

Educational Interventions to Improve Recognition of Delirium: A Systematic Review

Mamata Yanamadala, MBBS, MSc,* Darryl Wieland, PhD, MPH,^{†‡} and Mitchell T. Heflin, MD, MHS*

Delirium is a common and serious condition that is under-recognized in older adults in a variety of healthcare settings. It is poorly recognized because of deficiencies in provider knowledge and its atypical presentation. Early recognition of delirium is warranted to better manage the disease and prevent the adverse outcomes associated with it. The purpose of this article is to review the literature concerning educational interventions focusing on recognition of delirium. The Medline and Cumulative Index to Nursing and Allied Health Literature (CINHAL) databases were searched for studies with specific educational focus in the recognition of delirium, and 26 studies with various designs were identified. The types of interventions used were classified according to the Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation (PRECEDE) model, and outcomes were sorted according to Kirkpatrick's hierarchy. Educational strategies combining predisposing, enabling, and reinforcing factors achieved better results than strategies that included one or two of these components. Studies using predisposing, enabling, and reinforcing strategies together were more often effective in producing changes in staff behavior and participant outcomes. Based on this review, improvements in knowledge and skill alone seem insufficient to favorably influence recognition of delirium. Educational interventions to recognize delirium are most effective when formal teaching is interactive and is combined with strategies including engaging leadership and using clinical pathways and assessment tools. The goal of the current study was to systematically review the published literature to determine the effect of educational interventions on recognition of delirium. *J Am Geriatr Soc* 61:1983–1993, 2013.

Key words: delirium; recognition; education

From the *Duke University Medical Center, Durham, North Carolina; [†]Geriatrics Services, Palmetto Health Richland, Columbia, South Carolina; and [‡]Division of Geriatrics, School of Medicine, University of South Carolina, Columbia, South Carolina.

Address correspondence to Mamata Yanamadala, Division of Geriatrics, Duke University Medical Center, DUMC Box 3003, Durham, NC 27710. E-mail: mamata.yanamadala@duke.edu

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Delirium is defined as the acute onset of altered mental status associated with difficulty sustaining attention and a fluctuating course. It is a serious and common medical condition, particularly in older adults, with high incidence rates in various healthcare settings, including during hospitalization (6–56%), postoperatively (15–53%), in intensive care (70–87%), in post-acute care settings (up to 60%), and at the end of life (up to 83%).¹ Delirium is associated with risk of mortality, institutionalization, and worsening or incident dementia.²

Despite a growing awareness of its high prevalence and toxicity and availability of effective diagnostic tools, healthcare providers often do not recognize delirium, with nondetection rates as high as 69%.^{3,4} A recent study found that delirium remains underrecognized even when a standardized delirium assessment tool is used.⁵ A combination of an unpredictable and atypical presentation and a lack of knowledge make it challenging for providers to recognize delirium. The provider's sense of futility—that is, a perceived lack of available interventions even if delirium is recognized—may impede recognition. The high incidence of delirium in older adults coupled with low rates of recognition contribute to high rates of negative outcomes, including falls, pressure ulcers, long length of stay, healthcare costs, institutionalization, and mortality.⁴ Early recognition of delirium is important not only because of its potential reversibility, but also because diagnosis and treatment of the underlying cause increase the likelihood of preventing negative outcomes.⁶

Previous studies have demonstrated that delirium is often not recognized because of insufficient knowledge and minimal educational emphasis in medical and nursing schools.⁷ In prior studies, 75% of the nurses interviewed stated that, even after they received formal education on the topic of delirium, they could not differentiate between delirium and dementia.⁸ Although education might play an important role in boosting delirium recognition, the optimal strategies to improve recognition and their usefulness are currently unclear, and several authors have pointed out the limitations of standard delirium teaching methods.⁹ The purpose of this study was to systematically review published delirium education literature to determine the

effect of educational interventions on learning and patient care outcomes in delirium recognition.

