

Clinical reasoning underlying acute care occupational therapists' assessment of rehabilitation potential after stroke or brain injury: A constructivist grounded theory study

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Abstract

Introduction: In acute care hospitals, clinicians are expected to rapidly provide recommendations regarding patients' rehabilitation potential and candidacy for post-acute rehabilitation. Some studies have investigated factors influencing referral to rehabilitation, but few have examined clinical reasoning underlying referral decisions. This study aimed to investigate what occupational therapists were thinking about (factors influencing reasoning), how they reasoned (thought processes) when evaluating stroke or traumatic brain injury patients' rehabilitation potential and how they decided on referral to post-acute rehabilitation.

Methods: Using a constructivist grounded theory approach, the clinical reasoning of ten acute care occupational therapists working in a large Canadian city was examined. Participant recruitment, data collection and analysis were performed simultaneously following theoretical sampling procedures. Therapists' thoughts on patients' rehabilitation potential were collected twice (during chart consultation and initial patient assessment) using think-aloud protocols and semi-structured interviews. Constant comparison, memoing and diagramming methods were employed during coding to help categorisation and conceptualisation.

Findings: Numerous patient, clinician and organisation-related factors were found to influence clinical reasoning. Occupational therapists interpreted these factors in an attempt to (1) predict recovery, (2) estimate rehabilitation potential and (3) determine rehabilitation candidacy. They

used two types of thought processes: (1) building a representation of patients' rehabilitation potential (involving eight steps including gathering and interpreting factors); (2) activating bottom-up and top-down scripts (comparing the expected impact of impairments on activity performance to behaviours observed during activity performance). Furthermore, an algorithm was developed describing how occupational therapists decide on referral to post-acute rehabilitation.

Conclusion: Findings can be used to teach students and novice occupational therapists how to identify and interpret key factors in the assessment of stroke or traumatic brain injury patients' rehabilitation potential. Results also provide insight on cognitive processes that can be taught for efficient assessment of rehabilitation potential and decision-making regarding referral to post-acute rehabilitation

Keywords:

Stroke, Traumatic brain injury, Clinical reasoning, Acute care, Qualitative research

Introduction

Occupational therapists working in acute care are expected to assess patients' rehabilitation potential and provide recommendations regarding the need for post-acute rehabilitation (Hamby, 2017). Determining the rehabilitation potential of stroke or traumatic brain injury (TBI) patients is challenging (Enderby et al., 2017; Foster et al., 2004). Patients often present with multiple impairments affecting their ability to accomplish daily activities and engage in rehabilitation (Goverover et al., 2017; Kringle et al., 2018; Wondergem et al., 2017). Furthermore, pressure in acute care to discharge patients once medically stable leads to assessments conducted within limited time frames and constrains rehabilitation professionals to rapid decision-making (Crennan & MacRae, 2010; Lam Wai Shun et al., 2017).

Numerous factors influence clinicians' perceptions of patients' rehabilitation potential (Lam Wai Shun et al., 2017) and decisions regarding referral to post-acute rehabilitation (Longley et al., 2019; Marnane et al., 2021). Factors include patient-related (e.g., age, mental status, social support), clinician-related (e.g., experiential knowledge) and organisation-related factors (e.g., availability of post-acute rehabilitation services). These findings provide insight on WHAT influences decision-making. However, little is known about HOW clinicians think (i.e. thought processes) when assessing rehabilitation potential, i.e., clinicians' reasoning about who might benefit from rehabilitation (Lam Wai Shun et al., 2020).

Clinical reasoning is a complex concept that can be understood as a "context-dependent way of thinking and decision making in professional practice to guide actions" (Higgs & Jensen, 2019, p. 4). It is sometimes viewed as a cognitive process (how professionals think in a clinical situation) and other times as an interactive process (how knowledge is used when interacting with

clients) (Chapparo & Ranka, 2019). The seminal work of Mattingly and Fleming (1994) spurred research focused on interactive processes and has led to a better understanding of various clinical reasoning strategies (e.g., narrative, interactive, conditional reasoning). However, research in occupational therapy has largely neglected to investigate cognitive processes shaping how therapists think. In their study on occupational therapy practice in acute care, Britton et al. (2016) found that occupational therapists working under time pressure develop skills to quickly focus on areas of concern essential to discharge. Even before meeting patients, occupational therapists consider how a disease might impact patients and approach initial assessments with lists of information to be gathered. They rapidly focus on essential information. Moreover, while it is recognised that experienced therapists are efficient in performing comprehensive assessments, novices need support to develop reasoning and practical skills required in acute care settings (Britton et al., 2015; Crennan & MacRae, 2010; Griffin & McConnell, 2001). To teach assessment practices and improve decision accuracy, a better understanding of clinical reasoning and decision-making unfolding in acute care settings is needed.

