid COPD were less likely to have an adequate duration of treatment than patients without COPD (aOR=0.62, 95% CI=0.44-0.87). No relationships were observed between the other comorbidity conditions and the duration of antidepressant treatment Covariates: Sociodemographic, depression (severity) and comorbid condition (e.g. anxiety) characteristics |
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<td>Rost et al. (2000) United States</td>
<td>141 primary care patients aged 18 and over with significant depressive symptoms receiving treatment from 6 primary care practices * IDD scale (score ≥ 5)</td>
<td>O: Changing depression management: During an index visit a provider referred the patient to counseling OR prescribed medication for emotional problems OR changed the medication that the patient was taking for emotional problems</td>
<td>Unweighted comorbidity count (Scores ranging from 0 to 14) No association between comorbidity count and likelihood of changing depression management (aOR=0.84, 95% CI=0.65-1.10) Covariates: Sociodemographic, comorbid condition (e.g. anxiety) and healthcare (type of clinical care) characteristics</td>
</tr>
<tr>
<td>Sewitch et al. (2006) Canada</td>
<td>5258 adults between ages of 65 and 85 years with new diagnosis of depression * ICD-9 codes for major depression, bipolar disorder, dysthymia, adjustment disorder, depression not otherwise specified, other depressive disorder</td>
<td>M(1): At least one claim for an antidepressant medication in the year following depression diagnosis M(1): At least one claim for a guideline-recommended first-line antidepressant treatment at first prescribing visit</td>
<td>Weighted comorbidity score: (Score ranging from 0-35) Older adults with higher comorbidity scores had higher likelihood of using antidepressants (aOR=1.07, 95% CI=1.04-1.10) No relationship between comorbidity score and likelihood of being prescribed a first-line antidepressant at first prescribing visit Covariates: Sociodemographic, depression (diagnosis) and healthcare (diagnosing physician specialty) characteristics</td>
</tr>
<tr>
<td>Sewitch et al. (2009) Canada</td>
<td>2746 adults between ages of 18 and 64 years with new diagnosis of depression * ICD-9 codes for depression, dysthymia and depression not otherwise specified</td>
<td>M(1): Prescription of guideline-recommended first-line antidepressant treatment at first prescribing visit</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ≥ 1 CMCs Patients with comorbid CMCs had lower likelihood of receiving guideline recommended pharmacotherapy than patients without comorbid CMCs (aOR=0.93, 95% CI=0.90-0.97) Covariates: Sociodemographic, depression (diagnosis) and healthcare (diagnosing physician specialty) characteristics</td>
</tr>
<tr>
<td>Simon et al. (2004) 6 countries (Australia, Brazil, ...)</td>
<td>652 primary care patients aged between 18 and 75 years with major depression but no depression treatment in previous 3 months</td>
<td>M(2): Antidepressant at adequate dosage during 9 month follow-up</td>
<td>Categorical: (G1) DEP + No CMCs (G2) DEP + ≥ 1 CMCs In Barcelona and Melbourne, patients with comorbid CMCs were more likely to receive an adequate dosage of antidepressant medication than patients without comorbid CMCs (Barcelona: ...</td>
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<tr>
<td>Country</td>
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<tr>
<td>Israel, Russia, Spain, United States</td>
<td>(Barcelona: 185 patients, Melbourne: 170 patients, Porto Alegre: 155 patients, 142 patients)</td>
<td>* CIDI interview</td>
<td>aOR=2.73, 95% CI=1.08-6.90; Melbourne: aOR=5.88, 95% CI=1.26-27.3. No relationship between comorbidity and adequate treatment dosage in other countries</td>
</tr>
<tr>
<td>Simon et al. (2005) United States</td>
<td>439 primary care patients between the ages of 18 and 75 years with depression or dysthymia and newly initiated depression treatment receiving care in staff-model primary care clinics</td>