METHODS

A review was conducted on the Medline and Cumulative Index to Nursing and Allied Health Literature (CINHAL) databases through September 2012 to identify published articles in English. The search combined the terms “delirium,” “diagnosis,” “diagnosed,” “diagnosing,” “detection,” “detect,” “detects,” “recognized,” “recognised,” “recognizing,” “recognising,” “recognize,” “recognise,” “recognizes,” “recognises,” “identify,” “identifying,” “identified,” “identifies,” “screen,” “screening,” “screens,” “psychiatric status rating scales,” “mass screening,” “diagnosis” OR “diagnosis”[Subheading], “delirium/diagnosis,” OR “delirium/prevention and control,” “curriculum,” “pilot projects,” “training,” “train,” “trains,” “trained,” “educational,” “education,” “intervention,” “staff development,” “program,” “programs,” “education.”

The initial search identified 906 abstracts. The screening process is summarized in Figure 1. Abstracts were screened to identify studies describing educational interventions and outcomes focusing on the recognition of delirium. Disagreements regarding classification of 14 abstracts were resolved in discussion between the authors. References from all of the included abstracts were screened manually, and 13 additional pertinent abstracts were identified. Sixty-five abstracts was identified for full-text review and were selected for further analysis if they satisfied the following criteria: primary focus is an educational intervention for recognition of delirium and reported outcomes of the intervention on recognition of delirium. Twenty-six articles were identified for inclusion in this review.

On full-text review, studies were classified according to target audience, setting, and educational intervention. Interventions were classified according to the Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation (PRECEDE) model (Table 1).^{10,11} In this model, originally used for studies of continuing medical education, interventions are classified into one of four types: Type 1—predisposing factors (dissemination of information, communication and didactics); Type 2—predisposing factors and enabling strategies (facilitate desired change in performance, for example, by using protocols and guidelines and providing resources); Type 3—predis-

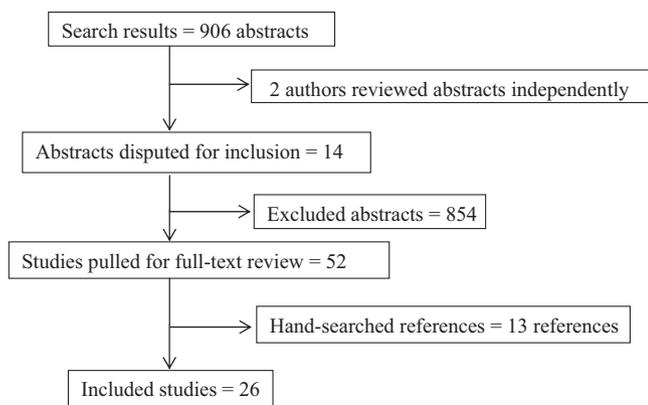


Figure 1. Flow diagram for study inclusion.

Table 1. PRECEDE* Model

Type	Factors	Strategies
1	Predisposing	Include dissemination of information, communication, and didactics
2	Predisposing and enabling	Enabling factors include providing resources, facilitating desired change in performance, for example by using protocols and guidelines
3	Predisposing and reinforcing	Reinforcing factors include consolidate learning through reminders and feedback from peers and experts
4	Combination of all three factors	Include a single multifaceted intervention or a combination of interventions across all three types

* Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation.

posing and reinforcing factors (consolidate learning through reminders and feedback from peers and experts); and Type 4—a single multifaceted intervention or a combination of interventions across all three types. Finally, study results were assigned to one of the four levels of the widely used Kirkpatrick model¹² (Table 2) to classify the outcomes.

RESULTS

Of 26 studies identified, 15 were conducted in the United States; three in the United Kingdom; three in Australia; and one each in Canada, Belgium, Italy, Japan, and the Netherlands. Study venues included clinical and educational settings. Thirteen studies targeted staff in the hospital wards, seven in the intensive care unit (ICU), two in long-term care and rehabilitation centers, and four in other settings (course workshops, continuing education, simulation laboratory). Educational interventions targeted nurses in 15 studies, physicians in four studies, and interprofessional staff in seven studies.

Educational Interventions

Nine studies were classified as Type 1,^{5,9,13,16–21} or using a predisposing approach alone, 11 as Type 2,^{14,15,22–30} one as Type 3,⁷ and the remaining five as Type 4.^{31–35} Most of the Type 4 studies used techniques of the first three study types. An evaluation of the studies and a comparison of their findings are shown in Table 3.