This study examined acute care occupational therapists' clinical reasoning when assessing stroke or TBI patients' rehabilitation potential and the decision-making regarding referral to post acute rehabilitation. More specifically, the following research questions guided this study: (1) **WHAT** are acute care occupational therapists reasoning about (i.e., what factors influence their reasoning) when assessing the rehabilitation potential of stroke or TBI patients? (2) **HOW** are they reasoning (what are the cognitive thought processes used) when assessing rehabilitation potential? and (3) **HOW** do they make decisions about referral to post-acute care rehabilitation?

Methods

Study design

A constructivist grounded theory approach guided the design of this study (Chamaz, 2014). This approach aims to develop explanatory theories about processes emerging from the narrative accounts of participants' experiences within particular settings and is therefore well suited to studying cognitive processes underlying occupational therapists' clinical reasoning in authentic real-world acute care practice. Ethics approval was obtained from McGill University Health Centre Research Ethics Board and from the department of ethics of the Université de Montréal.

Study setting and participant recruitment

Occupational therapists (referred to as therapists hereafter) working with stroke or TBI patients in one of five acute care hospitals in a Canadian metropolitan city were recruited. At the time of this study, patients requiring post-acute rehabilitation could be referred by the acute care multidisciplinary team to either inpatient or outpatient rehabilitation delivered in free-standing facilities (slow-stream rehabilitation and early supported discharge were not available).

Each acute care therapist was asked to conduct a typical initial assessment with one or two patients. Theoretical and iterative sampling procedures were used and consisted of recruiting a set of participants, collecting and analysing data, and then deciding which participants to recruit next to further elaborate/refine emerging categories (Chamaz, 2014). This procedure was done until theoretical sufficiency was reached.

Therapists with at least three years of experience working with stroke or TBI patients in

acute care were recruited. Clinicians with such experience are usually able to sort relevant data, plan actions in a deliberate manner and reflect on their practice. (Schell, 2014). After each recruitment phase of two or three therapists, more specific criteria were generated to recruit therapists with different characteristics - i.e., years of experience working with stroke or TBI patients in acute care and working in different hospitals. The overall purpose of re-specifying selection criteria was to check emergent categories and identify commonalities or discrepancies in clinical reasoning.

Patients had to be at least 18 years old, have a diagnosis of stroke or TBI, speak English or French and be sufficiently stable medically to participate in an initial assessment. After each recruitment phase of two or three patients, more specific criteria were generated to recruit patients presenting different characteristics - i.e., different age, type of injury (stroke vs TBI), severity of injury (mild, moderate, severe) and location of the injury (left vs right sided stroke). The purpose of recruiting patients with various characteristics was to examine variations in clinical reasoning according to the type of patient being assessed.

Participating therapists and patients (or their legal representatives) gave informed written consent to participate. The focus of the study was therapists' thoughts about patients' rehabilitation potential, which made up the data that was collected and analysed. Patients participated but the study did not focus on their behaviours per se.

Data collection

Data were collected between December 2016 and June 2017 by the first author (PL), an occupational therapist with seven years of experience working in acute care and doctoral

candidate. Participating therapists recruited eligible patients. They first **consulted patients' charts**, a time-point rarely considered in the clinical reasoning literature but a required step prior to initial assessment (Shotwell et al., 2017), and then conducted **initial assessments**.

A think-aloud protocol was used to collect data and involved asking participants to verbalise their thoughts while performing a task (Lundgren-Laine & Salanterä, 2010). Think-aloud protocols are based on the assumption that verbal behaviour can be recorded and analysed as a way to access cognitive processes underlying a person's reasoning (Ericsson & Simon, 1980). In this study, therapists were encouraged to verbalise their thoughts about patients' rehabilitation potential as they reasoned through chart consultation and initial assessment. A 30-60 minute semi-structured interview followed. Questions were deliberately open-ended and focused on further eliciting therapists' thoughts (Paskins et al., 2014). Questions included: "What kind of information were you looking for when you said (those words)?", "When you said (those words), what you were thinking about?".

During initial assessments, therapists wore a head-mounted action camera allowing them to move about freely (Unsworth, 2005). Subsequently, they watched their video recording and a retrospective think-aloud protocol was used. Video-stimulated recall is believed to be a better way to recall thoughts than memory alone or memory prompted by audio recording (Paskins et al., 2014). Data collected during chart consultation were audio-recorded and data collected during initial assessment were video-recorded. Both were transcribed verbatim.

Data analysis

NVivo 12 was used to manage data. A three-step coding process was performed: initial coding,

focused coding, and theoretical coding (Chamaz, 2014). Initial coding involved comparing incidents, where an ‘incident’ refers to any element/event that relates to what occupational therapists were thinking about (i.e., factors influencing their reasoning) or how they were thinking (i.e., thought processes). Descriptive codes were given to factors (e.g., age, severity of injury) while gerunds (i.e. process codes that are verbs ending with ‘ing’) were used to code thought processes (Saldanã, 2014). During focused coding, initial codes were triaged and grouped into more abstract categories. Recurrent codes, or those that made the most analytical sense when focusing on the concept of rehabilitation potential, were kept. During theoretical coding, relationships between codes and categories were examined. Data analysis was performed by the first author (PL), supported on three occasions by two senior researchers (CB and BS): during data collection to review initial codes and emerging categories, after data collection to review categories and relationship between categories, and a third time to review final codes, categories and diagramming.