<td>M(4): Continuous antidepressant use for at least 90 days at minimally adequate dose during 6 months following the index prescription date</td>
<td>Patients with comorbid heart disease had lower rate of adequate pharmacotherapy compared with patients without comorbid CMCs (G1=48%, G2=28%, G3=38%, G4=44%, p&lt;0.01)</td>
</tr>
<tr>
<td>Smolders et al. (2008) Netherlands</td>
<td>4372 primary care patients aged between 18 and 65 years with new diagnosis of depression receiving care from 77 primary care practices</td>
<td>M(3): Quarterly mean number of antidepressant prescriptions per patient over the first three months after diagnosis (0-3 months) and over the rest of the year (4-12 months).</td>
<td>Patients with comorbid neurological conditions had higher antidepressant prescriptions rates than patients without comorbid chronic conditions over first 3 months after diagnosis (G1=1.62, G2=2.01). No other differences between comorbidity groups and prescription rates in the acute treatment phase were observed</td>
</tr>
<tr>
<td>Study</td>
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<td>Starkes et al. (2005)</td>
<td>Canada</td>
<td>1312 respondents aged 12 years and over with probable major depressive episode in previous 12 months</td>
<td>* CIDI-Short Form scale (score ≥ 5)</td>
</tr>
<tr>
<td>Unutzer et al. (2003)</td>
<td>United States</td>
<td>1797 older primary care patients aged 60 years and over with major depression or dysthmic disorder receiving care from 18 primary care clinics</td>
<td>* SCID interview</td>
</tr>
<tr>
<td>Unutzer et al. (2004)</td>
<td>United States</td>
<td>1801 older primary care patients aged 60 years and over with major depression or dysthmic disorder receiving care from 18 primary care clinics</td>
<td>* SCID interview</td>
</tr>
<tr>
<td>Wang et al. (2003)</td>
<td>Canada</td>
<td>608 respondents aged 12 years and over with major depressive episode in previous 12 months</td>
<td>* CIDI-Short Form interview</td>
</tr>
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</table>
| Wang et al. (2005)  | 12130 older adults aged 65 years and over with new diagnosis of depression and newly initiated depression treatment  
* Medicare codes for depression | O: Potentially hazardous treatment regimen:  
Patient prescribed a highly anticholinergic antidepressant drug AND/OR Prescribed antidepressant medication above the recommended upper limits of dosage (both over 180 day period after index date) | Weighted comorbidity count  
(count range not specified)  
*Based on modified Charlson Comorbidity Index  
Comorbidity pairings:  
(1) DEP +/- Cardiovascular disease  
(2) DEP +/- Cerebrovascular disease  
(3) DEP +/- Cancer  
(4) DEP +/- Migraine | Higher comorbidity scores were associated with lower odds of receiving a potentially hazardous treatment regimen (aOR=0.96, 95% CI=0.92-0.99)  
Patients with comorbid cancer were more likely to receive a potentially hazardous treatment regimen than patients without comorbid cancer (aOR=1.22, 95% CI=1.04-1.44). No other conditions were associated with having a hazardous treatment regimen  
Covariates: Sociodemographic, depression (antidepressant history), comorbid condition (psychiatric comorbidity), healthcare (e.g. service use) characteristics |
|---|---|---|---|---|
| Watson et al. (2009)  | 145784 primary care patients aged between 18 and 50 years with major depression  
* GPRD database codes for major depression | M(1): Antidepressant prescription during the six-year study observation period | Categorical:  
(G1) DEP + No pain  
(G2) DEP + Unexplained pain  
(G3) DEP + Pain with diagnoses for CMCs | Patients with comorbid pain (unexplained or tied to a diagnosis) had higher rates of antidepressant prescriptions during the study observation period (G1=92%, G2=95%, G3=95%, p < 0.001)  
Covariates: none |