Table 2. Kirkpatrick Model of Learning Outcomes

Level	Evaluation	Example
1	Reaction—Participant satisfaction	Learners' impression of the teaching experience
2	Learning—Staff knowledge and attitudes	Improved level of understanding of the subject area
3	Behavior—Changes in staff practice	Demonstrable change in professional practice
4	Results—Changes in health outcomes	Significant changes in health outcome

Table 3. Evaluation of Studies and Comparison of Findings

Reference	Setting	Subjects	Interventions	Outcomes
Type 1				
Duane et al. ¹⁶	Level 1 trauma center	Residents rotating through critical service	Received articles and websites to review on their own	Validated pretest and posttest in delirium, separated by 1 month showed improvement in scores (53.1–56.5%) without report of statistical significance
Meako et al. ⁵	Orthopedic unit	Nurses	50-minute in-service in lecture format	Significant improvement from pretest to mean immediate posttest scores ($P = .001$)
Paquette et al. ¹⁷	Simulation lab	100 third-year baccalaureate nursing students enrolled in course	Readings and lecture content on delirium, depression, and dementia provided 1 week before the simulation; simulations used improvisational actors to portray a hospitalized elderly adult whose symptoms of delirium superimposed on dementia; students applied theory content to practice	Significant increase in self-reported comfort and knowledge after the simulation ($P < .01$)
Ramaswamy et al. ¹⁸	Community hospital with university affiliation	Nurses, physicians, residents, pharmacists, social workers, laboratory personnel, nutritionists, physical therapists, president, vice president	Progressive didactic sessions with important content repeated in subsequent sessions, interspersed with interactive small group sessions that included medical rounds, case discussions and problem solving, peer discussion, and reflection	Significant improvement in posttests ($P < .001$), self-confidence in recognition of delirium ($P < .001$), and self-assessed capacity to administer the CAM ($P < .001$); for confidence in identifying delirium and capacity to administer the CAM, differences reached significance with multiple didactic sessions but not with single session
Page et al. ¹⁹	Continuing education workshop	Nurses	Each day/long workshop consisted of a didactic component in the morning and an experiential simulation learning in small groups in the afternoon; didactic sessions included content pertinent to care of older adults	Participants strongly agreed or agreed (95.7%, $n = 480$) that their ability to identify strategies to improve the cognitive function of acutely confused elderly adults increased.
Devlin et al. ⁹	University and community teaching hospitals	Nurses	During one shift on the same day, research nursing and nursing subjects screening of an individual for delirium simultaneously but independently, two clinical-based validated scenarios and a 30-minute didactic presentation, and nursing subject and research nurse screening of a different individual	Number of nurses able to evaluate delirium using any scale (12% vs 82%, $P < .001$) and use it correctly (8% vs 62%, $P < .001$) increased significantly; education did not alter nurses' self-reported evaluation of delirium (before 76% vs after 100%, $P = .12$)
Rockwood et al. ¹³	University hospital in Canada	Residents	Medical grand rounds and noon teaching sessions—a teaching session on underrecognition of delirium and discussion of CAM; teaching session repeated monthly with variations emphasizing a systematic approach to atypical presentations	Knowledge test for house staff, mean pretest score 5.4 ± 0.3 , mean posttest score 7.3 ± 0.4 ($t = 5.07$, $P < .01$), improved recognition of delirium
Desy et al. ²⁰	GENE course at San Diego convention center	Emergency nurses	GENE course comprises 10 modules that address attitudes and ageism; validated age-appropriate assessment tools (including CAM) introduced throughout course; case studies presented to apply specific geriatric concepts	Knowledge of geriatric concepts ($P < .001$); self-rated ability to provide care for older adults, including delirium; 10% increase in proportion of emergency department nurses who used six other assessment tools, including CAM
Lacko et al. ²¹	Community hospital	Nurses	Self-learning booklet on delirium with cases and quizzes and video on delirium; intervention ward nurses required to do both; also attended in-service delivered by geriatric nurse practitioner on screening tools for delirium	Comparison of assessment of delirium by study nurse and nurses using prescribed tools demonstrated strong correlation

(Continued)

Table 3. (Contd.)