Constant comparative methods were used throughout. This involved comparing codes and categories within a single transcript and between transcripts. Memo-writing captured ideas about emerging codes as well as thoughts about the meaning of data and helped in constructing theoretical categories. Finally, diagramming was used to further explore how codes and categories fit together and allowed for visual representation of relationships between categories (Chamaz, 2014).

Findings

Participants

Participants were ten female therapists and 14 patients. Six therapists assessed one patient and four therapists assessed two patients. Therapists' experience in acute care ranged from 3.5 to 31.5 years (average of 13.5) and from 1 to 28 years working with stroke or TBI patients (average of 11.25). Therapists worked in one of five hospitals in the Greater Montreal region (Quebec, Canada) and all worked in multidisciplinary teams involved in discharge planning. They assessed rehabilitation potential in 75 to 100% of their caseloads. Initial assessments were completed in one or two sessions, except for one assessment requiring three sessions. Average total time to complete chart consultation was 15 minutes (range 4 to 47 minutes) and 57 minutes for initial assessment (range 15 to 105 minutes). Patients' characteristics are listed in Table 1.

<Insert Table 1 about here>

Factors influencing clinical reasoning (the WHAT)

Multiple patient, clinician and organisational factors influenced reasoning. Therapists interpreted these factors in an attempt to (1) predict recovery, (2) estimate rehabilitation potential, and (3) determine rehabilitation candidacy. These three overarching coding categories were distinct but closely related. Figure 1 presents a summary of factors within each category and illustrates the embedded relationship between the three overarching categories.

Recovery potential

Many factors were considered by therapists when attempting to predict recovery. During chart consultation, they gathered information on patients' age, type and location of the brain injury,

injury severity, comorbidities, prior and present cognitive functions, physical functions, independence in self-care activities and improvement since admission. Upon initial assessment, therapists interviewed patients or families to gather information regarding how patients accomplished their daily activities prior to the stroke or TBI. Some therapists used standardised assessments to measure cognitive or physical functions (i.e., Dynamometer, Pinchmeter, Nine-Hole Peg Test, Grooved Pegboard Test, Montreal COgnitive Assessment, Bells Test, Motor-Free Visual Perception Test-Revised). All therapists used non-standardised approaches to assess performance in daily activities.

Younger patients were thought to have greater likelihood of recovery. However, therapists never relied solely on age but gathered information on other patient characteristics to try to predict recovery. *“I see this is a man, 49 years old. Age is a factor that I consider [...] but I do not consider exclusively this factor.”* [OT2] The type of brain injury influenced their predictions. *“(...) what’s been our experience is that haemorrhagic don’t recover necessarily as fast as ischemic (...)”* [OT4] They also considered injury severity. *“[...] the National Institute of Health Stroke Scale provides insight on stroke severity. I know that it is an indicator that says that the more severe the stroke, the more severe the impairments.”* [OT2] They identified co-morbidities that may affect patients’ potential for recovery. For example, when dementia was suspected, therapists questioned the likelihood of recovery. *“Because of this past medical history, maybe Korsakov dementia, (...) will he return to his baseline function? I don’t know really.”* [OT6]. Prior cognitive and physical functions were important and compared to present cognitive and physical functions observed during initial assessment. When patients reported being previously independent, therapists expected greater recovery. Moreover, when patients showed improvement since admission to acute care, therapists expected further recovery. *“We are already seeing progress between yesterday*

and today. Some improvement in terms of movement and following commands better (...). These are not big changes but enough in one day that I can expect further improvement.” [OT3]

Recovery was considered most favourable when impairments were mild. In severe cases, therapists thought that some recovery might be possible although they did not expect patients to be able to accomplish their activities as before. *“I see her going home but I don’t know if she is going to be able to do things like going out in the community by herself, in terms of IADLs, (...) unless she gets some more recovery in the lower extremity.” [OT4]*

Therapists often relied on past clinical experiences when attempting to predict recovery. They were also guided by their professional field of expertise and placed emphasis on the recovery of independence in everyday activities. A few times, they reported thinking about scientific evidence in their predictions of recovery. *“Literature tells me that there are chances that she will continue to progress because she did not stay at level III on the Rancho Los Amigos Scale (...) she is now at level IV.” [OT1]*

Rehabilitation potential

When thinking about rehabilitation potential, therapists considered factors influencing recovery potential, as described above, but also considered other factors in an attempt to estimate the likelihood of patients improving with rehabilitation interventions.

Ability to participate in therapy was deemed essential. Three groups of factors were considered: cognition, behaviour and endurance. For cognition, they assessed level of alertness, ability to follow commands, ability to remember and learn and level of self-awareness. Patients had to minimally be able to follow simple one step command and demonstrate enough memory to learn what is taught in rehabilitation. *“He remembered how to do the transfer. That indicates that*

he can learn new things.” [OT3] Therapists purposefully integrated teaching within assessment sessions and looked for indications that patients were able to carry-over teachings.

