

1 **An Emergency Department Delirium Screening and Management Initiative: The**
2 **Development and Refinement of the SCREENED-ED intervention**

3

4 **Tanya Mailhot, RN, PhD**

5 Adjunct professor, Faculty of nursing, Université de Montreal

6 Researcher, Montreal Heart Institute Research Center

7 Montreal, Quebec, Canada

8 t.mailhot@umontreal.ca

9

10 **Jane S. Saczynski, PhD**

11 Associate Professor, Bouvé College of Health Sciences, Department of Pharmacy and Health

12 Systems Sciences

13 Northeastern University

14 Boston, Massachusetts

15 j.saczynski@northeastern.edu

16

17 **Yelena Malyuta, BS**

18 Senior Program Manager, Department of Global Health and Population, Harvard T.H. Chan

19 School of Public Health

20 Harvard University

21 Boston, Massachusetts

22 ymalyuta@hsph.harvard.edu

23

Development and Refinement of SCREENED-ED

24 **Sharon K. Inouye, MD, MPH**

25 Director, Aging Brain Center, Marcus Institute for Aging Research,

26 Hebrew SeniorLife

27 Professor, Department of Medicine, Beth Israel Deaconess Medical Center,

28 Harvard Medical School

29 Boston, Massachusetts

30 sharoninouye@hsl.harvard.edu

31

32 **Chad Darling MD**

33 Associate professor, Department of Emergency Medicine

34 University of Massachusetts Medical School

35 Worcester, Massachusetts

36 chad.darling@umassmed.edu

37

38

39 **Corresponding Author:**

40 Tanya Mailhot, RN PhD

41 Faculty of nursing, Université de Montreal

42 2375 Chemin de la Côte-Sainte-Catherine,

43 Montréal, QC H3T 1A8

44 t.mailhot@umontreal.ca

45

46 **Funding.**

Development and Refinement of SCREENED-ED

47 This study was funded by grants R21AG049239 (JS/CD) and R24AG054259 (SI) from the
48 National Institute on Aging. The work was supported via a postdoctoral fellowship grant for TM
49 from the Fonds de Recherche du Québec – Santé.

50

51 **Disclosure.**

52 No conflicts of interest to disclose.

53

54 **Acknowledgements.**

55 No acknowledgements.

56

57

58 **ABSTRACT**

59 An intervention aimed at ED nurses and physicians, was designed to address the challenges of
60 managing delirium in an ED environment. The intervention development process was inspired by
61 the Medical Research Council principles paired with a User-Centered Design perspective. Expert
62 clinicians and nursing staff were involved in the development process. As a result, the
63 SCREENED-ED intervention includes 4 major components: screening for delirium, informing
64 providers, an acronym (ALTERED), and documentation in the electronic health record. The
65 acronym “ALTERED” includes seven key elements of delirium management that were considered
66 the most evidence-based, relevant and practical for the ED. Nurses are at the frontline of delirium
67 recognition and management and the SCREENED-ED intervention with the ALTERED acronym
68 holds the potential to improve nursing care in this complex clinical setting.

69 **Keywords.** Delirium, nursing intervention, emergency department

70

71 Delirium is an acute decline in cognitive function occurring in up to 10-30% of older adults
72 in the Emergency Department (ED) and is associated with poor outcomes including longer hospital
73 stays, complications, institutionalization and death (Han, Wilson, & Ely, 2010; Inouye,
74 Westendorp, & Saczynski, 2014; Kakuma et al., 2003). Despite its' high prevalence, delirium is
75 unrecognized in up to 85% of older ED patients (Boucher et al 2019). Failure to identify and admit
76 delirious patients is associated with a 7-fold increased risk of death, highlighting the importance
77 of delirium screening and appropriate management in the ED (Kakuma et al., 2003).

78 Despite strong recommendations for systematic mental status and delirium screening, it is
79 not common practice in most Eds (Boucher et al., 2019; Kakuma et al., 2003; LaMantia, Messina,
80 Hobgood, & Miller, 2014; Terrell et al., 2009). While screening for delirium in the ED setting is
81 certainly important, screening alone is not likely to improve clinical outcomes (Marcantonio,
82 2017). Additional research is needed to better understand what interventions will be feasible and
83 acceptable to nurses and physicians in the ED when caring for older patients with delirium. In the
84 Screening for Delirium in the Older Adults–Emergency Department (SCREENED-ED) study, we
85 developed and pilot tested an intervention designed to address these challenges. This research brief
86 describes the methods used to develop and refine the SCREENED-ED intervention.