Reference	Setting	Subjects	Interventions	Outcomes
Type 2 Gesin et al. ²²	Community teaching hospital	Nurses	Predisposing: Phase 1, no education; Phase 2, provision of modified ICDS screening form, provision of 2001 validating article; Phase 3, 30-slide live presentation by pharmacist including consequences of delirium, risk factors for its development, challenges associated with its detection, and comprehensive review on using ICDS with bedside demonstration Enabling: Provision of modified ICDS screening form	Intervention unit: nurses identified 6/8 delirium cases Control unit: nurses identified 0/2 delirium cases Knowledge was similar between Phase 1 (mean, 6.1) and Phase 2 (mean 6.5; $P = .08$) but greater in Phase 3 (mean 8.2; $P = .001$); agreement between nurses and validated judge in assessment of delirium increased from Phase 1 ($k = 0.40$) to Phase 2 ($k = 0.62$) to Phase 3 ($k = 0.74$); Across the 3 phases, the proportion of nurses who perceived delirium to be challenging to assess decreased (89.5% in Phase 1, 78.9% in Phase 2, 63.2% in Phase 3), and proportion of nurses who agreed that the ICDS makes delirium easier to identify increased (57.9% on 5-point Likert scale between Phases 1 and 3 for each of the questions were -0.53 ($P = .07$) and 0.58 ($P = .06$), respectively.
Reade et al. ²³	Tertiary hospital affiliated with university hospital	Nurses and nursing supervisors	Predisposing: Intensive CAM-ICU education program, including explaining its rationale, detailed features, and examples of situations that might cause confusion; critiqued practice assessments; clear documentation; and provision of an ongoing forum for discussion. Bedside nurses asked to record results of CAM-ICU assessments on audit forms. Enabling: CAM-ICU worksheet provided.	CAM-ICU identified significantly lower proportion of individuals (36.7% vs 21.3%; $P = .004$) and significantly lower proportion of shifts (14.7% vs 6.4% of shifts, $P = .002$) with delirium than on unstructured assessments
Siddiqi et al. ²⁴	6 care homes	Staff in care homes	Predisposing: education package consisting of three 20-minute flexible, interactive sessions for all staff delivered by delirium practitioner using variety of written materials; specialist delirium practitioner as trainer; and champion to engage staff in the project; Enabling: Delirium Box: a pack of all materials developed during the project to provide a resource for ongoing learning, checklists, and care pathways; developed customized materials and solutions for each home designed to engage and instill ownership of the initiative in staff	Self-reported staff confidence in recognizing, preventing, and managing delirium increased after intervention from 34.4% to 67.7%; interviews showed evidence of changes in staff practice, such as greater readiness to investigate for underlying physical causes if resident behavior changed; in interviews, staff showed more awareness of delirium, which may explain postintervention survey finding of increase in recorded delirium episodes; larger proportion of participants had a cognitive test
Ellis et al. ²⁵	Rural Australia	745 rural and remote clinicians	Predisposing: course used scenarios and case studies in role-play format Enabling: workbook given to participants on first day of the course	Only 4% of preworkshop respondents felt skilled at differentiating between delirium and dementia; 73% felt not skilled or that skill level was low; 74% of postworkshop respondents felt skilled or partially skilled at differentiating between dementia and delirium and had improved confidence in ability to differentiate ($P < .001$).
Lang et al. ¹⁵	University academic hospital and an affiliated community hospital	Medical students compared with third-year students from	Predisposing: in 1-hour workshop, information on delirium reviewed and students introduced to CAM; at end of month, students met with geriatrician for 1-hour wrap-up session; students presented and discussed two individuals they had	Mean test score 7.1 ± 0.3 correct out of 9 (79.0%) in nonintervention control group ($n = 18$) and 7.9 ± 0.1 (88.3%) in intervention group ($n = 101$), difference of 0.8 points ($P = .005$); students scored highest on

(Continued)

Table 3. (Contd.)