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\(^a\) CES-D: Center for Epidemiologic Studies Depression Scale, CIDI: Composite International Diagnostic Interview; DIS: Diagnostic Interview Schedule; GPRD: General Practice Research Database, HADS: Hospital Anxiety and Depression Scale, ICD: International Classification of Diseases, ICPC: The International Classification of Primary Care, IDD: Inventory to Diagnose Depression; PHQ-9: Patient Health Questionnaire for Depression; PRIME-MD: Primary Care Evaluation of Mental Disorders, SCID: Structured Clinical Interview for DSM-IV

\(^b\) CDS: Chronic Disease Score; CMC: Chronic medical condition; DEP: Depression, MPR: Medical Possession Ration; M1: Antidepressant use, M2: Adequate treatment dosage, M3: Adequate treatment duration, M4: Adequate pharmacotherapy, P1: Psychotherapy/Counselling, ). P2: Adequate psychotherapy, C1: Minimal treatment quality, C2: Minimally adequate treatment, O: Other; G1, G2, G3, etc.: Group 1, Group 2, Group 3, etc.

\(^c\) aOR: Adjusted Odds Ratio; uOR: Unadjusted Odds Ratio; CI: Confidence interval.
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<th>Comorbidity variables c * Comorbidity index used</th>
<th>Results and covariates d</th>
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<tr>
<td>Ani et al. (2009)</td>
<td>315 mostly Hispanic and African-American adults aged 18 years and over with new diagnosis of depression that were receiving care in three inner-city safety net primary care clinics * PHQ-9 ≥ 10</td>
<td>F(2): Follow-up visit within 4 weeks if PHQ-9 score = 10-14 OR Follow-up visit within 2 weeks if PHQ-9 score = 15-19 OR Follow-up visit within 2 weeks if PHQ-9 score ≥ 20</td>
<td>Categorical: (G1) DEP + No medical comorbidity (G2) DEP + Mild, Moderate or Severe comorbidity *Based on Charlson Comorbidity Index</td>
<td>No differences between comorbidity groups with respect to percentage (G1=22%, G2=15%, p=0.16) or likelihood of patients receiving adequate follow-up care (aOR=0.29, p=0.15) Covariates: Sociodemographic and depression (severity) characteristics</td>
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<tr>
<td>Chen et al. (2010b)</td>
<td>4102 primary care patients aged 18 years and over with new diagnosis of depression and newly initiated antidepressant treatment * ICD-9 codes for depression</td>
<td>F(3): At least 3 visits in the 3 months following date of index antidepressant prescription with at least one visit with a provider with prescribing privileges (definition A) F(3): At least 3 visits in the 3 months following date of index antidepressant prescription with all visits with a provider with prescribing privileges (definition B) F(3): At least 3 visits in the 3 months following date of index antidepressant prescription with the same provider that prescribed the antidepressant (definition C)</td>
<td>Weighted comorbidity score: (scores ranged from 0.2 to 7.5) * Chronic disease score – Based on prescription data over 6 month period</td>
<td>No relationship between chronic disease score and optimal follow-up when using definition A (aOR=1.05, p&gt;0.05). When using definitions B and C, a higher chronic disease score was associated with higher odds of receiving optimal follow-up care (definition B: aOR=1.11, 95% CI=1.00-1.23; definition C: aOR=1.26, 95% CI=1.15-1.37). Covariates: Sociodemographic, depression (antidepressant type), comorbid condition (e.g. anxiety) and healthcare (e.g. type of provider) characteristics</td>
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<tr>
<td>Fortney et al. (1999)</td>
<td>106 adults with clinically significant depressive symptoms * Burnam screening tool</td>
<td>F(3): Number of depression visits to a preferred provider in the 6 months after baseline interview</td>
<td>Unweighted comorbidity count (count range not reported)</td>
<td>Number of chronic CMCs did not predict visit frequency (p=0.75) Covariates: Sociodemographic, Depression (severity) and comorbid condition (psychiatric comorbidity) characteristics</td>
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<tr>
<td>Study</td>
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<td>Houle et al. (2010)</td>
<td>41375 adults aged 18 years and over with new episode of depressive disorder * ICD-9 codes for depression, dysthymia, adjustment disorder and depression NOS</td>
<td>F(1): More than half the patients visits were with the same provider in the 3 months following depression diagnosis F(2): Follow-up visit within 30 days following depression diagnosis F(3): At least 3 outpatient visits in the 3 months following depression diagnosis</td>
<td>Categorical: (G1) DEP + No, low or moderate medical comorbidity (G2) DEP + High or very high medical comorbidity * Based on John Hopkins adjusted medical group case-mix system</td>