87

88 **INTERVENTION DEVELOPMENT: METHODS AND RESULTS**

89 The process used to develop the SCREENED-ED intervention was comprised of three
90 steps, detailed below, which were informed by the Medical Research Council (MRC) framework
91 for intervention design (Craig et al., 2008) and also employed principles of User-centered Design
92 (Brunner et al 2017). We employed the three components outlined in the MRC for development
93 of a complex intervention: 1) identifying the evidence base, 2) identifying or developing the

94 theory, 3) modeling the process and outcomes. In the first component, the evidence base used for
95 the development is identified through a review of existing literature relevant to the intervention.
96 In the second component, an appropriate theory, consisting of a rationale for how the intervention
97 might work and how it might produce the expected changes, is identified. Finally, in the third
98 component, the process and outcomes of the intervention are modeled.

99 The SCREENED-ED intervention was designed based on these three components of the
100 MRC framework while making use of the User-Centered Design approach to ensure we were
101 focused on the needs and experiences of the target population. User-centered design involves a
102 deep understanding of the ED context and feedback from the target population (ED nurses and
103 physicians) as part of the intervention development and refinement. This approach translated into
104 making great efforts to understand the experience of users before designing the final intervention.
105 We used observation of the clinical context and an expert panel of ED-based end-users (nurses,
106 attendings and resident physicians) to ensure we were aligned with the experience of the target
107 population.

108 Based on our intervention development framework (i.e. MRC and User-Centered Design
109 approach) we defined 3 steps that would support the development of the SCREENED-ED
110 intervention:

- 111 1. defining the problem
- 112 2. determining the intervention components
- 113 3. assessing the intervention components designed during step 2 and receiving and
114 incorporating feedback from the end-users

115 Steps 1 and 2 consisted, respectively, of defining the problem and determining the
116 intervention components. To complete these two initial steps, an extensive literature review was

Development and Refinement of SCREENED-ED

117 performed to gather information on delirium in the ED, its risk factors and consequences, as well
118 as existing delirium prevention interventions, screening tools and management interventions.
119 During our literature review, we identified the guidelines recommended by the Society for
120 Academic Emergency Medicine Geriatric Task Force who identified areas among older adults in
121 the ED, such as the assessment of cognitive dysfunction, where quality improvement gaps may
122 exist (Terrell et al., 2009). These guidelines were used as a framework. In addition to this review
123 and framework, we gathered information on delirium in the ED based on the clinical experiences
124 of staff members through informal discussions with the ED nurses and physicians. Based on the
125 Geriatric task force recommendations (Terrell et al., 2009), the review of the literature and the
126 input from clinicians, four main components of the SCREENED-ED intervention, detailed below,
127 were identified.

128 *a. Screening.* For our intervention, we selected the Confusion Assessment Method (CAM)
129 completed by a trained interviewer (Inouye et al., 1990). The CAM was chosen because it is the
130 reference standard for delirium screening and has been validated, and successfully used, for
131 screening in the ED (Mariz et al 2016). In the SCREENED-ED intervention, delirium screening
132 consists of a brief (<10 minutes), standardized questionnaire that includes a cognitive and delirium
133 screen performed by a trained study interviewer, followed by scoring the CAM to determine the
134 screening result (positive or negative). The trained study interviewer was not part of the regular
135 care staff present in the ED.

136 *b. Informing providers.* Clinicians (nurses and physicians) are then verbally informed of
137 the result of the delirium screen (positive or negative). For patients who screen positive, a written
138 version of the delirium management guide is provided. In cases where the CAM screening is
139 negative (no delirium) we also communicate this result to clinicians since in situations where

140 patients have an altered mental state of unclear etiology (for example, memory impairment that is
141 not acute) a negative delirium screen may help focus on other potential diagnoses. A negative
142 delirium diagnosis also serves as a baseline for the patient and knowing the patient was ‘delirium
143 negative’ in the ED may be important information for the transition to an inpatient setting or
144 nursing home.