Reference	Setting	Subjects	Interventions	Outcomes
Devlin et al. ¹⁴	Academic medical center	end of preceding year Physicians (medical residents, fellows, attending physicians)	assessed using CAM and STRATIFY tools Enabling: laminated pocket card and version for personal digital assistant summarizing assessment tools provided Predisposing: one-on-one educational intervention consisting of a 20-slide multimedia presentation that reviewed sedation assessment using the Sedation–Agitation Scale and delirium evaluation using the ICDSC Enabling: each subject received ICDSC worksheet during educational intervention for use during two posteducation patient assessments	questions addressing prevention of delirium (97%), assessment of risk for falls (93.1%), and evaluation of delirium (91.4%) Before ICDSC, validated judge identified delirium in 5/50 individuals (10%); physician subjects and nurses correctly identified delirium in 0 and 4 of these individuals, respectively. After ICDSC, validated judge identified delirium in 11/50 individuals (22%), with physicians and nurses correctly identifying delirium in 8 and 10, respectively. Agreement between physicians and validated judge improved after ICDSC use (before $k = -0.14$, after $k = 0.67$). Similarly, agreement between physicians and nurses improved after ICDSC use (before $k = -0.15$, after $k = 0.58$). Agreement between nurses and validated judge was strong in both periods (before $k = 0.65$, after $k = 0.92$).
Lemiengre et al. ²⁶	University hospital	Nurses	Predisposing: 1-hour information and case discussion session to explain delirium in general and use of CAM algorithm in particular. Enabling: poster with information about use of CAM algorithm placed in nursing station at ward; research nurses available each morning to answer additional questions from bedside nurses about study or use of CAM algorithm	Delirium identified in 36/258 individuals (14%) or in 42/641 paired observations (6.5%); sensitive method of CAM algorithm as administered by bedside nurses had greatest diagnostic accuracy (66.7% sensitivity, 90.7% specificity); specific method had 23.8% sensitivity and 97.7% specificity; bedside nurses had difficulties recognizing features of acute onset, fluctuation, and altered level of consciousness.
Rapp et al. ²⁸	4 VA facilities	Nurses	Predisposing: consortium members developed day-long educational workshop on acute confusion in elderly adults; assessment protocol developed which included, MMSE, CAM, and Neecham. Interactive strategies included video-taped demonstration on confusion and observed role play. Enabling: Received ACRN handbook, which had guide for assessment using MMSE, CAM, and NEECHAM and chart comparing depression, delirium and dementia; expectation of resource nurse was to assess for confusion in all high-risk individuals when behaviors suggested confusion on admission and reassess as needed	Knowledge increased from pretest (mean 7.9) to posttest (mean 9.33) ($t = 3.54$, $P < .001$); confidence increased from pretest (mean 22.3) to posttest (mean 41.3), ($t = 8.36$, $P < .001$)
Rapp et al. ²⁷	4 VA facilities	Nurses	Predisposing and Enabling: Same as above study plus, 18 months after first education program, a second program was conducted to update ACRNs and trained additional nurses	Repeaters' pretest knowledge (mean 72.9) significantly higher ($t = 3.603$, $P < .01$) than first-time takers (mean 60.3), indicating retention of knowledge from previous education program; also significant increase in knowledge for all participants from before (mean 7.96) to after (mean 9.68), ($t = 6.68$, $P < .01$)
Speciale et al. ²⁹	Rehabilitation and aged care unit in Italy	Physicians, nurses, physiotherapists	Predisposing: educational training included RASS, CAM, and Memorial Delirium Assessment Scale. Enabling: protocol modified such that, for all individuals, nursing staff administered RASS three times daily from admission to discharge, and physicians administered CAM	Frequency of observed delirium significantly higher (23%)

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Table 3. (Contd.)