“I show her how to put the sling on. She doesn’t really get it. This is where I want to test if she has learning potential. I explain to her again. I show her how to do it. She tries another time. And she got it, she does it pretty much independently. This is where I was like, ya, rehab for sure.” [OT4]

Patients who are aware of their impairments and activity limitations were considered having better rehabilitation potential than those who lacked awareness. “(...) I want to see if he is able to recognise his difficulties, his impairments. That is an important element in my decision.” [OT6] Therapists also considered patients’ behaviour. Patients who collaborate and show motivation towards getting better were thought to have better rehabilitation potential. “She seems super motivated, (...) which is another positive for rehab.” [OT4] Moreover, patients had to demonstrate enough endurance during assessment sessions to be able to participate in therapy sessions, particularly for patients with severe physical impairments and reduced level of alertness. “The level of alertness can limit rehab. If he cannot tolerate many sessions during the day, that will limit his participation and how much he can improve with rehabilitation.” [OT3].

Therapists also envisioned attainable rehabilitation goals by considering past and present ability to perform daily activities. “It’s a lady that we can aim for a return to her baseline level of functioning in terms of safe transfers and mobility.” [OT1] Cognitive ability and behaviour were important to consider when thinking about how a patient might engage in working towards achieving rehabilitation goals. In cases where recovery at the physical level was unlikely, if the patient showed ability to learn and was motivated, compensatory strategies were considered.

“There is no movement whatsoever, rehab is going to be hard. I need to see that there is some learning going on. If this arm is not going to come back, she is going to need to learn a lot of compensatory strategies.”

[OT4]

On the other hand, if physical improvement was expected but ability to learn was limited, rehabilitation potential was considered poorer. *“Sometimes we have patients who show great motor recovery but are not able to follow commands, are not able to learn (...) then we cannot go anywhere with them. [OT4]*

Therapists used their knowledge of rehabilitation processes and interventions as well as their past experiences to interpret patients’ likelihood of improvement with rehabilitation. They mentioned a few times using their knowledge of scientific evidence regarding the efficacy of interventions to interpret what patients would be able to achieve with rehabilitation.

Rehabilitation candidacy

To determine post-acute rehabilitation candidacy, therapists consider patients’ likelihood of recovery and rehabilitation potential but also characteristics of programs available within the post-acute rehabilitation continuum.

When safe to be discharged home from acute care but with potential to improve, outpatient rehabilitation was recommended. Barriers to admission for outpatient rehabilitation were not mentioned. When inpatient rehabilitation was required, therapists’ knowledge of rehabilitation programs’ admission criteria guided their thoughts about candidacy. *“(…) sometimes patients are ready to go to rehab but some rehab facilities do not accept patients with nasogastric tubes.”*

[OT4]. Though not an official criterion for admission to inpatient rehabilitation, patients thought to be able to return home after inpatient rehabilitation were viewed as better candidates.

Therapists also mentioned situations that touched their ethical sensitivity. For example, patients with significant impairments were usually considered poor candidates for inpatient rehabilitation and admission to rehabilitation often refused. However, therapists felt some of these patients deserved a chance at rehabilitation even if they might not fully recover. Therapists reported having to advocate for these patients, especially when the patient was able to engage in therapy and had a supportive family.

“The family absolutely wanted the patient to return home. Therefore, I was able to ask for rehab for her. If I did not have this supportive family environment, considering the TBI and significant memory problems and knowing the rehab admission criteria, I am not sure she would have been accepted.” [OT9].

<insert Figure 1 about here>

Groupings of factors were not mutually exclusive but rather embedded, i.e. “predicting recovery” is embedded within “rehabilitation potential” which is in turn embedded within “rehabilitation candidacy” (see figure 1). Although groupings were described in a sequential manner, therapists search for these factors in an ongoing and iterative manner during chart consultation and initial assessment.

Cognitive reasoning processes (the HOW)

Codes related to processes revealed that therapists used two sequences of cognitive processes when consulting charts and performing initial assessment.

Building a representation of patients' rehabilitation potential

A first sequence began when therapists collected information from patients' charts and ended when initial assessments were completed. This sequence involved eight steps (see Figure 2a). During chart consultation, therapists searched for relevant patient-related factors which they immediately interpreted. They formulated preliminary thoughts regarding patients' recovery potential, rehabilitation potential or rehabilitation candidacy.

“At this time, I am telling myself that it will likely be rehab. Why? Because, he was completely independent before, he had a mild stroke that might affect his ability to accomplish everyday activities, there could be rehab goals to work on.” [OT2]

They established mental lists of patient-related factors requiring further investigation. *“The patient was confused. I am thinking about verifying the cognitive aspect, I will do a cognitive screen for sure.” [OT2]*

During initial assessment, therapists observed and interpreted patients' behaviours using non-standardised and standardised assessments. Therapists used standardised assessments to screen physical and cognitive functions; none used standardised assessments to measure performance. These observations and measures allowed them to enrich and confirm or refute preliminary thoughts.