145 *c. Proposing Guideline for delirium management.* If embedded into existing work
146 processes, checklists have the potential to advance care by improving decision making (Schnitker,
147 Martin-Khan, Burkett, Beattie, & Gray, 2013). Delirium in the ED represents a clinical scenario
148 where a management guide would focus ED providers on basic, yet key, evidence-based
149 management principles. In addition, behavioral and pharmacologic management guides for
150 delirium exist and provide a framework for delirium management protocol development but have
151 not been integrated into the ED setting (Inouye et al., 1999; Rosen et al 2015; Shenvi et al 2020).
152 Therefore, we developed a preliminary checklist, following the review of evidence-based
153 guidelines for the clinical work-up and behavioral and pharmacologic management of delirium
154 (AGS, 2012; Inouye et al., 1999; Inouye et al., 2014). Moreover, several prevention and
155 management strategies for delirium exist, such as the Hospital Elder Life Program (HELP) and are
156 associated with improved outcomes in the inpatient setting, and we also drew on these approaches
157 and modified them for adoption in the ED (Inouye et al., 1999; Rosen et al 2015).

158 *d. Documentation.* Documentation of delirium in the ED electronic health record (EHR),
159 was hypothesized to facilitate the transfer of care from one healthcare practitioner to the next (e.g.,
160 ED physicians and nurses to inpatient providers) and increase continuity in delirium screening and
161 management. Specifically, providers (nurses and physicians) were asked to use the specific term

Development and Refinement of SCREENED-ED

162 'delirium' in the EHR rather than a range of commonly used, non-specific synonyms. This was
163 felt to be important to heighten recognition and focus management after patient handoffs.

164 To complete step 3, the study team presented the initial SCREENED-ED intervention to
165 an expert panel of ED-based end-users to better understand barriers to optimizing management of
166 high-risk ED patients with delirium. The feedback obtained from the ED nurses and physicians
167 during step 3 was used to refine the components of the SCREENED-ED intervention.

168 We focused our efforts on getting an expert panel that was largely comprised of clinical
169 leaders whose job it was to focus on education and quality improvement. The expert panel
170 consisted of eight members: three nursing and five physician experts. The nursing experts included
171 a Nurse Practitioner that works clinically in our ED and is also involved in research, a nurse
172 director and nurse educator. For the physician experts were: the Vice Chair for Clinical Operations
173 that oversees all clinical care in our health systems EDs, the Clinical Director for the specific study
174 ED, and two senior staff physicians who work in the study ED and have an interest in quality
175 improvement. The panel also included a fellow who focuses on quality improvement. In parallel
176 to the expert panel meetings, education sessions were offered to ED nurses during staff meetings
177 which provided an opportunity for additional feedback.

178 Following discussions with the expert panel, the delirium management guide/checklist
179 underwent multiple rounds of refinement. Versions of the management guide were submitted to
180 the panel three times and following each feedback session, the guide was further modified until
181 consensus was reached. Ultimately the checklist approach was abandoned in favor of an acronym.
182 The rationale for this was that a checklist assumes that most or all the items will be addressable
183 (Winters et al., 2009). In our case not everything can or needs to be done for every patient. Our
184 expert panel determined that the acronym approach was more applicable and useful for ED

185 providers. The acronym offered more flexibility and was easier to adapt to the workflow in the
186 ED. The acronym “ALTERED”, was meant to help with recall. The acronym includes seven key
187 components of the delirium management that were considered the most evidence based, relevant
188 and practical for consideration in the ED (Table 1).

189 The expert panel also suggested an additional management element involving pharmacists
190 for patients with a positive screen for delirium. Pharmacists were asked to screen for possible
191 adverse drug reactions by reviewing all medication lists. The purpose of this review was to identify
192 medications that could be contributing to the patient’s delirium, since specific high-risk
193 medications (e.g., Beers criteria, AGS 2012), drug interactions, and polypharmacy may contribute
194 to delirium in hospitalized older patients. The results of the medication review are communicated
195 to study staff and care providers.

196

197 **DISCUSSION**

198 Nationally, nearly 20 million older patients are seen annually in the ED, corresponding to
199 approximately 3 million older patients in the ED with delirium, which is often under-recognized
200 (Han, et al., 2010; Boucher et al 2019). These patients are at high risk for poor outcomes, including
201 increased length of stay and short-term mortality (Han et al., 2010). With increasing evidence that
202 duration of delirium is associated with the severity and duration of cognitive and functional
203 outcomes, efforts to facilitate early identification and management of delirium in the ED could
204 impact both short and long-term clinical outcomes (Oh, Fong, Hshieh, & Inouye, 2017). Thus, as
205 the ED serves as the point of entry to the hospital for more than 75% of older inpatients, it
206 represents a critical point of first contact for most patients, where detection needs to be a priority
207 and where management should be initiated (Inouye et al., 2014). Recent delirium management

208 tools have focussed on ED physicians (Shenvi et al 2020). However, nurses are on the frontline of
209 delirium recognition and management and the SCREENED-ED intervention has the potential to
210 facilitate their care in this complex setting.