Reference	Setting	Subjects	Interventions	Outcomes
Foster et al. ³⁰	Tertiary hospital in Australia	Nurses	upon admission and every day when a variation in RASS score was noted; physicians administered Memorial Delirium Assessment Scale when CAM was positive to confirm diagnosis of delirium and to measure severity Predisposing: practical resource "rummage" boxes and an information pamphlet Enabling: delirium screening tool, local clinical pathway, educational program, standardized nursing care plan	Delirium found in 10/30 individuals, but ward medical team diagnosed only 50% of cases; nursing staff noted confusion in all cases of delirium; focus group participants knowledgeable about delirium but felt resources and support were limited; project tools used were acceptable to ward staff participants of focus groups, but substantial numbers of staff remained unaware of project materials
Type 3				
Akechi et al. ⁷	University-affiliated hospital	Nurses compared with nurses without training	Predisposing: 2-step approach: Two workshops, 1 month apart, with eight 1-hour discussion sessions held between workshops for delirium-link nurses. trained nurse provided Training session on NEECHAM using vignettes; delirium-link nurses educated other nurses on wards; delirium-link nurses given all materials and teacher training. Reinforcing: Providing participants with nonjudgmental feedback on what they have learned	Intervention did not have a significant effect on improving self-confidence of staff in early detection of delirium
Type 4				
Van den et al. ³¹	University hospital	Nurses	Predisposing: 1-hour group training on delirium and CAM-ICU. "Delirium key nurses" appointed and received supplementary training for further instruction and introduction of CAM-ICU in their unit. Enabling: Posters with CAM-ICU flow sheet distributed. Supplementary individual training on the job (by the delirium key nurses) started after implementation and was given whenever screening adherence and interrater reliability dropped. Two months after implementation, presence of delirium became standard part of daily multidisciplinary meeting, in which all patients are discussed. Reinforcing: A pop-up reminder on the bedside computer was set up for nurses to prompt missed delirium screening. Screening adherence to CAM-ICU and interrater reliability were measured, and feedback was provided by weekly e-mail and monthly clinical meetings. Project leader visited all ICU wards daily to identify problems concerning performance of and adherence to assessment tool and provided personal or group feedback.	Interrater reliability increased from 0.78 to 0.89 in first month after training. Screening with CAM-ICU was 77% and increased significantly to 92% ($P < .001$) after 4 months. Scoring rate of nurses at precourse delirium knowledge test (6.2 ± 1.7 ; $n = 136$) increased to 7.4 ± 1.2 ($n = 122$) 4 months later ($P = .001$). In same period, 13 (10%) and 20 (13%) individuals per month were treated with haloperidol. After implementation period, based on CAM-ICU results, this increased significantly to 37 (23%) individuals per month ($P < .001$). All individuals who received haloperidol in after implementation were detected using the CAM-ICU as having delirium.
Pun et al. ³²	University medical center and community VA hospital	Nurses	Predisposing: display of 3-by-3-foot poster about delirium; 20-minute unit-wide in-service with RASS and CAM-ICU descriptions, followed by bedside demonstration; Periodic question-and-answer sessions conducted	Adherence to CAM ICU 90% at UMC and 84% at VA hospital. CAM-ICU performed more often than requested on 63% of shifts at UMC and on 8% of shifts at York-VA. Overall weighted K_s between bedside nurses and references

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Table 3. (Contd.)