“We feel maybe he can go home with services or maybe a little bit of inpatient rehab to spruce him up. (...) So today the plan was to go see him and do more cognitive visual-perceptual and look a bit more at IADLs, given he does live alone, and he doesn’t have family or friends’ support.”

[OT5]

They interpreted the sum of these factors and established a final representation of rehabilitation potential and candidacy for post-acute rehabilitation.

<Insert figure 2 about here>

Activating bottom-up and top-down scripts

Two other sequences of cognitive processes were observed. They were complementary and explicitly associated with occupational therapy expertise.

Bottom-up scripts

During chart consultation, information gathered from medical and nursing notes mostly related to diagnosis and impairments. Therapists often reflected on the possible impact impairments might have on ability to accomplish everyday activities. *“I want to find out with the left middle cerebral artery stroke, if there is any neglect with that (...) that may affect her potential to do ADLs.” [OT4].* They envisioned behaviours they might observe in the following assessment session and how patients might perform in activities.

“Because it is written that the patient presents with some clumsiness and mild weakness of the right hand, I want to see various ways that she will

manipulate objects. I want to see if she will be able to open small containers on her meal tray” [OT9].

They relied heavily on this sequential reasoning process during chart consultation and occasionally during initial assessments, particularly when interpreting results from standardised assessments of cognitive or physical functions. For example, after administering the Montreal Cognitive Assessment, a therapist said:

“She did not recall the five words. This can have an impact on her learning potential, her rehabilitation potential. Will she recall instructions that I will give her? For example, will she remember to put on the brakes on the wheelchair before getting up?” [OT6]

Because this reasoning process was initiated by the identification of diagnosis or impairments, it was named bottom-up script (see Figure 2).

Top-down scripts

During initial assessments, therapists frequently pointed out behaviours observed when patients were accomplishing an activity. *“His arm is totally falling on the side; he is like completely not realising where his arm is in space.” [OT4]* They reflected on physical or cognitive impairments that caused the observed behaviours. *“Is it that he can’t feel it, is it that he’s having some issues with proprioception or is he neglecting it?” [OT4]* They also reflected on behaviours or impairments that could be expected given the type of brain injury. *“The physical function is usually not the problem with TBI, the physical function recovers usually more rapidly than the cognitive function” [OT7].* They relied on this reasoning process during initial assessments, particularly when conducting non-standardised assessments of performance in daily activities. Few instances

of top-down scripts were reported during chart consultation as very little information regarding activity performance had been documented. Because this reasoning process was initiated by behaviours observed during activity performance, it was named top-down script (see Figure 2).

Therapists constantly compared bottom-up scripts (expected impact of impairments on activity performance) and top-down scripts (linking observed behaviours during activity performance to physical or cognitive impairments caused by the brain injury). Such comparisons helped in determining the presence or absence of cognitive and physical impairments and the repercussions on patients' ability to perform everyday activities. This information was used to formulate thoughts about recovery potential and rehabilitation potential.

Decision-making for post-acute rehabilitation

Based on further analysis of the relationship between factors, the three overarching categories (recovery potential, rehabilitation potential and rehabilitation candidacy) and occupational therapists' recommended discharge to post-acute rehabilitation, a visual representation of decision-making was developed in the form of an algorithm (see figure 3). Although decision-making is represented in a sequential manner, therapists identified patient-related factors in a non-linear way.

<Insert figure 3 about here>

Discussion

Numerous factors were found to influence occupational therapists' clinical reasoning when they assessed and determined stroke or TBI patients' rehabilitation potential. This finding is consistent

with prior studies reporting various patient, clinician and organisation-related factors influencing decision-making regarding post-acute rehabilitation (Jette et al., 2003; Longley et al., 2019). However, this study further suggests that these factors can be better understood by examining three interrelated concepts, i.e., how clinicians attempt to predict patients' recovery, estimate rehabilitation potential, and determine rehabilitation candidacy. Authors in the field of brain injury rehabilitation have reported that clinicians' perceptions of patients' recovery potential influence referral to post-acute care (Foster et al., 2004); some have discussed the concept of rehabilitation potential (Enderby et al., 2017; Lam Wai Shun et al., 2020), while others have proposed candidacy criteria for admission to inpatient rehabilitation (Willems et al., 2012). Moreover, a recent study investigating occupational therapists' and physiotherapists' assessment of older patients' rehabilitation potential in acute care found that clinicians think about recovery in terms of the likelihood of patients returning to their baseline level of functioning and about the importance of observing patients' responses to rehabilitation (Bradley et al., 2021). However, to our knowledge, this is the first study to provide a detailed description of factors for each of these concepts and possible relationships between them.

Results suggest that the concept of recovery potential is embedded within the concept of rehabilitation potential which is in turn embedded within the concept of rehabilitation candidacy. For instance, when occupational therapists were thinking about patients' rehabilitation potential, they considered recovery potential, but also additional factors related to patients' ability to participate and engage in therapy, i.e. cognitive functions (level of alertness, ability to follow commands, ability to learn and self-awareness), behaviour (collaboration and motivation) and endurance. These results underscore the importance for acute care clinicians to assess patients' ability to participate and engage in therapy when appraising rehabilitation potential. Engagement

is recognised as a key component of the rehabilitation process and it has been shown that patients who are more engaged demonstrate better outcomes (Williams et al., 2021) .