211 Currently, the design of multifactorial interventions such as SCREENED-ED are not well
212 described in the literature. This limits the replicability and also the assessment of these
213 interventions. Here, we describe the development steps and components of the SCREENED-ED
214 intervention to facilitate its clinical translation, testing and replicability.

215 One strength of our intervention was the rigorous development process that was based on
216 principles of the MRC and User-Centered Design. This resulted in the inclusion of end-users of
217 the intervention in its development and the consideration of their expertise and opinions in the
218 final refinement of the SCREENED-ED intervention components. This also made our intervention
219 innovative and pragmatic for delirium screening and management in the ED. An expert panel was
220 involved throughout the intervention development process and provided crucial feedback that
221 resulted in meaningful modifications of, and additions to, the intervention components. In
222 particular, expert feedback results in the inclusion of pharmacists and a medication review and to
223 adjusting the initial management guide to a checklist and acronym for healthcare staff to use as a
224 guide in ED management of patients with potential delirium.

225 Another strength of the SCREENED-ED intervention is its interprofessional nature. It
226 involves nurses, doctors and pharmacists who each put forth their expertise in order to optimize
227 delirium screening and management. This is in line with the most recent guidelines on delirium
228 care (SIGN, 2019) and is highly promising in terms of improving patient outcomes.

229 Finally, the pragmatic nature of the SCREENED-ED intervention increases its potential
230 feasibility and acceptability in the ED. Much effort has been put forth in the recent years to enhance

Development and Refinement of SCREENED-ED

231 delirium screening and management in medicine (HELP) and in the ICU (A to F bundle). However,
232 efforts targeting delirium in the ED has been focused on the development of detection tools and
233 less so on developing intervention procedures that merge both the screening and detecting and the
234 management. The fact that we have involved end-users in its development further increases its
235 pragmatic nature.

236 A limitation of our intervention development process was that we did not include bedside
237 nurses among the expert panel and only sought their feedback informally via discussions on the
238 unit or during trainings on delirium. However, the expert panel included nursing experts (nurse
239 director, nurse practitioner and nurse educator). Future studies developing interventions to address
240 delirium should formally include bedside nurses as they represent a major taskforce in the fight to
241 improve delirium-related outcomes.

242

243 **CONCLUSION**

244 The SCREENED-ED intervention has great potential to aid healthcare professionals in the
245 ED in identification and early management of delirium. Future work will assess the SCREENED-
246 ED intervention acceptability, feasibility and efficacy.

247

248

249

250 **REFERENCES**

- 251 American Geriatrics Society (2012). American Geriatrics Society updated Beers Criteria for
252 potentially inappropriate medication use in older adults. *J Am Geriatr Soc*, 60(4), 616-631.
253 doi:10.1111/j.1532-5415.2012.03923.x
- 254 Boucher, V., Lamontagne, M. E., Nadeau, A., Carmichael, P. H., Yadav, K., Voyer, P., Pelletier,
255 M., Gouin, É., Daoust, R., Berthelot, S., Morin, M., Lemire, S., Minh Vu, T. T., Lee, J., &
256 Émond, M. (2019). Unrecognized Incident Delirium in Older Emergency Department
257 Patients. *The Journal of emergency medicine*, 57(4), 535–542.
258 <https://doi.org/10.1016/j.jemermed.2019.05.024>
- 259 Brunner, J., Chuang, E., Goldzweig, C., Cain, C. L., Sugar, C., & Yano, E. M. (2017). User-
260 centered design to improve clinical decision support in primary care. *International journal*
261 *of medical informatics*, 104, 56-64.
- 262 Craig P, Dieppe P, Macintyre S. (2008) Developing and evaluating complex interventions: The
263 new Medical Research Council guidance. *BMJ*;337:a1655
- 264 Han, J. H., Wilson, A., & Ely, E. W. (2010). Delirium in the older emergency department patient:
265 a quiet epidemic. *Emerg Med Clin North Am*, 28(3), 611-631.
266 doi:10.1016/j.emc.2010.03.005
- 267 Hoffmann, T. C., Glasziou, P. P., Boutron, I., Milne, R., Perera, R., Moher, D., . . . Michie, S.
268 (2014). Better reporting of interventions: template for intervention description and
269 replication (TIDieR) checklist and guide. *BMJ*, 348, g1687. doi:10.1136/bmj.g1687 %J BMJ
270 : British Medical Journal
- 271 Inouye, S. K., Bogardus, S. T., Jr., Charpentier, P. A., Leo-Summers, L., Acampora, D., Holford,
272 T. R., & Cooney, L. M., Jr. (1999). A multicomponent intervention to prevent delirium in