Reference	Setting	Subjects	Interventions	Outcomes
Tablet et al. ³³	Teaching hospital	Doctors and nurses	<p>Enabling: Bulletin boards, handouts, laminated pocket cards, and case studies. Graded, staged educational interventions occurred at regular time points (at VUMC, 1, 3, 6, 9 months; at York-VA, 2, 4, 6 months). Screening scales added to orientation competency checklists. Documentation systems documented to incorporate RASS and CAM-ICU into neurological assessment of hourly flow sheet below vital signs</p> <p>Reinforcing: Display of posters with adherence and accuracy data, educate nurse regarding mistakes or misconceptions after nurses performed screening using RASS and CAM-ICU</p> <p>Predisposing: 1-hour formal presentation and small-group discussion</p> <p>Enabling: Written guidelines</p> <p>Reinforcing: Follow-up sessions including one-to-one and small-group discussions to discuss challenging cases, reinforce learning, and provide supportive feedback customized to individuals to identify and remedy deficiencies</p>	<p>raters for RASS were 0.89 at VUMC and 0.77 at York-VA. agreement (<i>k</i>) between bedside nurses and reference raters Overall on using CAM ICU was 0.92 at VUMC and 0.75 at York-VA. Two most often-cited barriers to implementation were physician buy-in and time.</p> <p>Staff recognition of researcher-confirmed delirium cases significantly higher ($P < .01$) on intervention ward than on control ward. Doctors on intervention ward more likely ($P = .16$) to record diagnosis of delirium despite lower point prevalence of delirium established by the researchers.</p>
Young et al. ³⁴	Five general hospitals	Nurses and doctors	<p>Predisposing: educational sessions lasted up to 1 hour and covered features of delirium, management guidelines with supporting evidence, and information regarding current practice in that unit. Separate sessions conducted with medical staff covering same areas; use was made of medical grand round meetings for this.</p> <p>Enabling: all patients admitted over 3-month period screened for delirium. Distribution of guidelines.</p> <p>Reinforcing: Feedback of baseline data.</p>	No significant difference in recognition of delirium
Miller et al. ³⁵	General medicine unit	Nurses	<p>Predisposing: Information about incidence and effect of acute confusion on elderly adults presented in workshop. Use of Neecham to detect delirium emphasized. Conducted practice sessions on unit on use of Neecham. Gerontological staff nurses or research nurses worked with nurses for first three Neechams and were available for consultation throughout study.</p> <p>Enabling: Gerontological staff nurses available for consultation throughout study. Neecham modified to suit system. Bulletin board in staff lounge used to display information on incidence and severity of acute confusion. Team of staff nurses who staff viewed as leaders on units helped solve problems and fostered use of Neecham served as implementation team. Strong emphasis on organizational culture.</p> <p>Reinforcing: periodic meetings and project newsletters provided information on how many individuals were screened for confusion.</p>	<p>Results: Comparison of Neecham scores done on same day by nurses and research assistants showed no significant differences ($P = .66$). Average Neecham scores for research assistants were 23.2 and 23.0. Performance of staff nurses in assessment of elderly adults using Neecham examined weekly throughout study. Overall, average scores of nurses paralleled those of research assistants, indicating that assessment was maintained long term.</p>

CAM = Confusion Assessment Method; ICDSC = Intensive Care Delirium Screening Checklist; ICU = intensive care unit; VA = Veterans Affairs; MMSE = Mini-Mental State Examination; RASS = Richmond Agitation and Sedation Scale; NEECHAM = Neelon and Champagne; ACRN = acute confusion resource nurse; STRATIFY = St. Thomas' risk assessment tool in falling elderly inpatients; UMC = University Medical Center; VUMC = Vanderbilt University Medical Center; GENE = Geriatric Emergency Nursing Education.

Type 1 interventions included distributing learning material for self-review by learners,^{16,21} lectures^{5,13,17,20} and didactics paired with active learning strategies such as small group case discussions,¹⁸ simulation,¹⁹ and script concordance.⁹ Education programs all covered delirium, with a focus on recognition of delirium in all except three studies that focused on teaching broader geriatric content including delirium.^{16,19,20} The target clinicians were multidisciplinary in one study,¹⁸ nurses alone in six studies,^{5,9,14,17,19-21} and residents alone in two studies.^{13,16} One study reported beneficial patient outcomes (Kirkpatrick Level 4) in terms of greater recognition of delirium after the intervention.²¹ One study reported change in behavior (Kirkpatrick Level 3), with more nurses evaluating for delirium after the intervention. Six of the 10 studies reported knowledge gain (Kirkpatrick Level 2), with four having significant knowledge gain^{5,9,13,18} and two not mentioning whether the knowledge gain was significant.^{16,21} Four of the Type 1 studies reported gain in self-confidence (Kirkpatrick Level 2) in recognizing delirium, with one study showing significant change¹⁸ and the others not reporting whether the change was significant.^{17,19,20} Overall, the results of the Type 1 studies showed greater knowledge and self-confidence but with a high degree of variability in reporting the results.