Occupational therapists in this study also considered factors related to the organisational context when trying to determine rehabilitation candidacy. This highlights the importance for acute care clinicians to be knowledgeable of the rehabilitation services available in their local health care context and to stay informed of constantly evolving changes within their health network.

As for clinical reasoning processes, two cognitive thought processes clearly emerged. The first involved eight steps beginning with the search for relevant patient-related factors during chart consultation to establishing a final representation of rehabilitation potential and rehabilitation candidacy. This process is similar to hypothetico-deductive reasoning processes reported in clinical reasoning studies (Pelaccia et al., 2011). Hypothetico-deductive reasoning refers to the process of formulating hypotheses based on patients' clinical features, and gathering and interpreting additional data to confirm, refine or reject hypotheses (Chapparo & Ranka, 2019). Both novices and experts use hypothetico-deductive processes, especially when situations are complex or ill-defined (Moulton et al., 2007). Determining rehabilitation potential within the pressured acute care environment is a complex problem to solve and the concept of rehabilitation potential has been until recently poorly defined (Lam Wai Shun et al., 2020). This might explain why even the most experienced occupational therapists in this study used this type of reasoning. They also used bottom-up and top-down scripts closely resembling illness scripts described in the medical literature (Custers, 2015). Scripts are recognised as “sets of interconnected concepts that allow individuals to make predictions about how a particular event or sequence of events is likely to play out” (Lubarsky et al., 2015, p. e62). Scripts are activated rapidly and automatically when cues or patterns are observed. Because occupational therapy focuses on how patients accomplish

everyday activities rather than illness or disease, scripts used by occupational therapists concerned the relationship between impairments and activity performance. Bottom-up scripts allowed the rapid anticipation of possible repercussions of impairments on patients' ability to perform activities while top-down scripts allowed rapid inference about which impairments might explain behaviours observed during activity performance. There is debate as to which approach (bottom-up or top-down) is considered most appropriate for occupational therapy assessment (Brown & Chien, 2010; Weinstock-Zlotnick & Hinojosa, 2004). However, in this study, therapists used both bottom-up and top-down scripts within a single assessment session, thereby suggesting that both scripts can overlap dynamically. This finding echoes what Creek et al. (2005) underscore in their opinion piece on occupational therapy as a complex intervention, i.e., occupational therapists constantly shift the focus of their assessment and intervention from occupation to activity to task to skill and back again.

To our knowledge, this is the first study to report clinical reasoning processes unfolding during chart consultation, i.e., prior to meeting a patient. Occupational therapists identify multiple factors when consulting other professionals' notes and activate processes allowing preliminary thoughts about patients' rehabilitation potential. They establish mental checklists of factors needing further investigation, allowing them to rapidly focus on possible problematic areas during initial assessment. Results therefore suggest that clinical reasoning unfolding during chart consultation is key in planning efficient assessments.

This is also the first study to provide an algorithm describing how occupational therapists decide referrals to post-acute rehabilitation. Future research could examine if this algorithm applies to other patient populations and to decision-making of other rehabilitation professionals. Expanding the algorithm from a descriptive tool of clinical reasoning to a normative tool

integrating scientific evidence into clinical reasoning could also prove useful to support evidence-based decision-making in acute care.

Overall, results provide knowledge that may help better prepare students and novice occupational therapists to the assessment of stroke or TBI patients' rehabilitation potential in acute care and decision-making regarding referral to post acute rehabilitation.

Limitations

For pragmatic reasons, participant recruitment ended after 14 patient assessments. Although theoretical saturation cannot be guaranteed, this sample size allowed for theoretical sufficiency as categories and relationships between categories were observed multiple times and categories were dense (Dey, 1999). Clinician-related factors found to influence reasoning were not extensively investigated, possibly explaining surprising findings. For instance, in an era of evidence-based practice it might seem problematic that occupational therapists reported considering scientific evidence a few times only. Also, clinicians' personal assumptions did not emerge as a factor influencing clinicians' thoughts even though there is evidence that assumptions shape reasoning (Hooper, 2018). These limitations may be understood by considering the research questions guiding this study which focused on WHAT occupational therapists were thinking about (factors influencing thoughts) and HOW they were thinking (cognitive processes used) but not on WHY they were thinking the way they were (reasons underlying actions or decisions). Future research asking therapists to elaborate on reasons underlying their actions or decisions when assessing rehabilitation potential would allow a deeper understanding of clinicians' tacit knowledge and how this knowledge influences their reasoning. Furthermore, future studies are

needed to examine if the theoretical understanding emerging from this study is seen with other patient populations and clinical contexts. Hence, findings from this study should be considered a first step in developing a theory of occupational therapists' clinical reasoning underlying assessment of acquired brain injury patients' rehabilitation potential.