<td>Adults with high/very high medical comorbidity were less likely to have a follow-up visit within 30 days after diagnosis than patients with lower medical comorbidity (aOR=0.78, 95% CI=0.73-0.83) Adults with high/very high medical comorbidity were more likely to have at least 3 outpatient visits in the 3 months following depression diagnosis than patients with lower medical comorbidity (AOR=1.17, 95% CI=1.09-1.25) Covariates: Sociodemographic, comorbid condition (e.g. anxiety) and healthcare (providers involved in follow-up) characteristics</td>
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<tr>
<td>Jones et al. (2006)</td>
<td>2178 veterans aged 18 years and over with new episode of depression and newly initiated depression treatment * ICD-9 codes for major depression, dysthymia or depression NOS</td>
<td>F(2): Follow-up visit within 7 days following initiation of treatment F(2): Follow-up visit within 14 days following initiation of treatment F(3): At least 3 visits in the 3 months following initiation of treatment</td>
<td>Comorbidity count (count of 0-29 conditions) *Based on Elixhauser Comorbidity Index Comorbidity pair: (2) DEP +/- Diabetes</td>
<td>No relationship between chronic medical comorbidity and follow-up visits within 7 days of initiating depression treatment Higher number of comorbid CMCs associated with increased likelihood of having a follow-up visit within 14 days of treatment initiation (aOR=1.08, 95% CI=1.01-1.15) and having at least 3 visits in the acute phase of treatment (aOR=1.20, 95% CI=1.13-1.28). Patients with comorbid diabetes were also more likely to have at least 3 visits in acute phase of treatment compared to patients without comorbid diabetes (aOR=1.36, 95% CI=1.05-1.75) Covariates: Sociodemographic, depression (diagnosis, history), comorbid condition (psychiatric comorbidity) and healthcare (location of diagnosis) characteristics</td>
</tr>
</tbody>
</table>
| Jordan et al. (2007) | 5517 predominantly male older veterans diagnosed with COPD and depression that newly initiated depression treatment and received care from Veteran Affairs (VA) health services | F(3): At least 3 clinical encounters for depression in the 84 days following depression diagnosis (only one could be by telephone) | Comorbidity pairs:  
(1) DEP + COPD +/- Heart disease  
(2) DEP + COPD +/- Lung cancer  
(3) DEP + COPD +/- Colon cancer  
(4) DEP + COPD +/- Stroke  
(5) DEP + COPD +/- Hypertension  
(6) DEP + COPD +/- Arthritis  
(7) DEP + COPD +/- Diabetes | Veterans with COPD and comorbid lung cancer were more likely to have at least 3 contacts with providers in the acute phase of treatment than veterans with COPD but without comorbid lung cancer (aOR=1.61, 95% CI=1.10-2.35)  
Covariates: Sociodemographic, comorbid condition (e.g. anxiety, COPD hospitalizations) and healthcare (e.g. mental health care before index date) characteristics |
| --- | --- | --- | --- | --- |
| Katon et al. (2000) | 1220 primary care patients aged between 18 and 80 years with newly initiated depression treatment receiving care from 4 primary care clinics * SCID interview | F(2): Follow-up visit within 3 weeks of antidepressant prescription date  
F(2): Follow-up visit within 6 weeks of antidepressant prescription date | Weighted comorbidity score: (score range not specified)  
* Chronic disease score – Based on prescription data over 6 month period | No relationship between chronic disease score and promptness of follow-up visits (both definitions) for depression treatment  
Covariates: Sociodemographic, depression (number of episodes) and healthcare (physician attributes) characteristics |
| Kendrick et al. (2009) | 1658 adult primary care patients with depression as determined by the PHQ-9 and 584 adult primary care patients with depression as determined by the HADS, both receiving care from general practices within three primary care trusts * PHQ-9 and HADS scales | F(2): Follow-up appointment within 4 weeks following depression detection | Comorbidity pairs:  
(4) DEP +/- Diabetes  
(5) DEP +/- Heart disease  
(6) DEP +/- Other CMCs | In patients identified as depressed using the PHQ-9, patients with comorbid heart disease were less likely to have a follow-up appointment within 4 weeks of their diagnosis compared with patients without comorbid heart disease (uOR=0.60, 95% CI=0.38-0.96). No relationships between diabetes or other CMCs and follow-up care when depression measured using the PHQ-9  
No relationships observed between comorbidity pairings and follow-up care  
In patients identified as depressed using the HADS  
Covariates: none |
Nuyen et al. (2008)  
991 primary care patients aged between 18 and 93 years with new episode of depression  
* ICPC code for new episode of depression  