Development and Refinement of SCREENED-ED

- 273 hospitalized older patients. *N Engl J Med*, 340(9), 669-676.
274 doi:10.1056/nejm199903043400901
- 275 Inouye, S. K., van Dyck, C. H., Alessi, C. A., Balkin, S., Siegel, A. P., & Horwitz, R. I. (1990).
276 Clarifying confusion: the confusion assessment method: a new method for detection of
277 delirium. *Annals of internal medicine*, 113(12), 941-948.
- 278 Inouye, S. K., Westendorp, R. G., & Saczynski, J. S. (2014). Delirium in elderly people. *Lancet*,
279 383(9920), 911-922. doi:10.1016/s0140-6736(13)60688-1
- 280 Kakuma, R., du Fort, G. G., Arsenault, L., Perrault, A., Platt, R. W., Monette, J., . . . Wolfson, C.
281 (2003). Delirium in older emergency department patients discharged home: effect on
282 survival. *J Am Geriatr Soc*, 51(4), 443-450.
- 283 LaMantia, M. A., Messina, F. C., Hobgood, C. D., & Miller, D. K. (2014). Screening for delirium
284 in the emergency department: a systematic review. *Ann Emerg Med*, 63(5), 551-560.e552.
285 doi:10.1016/j.annemergmed.2013.11.010
- 286 Marcantonio, E. R. (2017). Delirium in Hospitalized Older Adults. *N Engl J Med*, 377(15), 1456-
287 1466. doi:10.1056/NEJMcp1605501
- 288 Mariz, J., Costa Castanho, T., Teixeira, J., Sousa, N., & Correia Santos, N. (2016). Delirium
289 Diagnostic and Screening Instruments in the Emergency Department: An Up-to-Date
290 Systematic Review. *Geriatrics (Basel)*, 1(3). doi:10.3390/geriatrics1030022
- 291 Oh, E. S., Fong, T. G., Hshieh, T. T., & Inouye, S. K. (2017). Delirium in Older Persons: Advances
292 in Diagnosis and Treatment. *Jama*, 318(12), 1161-1174. doi:10.1001/jama.2017.12067
- 293 Rosen, T., Connors, S., Clark, S., Halpern, A., Stern, M. E., DeWald, J., Lachs, M. S., &
294 Flomenbaum, N. (2015). Assessment and Management of Delirium in Older Adults in the
295 Emergency Department: Literature Review to Inform Development of a Novel Clinical

Development and Refinement of SCREENED-ED

- 296 Protocol. *Advanced emergency nursing journal*, 37(3), 183–E3.
297 <https://doi.org/10.1097/TME.0000000000000066>
- 298 Schnitker, L. M., Martin-Khan, M., Burkett, E., Beattie, E. R., & Gray, L. C. (2013). Appraisal of
299 the quality of care of older adults with cognitive impairment in the emergency department.
300 *J Gerontol Nurs*, 39(3), 34-40. doi:10.3928/00989134-20130131-03
- 301 Shenvi, C., Kennedy, M., Austin, C. A., Wilson, M. P., Gerardi, M., & Schneider, S. (2020).
302 Managing Delirium and Agitation in the Older Emergency Department Patient: The ADEPT
303 Tool. *Annals of emergency medicine*, 75(2), 136–145.
304 <https://doi.org/10.1016/j.annemergmed.2019.07.023>
- 305 Terrell, K. M., Hustey, F. M., Hwang, U., Gerson, L. W., Wenger, N. S., & Miller, D. K. (2009).
306 Quality indicators for geriatric emergency care. *Acad Emerg Med*, 16(5), 441-449.
307 doi:10.1111/j.1553-2712.2009.00382.x
- 308 Winters, B. D., Gurses, A. P., Lehmann, H., Sexton, J. B., Rampersad, C. J., & Pronovost, P. J.
309 (2009). Clinical review: checklists - translating evidence into practice. *Crit Care*, 13(6),
310 210. doi:10.1186/cc7792
- 311