Key points for occupational therapy

- Key factors and cognitive processes involved in the assessment of rehabilitation potential should be explicitly taught.
- Bottom-up and top-down scripts are essential and complementary cognitive processes associated with occupational therapy expertise.
- Activating clinical reasoning processes during chart consultation is pivotal in planning efficient assessments in acute care.

Authors' contribution:

All authors made substantial contributions to the design of this study. PL collected and analysed data under the supervision of BS and CB. PL drafted the manuscript. BS and CB reviewed and approved the final version of the manuscript.

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Conflict of interest

The authors have no conflict of interest to declare.

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Data availability statement

The data that support the findings from this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Table 1. Patients' characteristics (n=14)

Age	mean = 69.7 (range 24-89)
Stroke (n=10)	
Nature of the stroke	
• Right ischemic stroke	n=4
• Left ischemic stroke	n=5
• Left haemorrhagic stroke	n=1
Severity of the stroke [†]	
• Mild	n=7
• Moderate	n=1
• Severe	n=2
Actual discharge destination	
• Inpatient rehabilitation	n=7
• Home with outpatient rehabilitation	n=2
• Home without rehabilitation services	n=1
• Long term care	none
TBI (n=4)	
Nature of the TBI	
• Subdural hematoma	n=1
• Subarachnoid haemorrhage	n=3
Severity of the TBI [‡]	
• Mild	n=2
• Moderate	n=1
• Severe	n=1
Discharge destination	
• Inpatient rehabilitation	n=1
• Home with outpatient rehabilitation	n=1
• Home without rehabilitation services	none
• Long term care	n=2

[†] according to the score on the Canadian Neurological Scale or the National Institute of Health Stroke Scale