| F(2): Follow-up visit with general practitioner within 4 weeks following depression diagnosis | Categorical:  
| (G1) DEP + No CMCs  
| (G2) DEP + ≥ 1 CMCs  
| Categorical:  
| (16) DEP + No comorbid CMCs  
| (17) DEP + Thyroid conditions  
| (18) DEP + Colon conditions  
| (19) DEP + Stomach/Duodenal conditions  
| (20) DEP + Skin conditions  
| (21) DEP + Chronic lung conditions  
| (22) DEP + Cancer  
| (23) DEP + Osteoarthritis / Rheumatoid arthritis conditions  
| (24) DEP + Neurological conditions  
| (25) DEP + Diabetes  
| (26) DEP + Hypertension  
| (27) DEP + Migraine  
| (28) DEP + Heart disease  
| (29) DEP + Cardiac arrhythmia  
| (30) DEP + Any other chronic condition | Fewer patients with comorbid cardiac arrhythmia had follow-up visits within 4 weeks of depression diagnosis compared with patients without comorbid CMCs (29.6% vs 50.4%, p<0.05). No significant relationship between follow-up visits and other CMCs. No differences between patients without CMCs and patients with CMCs.  
Covariates: none  

---

a HADS: Hospital Anxiety and Depression Scale, ICD: International Classification of Diseases, ICPC: The International Classification of Primary Care, PHQ-9: Patient Health Questionnaire for Depression; SCID: Structured Clinical Interview for DSM-IV; NOS: not otherwise specified.  

b F1: Continuity of follow-up care, F2: Promptness of follow-up care, F3: Intensity of follow-up care  

c CMC: Chronic medical condition; COPD: Chronic obstructive pulmonary disease; DEP: Depression; G1, G2, G3, etc.: Group 1, Group 2, Group 3, etc.  

d aOR: Adjusted Odds Ratio; uOR: Unadjusted Odds Ratio; CI: Confidence interval.
Appendix 7 – Permission to publish article 3 in thesis

Dear Matthew
Thank you for your email.
Please note that as one of the Authors of this article, you retain the right to include the journal article, in full or in part, in a thesis or dissertation. You do not require permission to do so.
For full details of your rights as a Journal Author, please visit: http://www.elsevier.com/wps/find/authorsview.authors/copyright#whatrights
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| url: ____________________________

On Thu, 22 May 2014, Menear Matthew wrote:

> Hello,
>
> My paper "Primary care practice characteristics associated with the quality of care received by patients with depression and comorbid chronic conditions" was recently published in your journal and appears in the current (May-June) issue. I would like to request your permission to include this paper in my doctoral thesis. A simple email response from the journal editor (Dr. Katon or Ms. Templeton) authorizing my use of the paper in this way is sufficient.
>
> I would appreciate it if this response could be sent to me before the end of this month (May 30th). Thanks in advance and I hope to publish with you again in the future!
>
> Matthew Menear
> School of Public Health
> University of Montreal
Appendix 8 – Ethics certificates
Comité d'éthique de la recherche en santé

13 juin 2013

Objet: Approbation éthique – «L'influence des caractéristiques des cliniques de première ligne sur la qualité des soins pour la dépression chez des patients ayant différents profils de comorbidité »

M. Matthew Menear, Mme Louise Fournier,

Le Comité d'éthique de la recherche en santé (CERES) a étudié le projet de recherche susmentionné et a délivré le certificat d'éthique demandé suite à la satisfaction des exigences précédemment émises. Vous trouverez ci-joint une copie numérisée de votre certificat; copie également envoyée à votre directeur/directrice de recherche et à la technicienne en gestion de dossiers étudiants (TGDE) de votre département.

Notez qu'il y apparaît une mention relative à un suivi annuel et que le certificat comporte une date de fin de validité. En effet, afin de répondre aux exigences éthiques en vigueur au Canada et à l'Université de Montréal, nous devons exercer un suivi annuel auprès des chercheurs et étudiants-chercheurs.

De manière à rendre ce processus le plus simple possible et afin d'en tirer pour tous le plus grand profit, nous avons élaboré un court questionnaire qui vous permettra à la fois de satisfaire aux exigences du suivi et de nous faire part de vos commentaires et de vos besoins en matière d'éthique en cours de recherche. Ce questionnaire de suivi devra être rempli annuellement jusqu'à la fin du projet et pourra nous être retourné par courriel. La validité de l'approbation éthique est conditionnelle à ce suivi. Sur réception du dernier rapport de suivi en fin de projet, votre dossier sera clos.

Il est entendu que cela ne modifie en rien l'obligation pour le chercheur, tel qu’indiqué sur le certificat d'éthique, de signaler au CERES tout incident grave dès qu'il survient ou de lui faire part de tout changement anticipé au protocole de recherche.