[‡] according to the score on the Glasgow Coma Scale

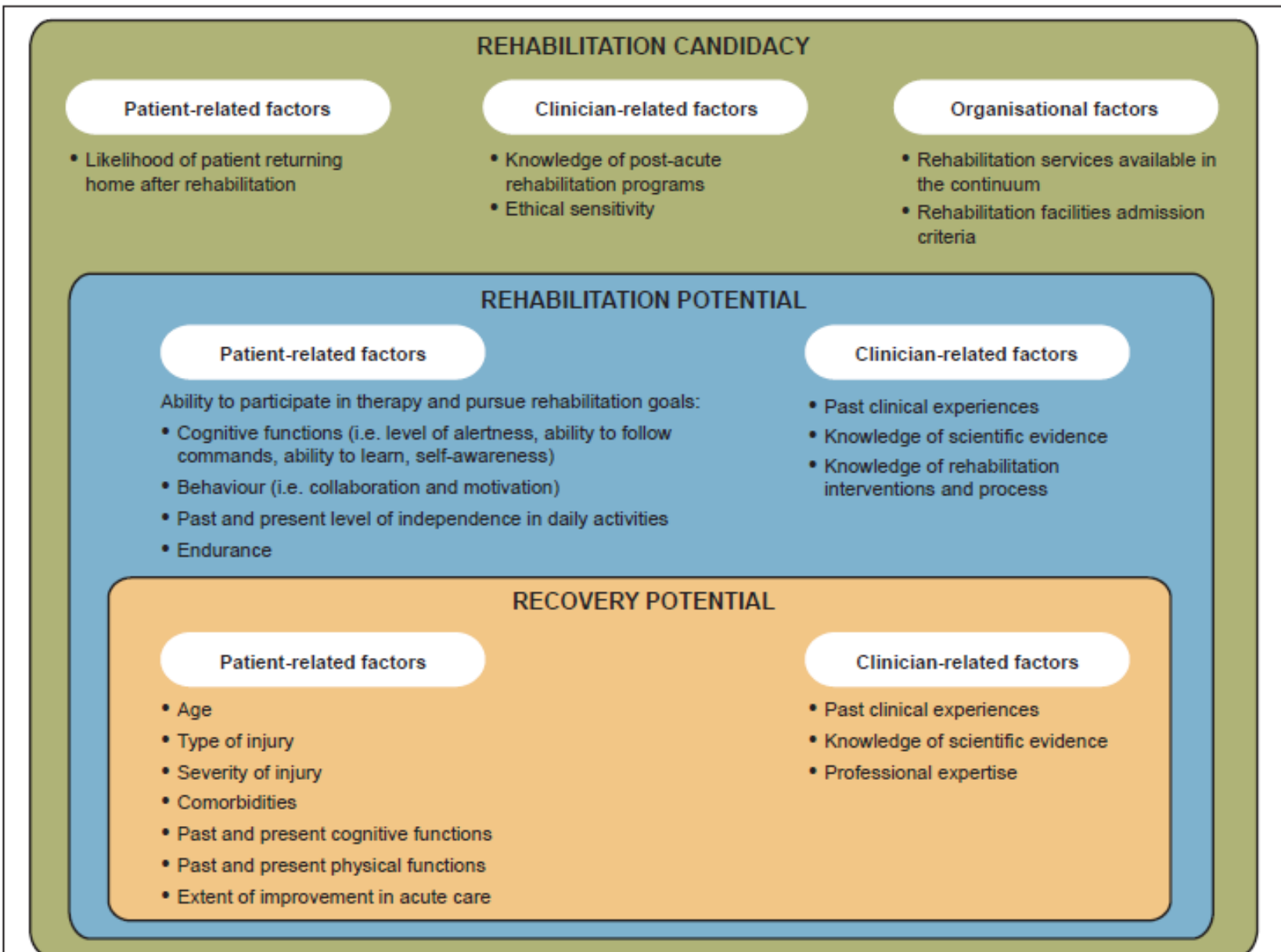
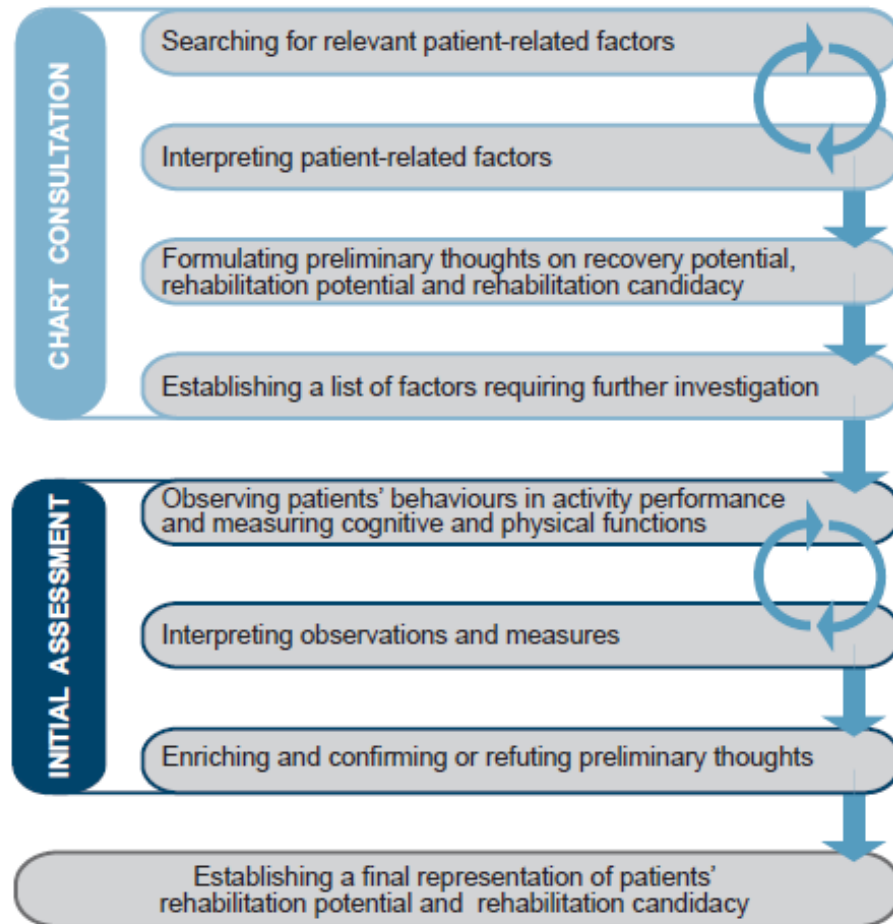


Figure 1. Factors (What occupational therapists are thinking about)

a) Building a representation of patients' rehabilitation potential



b) Activating bottom-up and top-down scripts

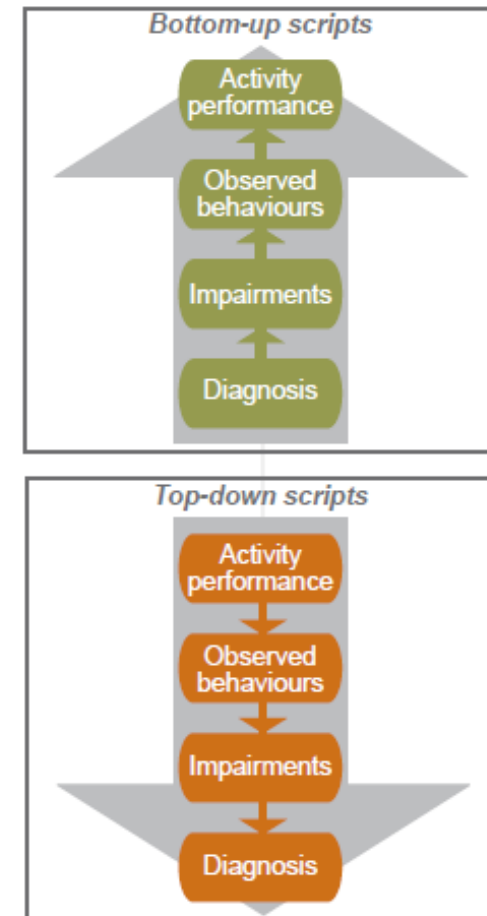


Figure 2. Cognitive thought processes (How occupational therapists think)