Nous vous prions d’agréer, monsieur, madame, l’expression de nos sentiments les meilleurs,

Dominique Langelier, présidente
Comité d'éthique de la recherche en santé (CERES)
Université de Montréal

/gp

c.c. Gestion des certificats, BRDV
Louise Fournier, Professeure agrégée de clinique au département de Médecine sociale et préventive, Faculté de médecine, département de Médecine sociale et préventive
p.j. Certificat #13-049-CERES-D
CERTIFICAT D’APPROBATION ÉTHIQUE

Le Comité d’éthique de la recherche en santé (CERES), selon les procédures en vigueur, en vertu des documents qui lui ont été fournis, a examiné le projet de recherche suivant et conclu qu’il respecte les règles d’éthique énoncées dans la Politique sur la recherche avec des êtres humains de l’Université de Montréal.

<table>
<thead>
<tr>
<th>Titre du projet</th>
<th>L’influence des caractéristiques des cliniques de première ligne sur la qualité des soins pour la dépression chez des patients ayant différents profils de comorbidité</th>
</tr>
</thead>
<tbody>
<tr>
<td>Étudiant requérant</td>
<td>Matthew Menear, Candidat au doctorat Médecine Sociale et préventive, Département de médecine sociale et préventive Département de médecine sociale et préventive</td>
</tr>
<tr>
<td>Sous la direction de</td>
<td>Louise Fournier, Professeure agrégée de clinique au département de Médecine sociale et préventive, Université de Montréal</td>
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**Financement**

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<td>Numéro d’octroi</td>
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<tr>
<td>Chercheur principal</td>
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<td>No de compte</td>
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**Modalités d’APPLICATION**

Tout changement anticipé au protocole de recherche doit être communiqué au CERES qui en évaluera l’impact au chapitre de l’éthique.

Toute interruption prématuée du projet ou tout incident grave doit être immédiatement signalé au CERES.

Selon les règles universitaires en vigueur, un suivi annuel est minimalement exigé pour maintenir la validité de la présente approbation éthique, et ce, jusqu’à la fin du projet. Le questionnaire de suivi est disponible sur la page web du CERES.

Dominique Langelier, présidente
Comité d’éthique de la recherche en santé
Université de Montréal

13 juin 2013
Date de délivrance

1er juin 2014
Date de fin de validité
# CERTIFICAT DE CONFORMITÉ ÉTHIQUE

émis par le COMITÉ D’ÉTHIQUE DE LA RECHERCHE
DE L’AGENCE DE LA SANTÉ ET DES SERVICES SOCIAUX DE MONTRÉAL

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<th>292</th>
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<td>Titre</td>
<td>L'influence des caractéristiques des cliniques de première ligne sur la qualité des soins pour la dépression chez des patients ayant différents profils de comorbidité</td>
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<tr>
<td>Chercheur principal</td>
<td>Louise Fournier</td>
</tr>
<tr>
<td>Date du dépôt de la demande</td>
<td>15 avril 2013</td>
</tr>
</tbody>
</table>
| Documents examinés | • Formulaire de demande d'évaluation d'un projet de recherche monocentrique (daté du 10 avril 2013);
• Engagement à la confidentialité signé par l'équipe de recherche;
• Engagement des chercheurs à la tenue d'une liste des sujets de recherche recrutés (daté et signé le 10 avril 2013);
• Autorisation de diffusion des renseignements nominatifs des chercheurs (datée du 10 avril 2013);
• Rapport du jury de l'examen général de doctorat (daté du 13 décembre 2010);
• Résumé du protocole de recherche (version du 5 mars 2013);
• Guide d'entretien (sans date de version);
• Vignettes cliniques (sans date de version);
• Le tableau relatif aux caractéristiques mesurées et au processus de soins (sans date de version);
• Lettre d'invitation qui a été envoyée aux cliniques pré-sélectionnées (datée du 20 mars 2013);
• Formulaire d'information et de consentement (version du 10 avril 2013);
• Courriel/script téléphonique qui sera utilisé pour solliciter les participants pressentis (version du 7 janvier 2013);
• Avis courriel confirmant l’octroi d’une bourse de la Faculté des études supérieures et postdoctorales de l’Université de Montréal (daté du 23 août 2012);
• Lettre d’octroi d’une bourse par le programme TUTOR-PHC des IRSC (datée du 16 janvier 2013);
• Curriculum vitae de Mme Louise Fournier et M. Matthew Menear. |
| Date d'évaluation | 13 mai 2013 – Approbation conditionnelle |
| Documents en réponse | • Lettre à Mme I. Mondou, datée du 11 juin 2013;
• Lettre d’appui du CSSS de la Pointe-de-l’Île, datée du 21 mai 2013;
• Formulaire de demande d’évaluation d’un projet de recherche monocentrique (daté du 11 juin 2013);
• Courriel/script téléphonique qui sera utilisé pour solliciter les participants pressentis (version du 7 janvier 2013). |
CERTIFICAT DE CONFORMITÉ ÉTHIQUE émis par le COMITÉ D’ÉTHIQUE DE LA RECHERCHE
DE L’AGENCE DE LA SANTÉ ET DES SERVICES SOCIAUX DE MONTRÉAL

| participants pressentis (version du 11 juin 2013); |
| - Formulaire d’information et de consentement (version du 11 juin 2013); |
| - Approbation éthique émise par le CÉRES de l’Université de Montréal (Courriel du 13 juin 2013). |

<table>
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<th>Évaluation des réponses</th>
<th>20 juin 2013 - Approbation finale des modifications</th>
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<td>Établissement(s) dans le(s)quel(s) sera menée la recherche</td>
<td>• CSSS de la Pointe-de-l’Île</td>
</tr>
<tr>
<td></td>
<td>• CSSS à déterminer</td>
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</tbody>
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1. DÉCISION DU COMITÉ

Le Comité d’éthique de la recherche de l’Agence de la santé et des services sociaux de Montréal (CÉR) agit pour le compte du CSSS de la Pointe-de-l’Île. Il a évalué le projet de recherche en titre. Le CÉR est d’avis que ce projet respecte les normes éthiques généralement acceptées pour ce genre de recherche. Il est favorable à l’émission du certificat d’éthique.

Le certificat de conformité éthique du projet est valide pour une période d’**un an à compter du 20 juin 2013**, si et seulement si les chercheurs respectent les engagements énoncés au point 2.

2. ENGAGEMENTS DES CHERCHEURS

Pour que le présent certificat soit valide, il est entendu que les chercheurs¹ :

- Tiendront et conserveront à jour la liste des sujets de recherche recrutés;
- Obtiendront l’approbation préalable du CÉR de toute modification autre qu’administrative apportée au projet de recherche, sauf si la modification est nécessaire afin d’éliminer un danger immédiat pour les sujets de recherche – auquel cas le CÉR en sera avisé dans les meilleurs délais;
- Notifieront tout incident ou toute réaction indésirable et inattendue pouvant être liés à une procédure du projet;
- Notifieront tout nouveau renseignement susceptible d’affecter l’intégrité ou le caractère éthique du projet de recherche ou, encore, d’influer sur la décision d’un sujet de recherche quant à sa participation;
- Notifieront toute suspension ou annulation d’autorisation relative au projet qu’aura formulée un organisme subventionnaire ou réglementaire;
- Notifieront tout problème constaté par un tiers au cours d’une activité de surveillance ou de vérification, interne ou externe, qui est susceptible de remettre en question l’intégrité ou le caractère éthique du projet ainsi que la décision du CÉR;

¹ Adapté de : Ministère de la santé et des services sociaux (2007), Note de clarification relative au suivi continu de l’éthique des projets. Direction générale adjointe de l’évaluation, de la recherche et des affaires extérieures, Unité de l’éthique, p.4-5
• Notifieront de l'interruption prématurée, temporaire ou définitive, du projet qui doit être accompagnée d'un rapport faisant état des motifs à la base de cette interruption et des répercussions de celle-ci sur les sujets de recherche;

• Fourniront au CÉR un bref rapport intérimaire au plus tard dans un an, condition nécessaire à un renouvellement annuel du présent certificat, le cas échéant;

• Transmettront au CÉR une copie du rapport final des résultats de l'étude lorsque celle-ci sera terminée.

En acceptant le présent certificat, les chercheurs acceptent de se conformer à toutes les conditions qu'il comporte.

Élodie Petit
Présidente du Comité d'éthique de la recherche
Agence de la santé et des services sociaux de Montréal

20 juin 2013