The Type 2 studies used education in conjunction with enabling factors such as Intensive Care Delirium Screening Checklist (ICDSC) forms,^{14,22} the Confusion Assessment Method (CAM) tool,^{23,26} protocols and pathways for recognition of delirium,^{24,29,30} trained champions to answer questions,^{24,26} and additional resources such as work books, laminated pocket cards and assessment tools on Personal Digital Assistants (PDA).^{15,24,25,27,28} Six studies included training nurses,^{22,23,26-28,30} one included medical students,¹⁵ one included physicians,¹⁴ and three included interdisciplinary staff.^{24,25,29} Two reported positive patient outcomes (Kirkpatrick Level 4) in terms of increased recognition of delirium.^{29,30} Indicators of improved staff performance included increase in recorded delirium and increase in percentage of participants that had an assessment test (Kirkpatrick Level 3),²⁴ significant knowledge gain (Kirkpatrick Level 2),^{14,15,22,27,28} and significant increase in self-confidence of recognizing delirium. Overall, many of the Type 2 studies demonstrated significant knowledge gain and improved confidence in recognizing delirium, and some demonstrated behavior modification in identifying delirium and improved recognition of delirium.

The single study identified in the Type 3 category used several workshops to provide information and training on the Neelon and Champagne (NEECHAM) assessment tool to a few nurses. The trained nurses taught additional nurses and provided feedback to the nurses on their performance. This study did not demonstrate any improvement in self-confidence of the nurses in recognizing delirium.

All the Type 4 studies combined predisposing with enabling and reinforcing factors. The educational interventions were targeted to nurses in three studies^{31,32,35} and included interdisciplinary staff in two studies.^{33,34} All studies used enabling strategies in the form of flow sheets,³¹ champions,^{31,35} handouts and pocket cards,³² and guidelines.^{33,34} Reinforcing strategies used were feedback on

performance by all five studies, reminders,³¹ modification of the current system to incorporate routine assessment,^{32,34} and provision of CAM-ICU³² and NEECHAM³⁵ assessment tools. Two studies demonstrated a significant increase in recognition of delirium (Kirkpatrick Level 4)^{31,33} and two showed improvement in use of an assessment tool (CAM-ICU) to screen for delirium (Kirkpatrick Level 3)^{31,32,35} and significant improvement in knowledge³¹ and interrater agreement on scores on the assessment tools administered.^{31,32} One study reported no change in recognition of delirium.³⁴

DISCUSSION

The literature evaluating the effect of educational interventions on recognition of delirium was reviewed. Studies were classified according to type of educational approach¹⁰ and evaluated in terms of outcomes for patients and changes in staff performance. Given the challenges that the complex nature of delirium poses, it was not surprising to find that Type 4 studies that combined predisposing, enabling, and reinforcing factors achieved better results than strategies that included one or two of these components (Figure 2). Effective enabling and reinforcing strategies included the use of resource nurses or champions,^{24,31} feedback on performance,^{31,33} and protocols.^{24,29,31,32} Resource nurses or champions in the studies were often trained exclusively to gain expertise in delirium recognition, further train other staff, and act as resources to answer questions and provide feedback on performance. Considering methodological variations, the Type 4 studies, with one exception, showed improved staff performance and recognition of delirium and adherence to protocols when reported.

Type 1 studies involved didactic teaching sessions or workshops and varied widely in interventions and measuring outcomes. Few used active learning strategies such as small group discussions,¹⁸ simulation,¹⁹ and script concordance,⁹ although interactive techniques such as case discussions and practical sessions were proven to be more effective in changing outcomes in the literature.¹¹ Most Type 1 studies did not report clinical performance and patient care outcomes but reported improved knowledge and self-confidence in recognizing delirium, except two that reported improved recognition of delirium²¹ and behavior modification.⁹ Expectations for measurable effect on clinical outcomes in these studies is low, with the literature showing that isolated educational interventions involving predisposing factors alone are not effective in improving healthcare outcomes or changing provider behavior.³⁶⁻³⁸

Type 2 studies typically involved education sessions with assessment tools and protocols for practice. Most did not report patient care outcomes and change in practice behavior, but many showed significant gain in knowledge or self-confidence, one showed change in behavior,²⁴ and two showed improved recognition of delirium.^{24,29} Sequenced sessions have also been shown to have greater effect.^{22,27}

Although some studies used validated delirium assessment tools in education and clinical protocols, variations in methodology and evaluation techniques prevented

Effect of PRECEDE Type on Kirkpatrick Outcomes

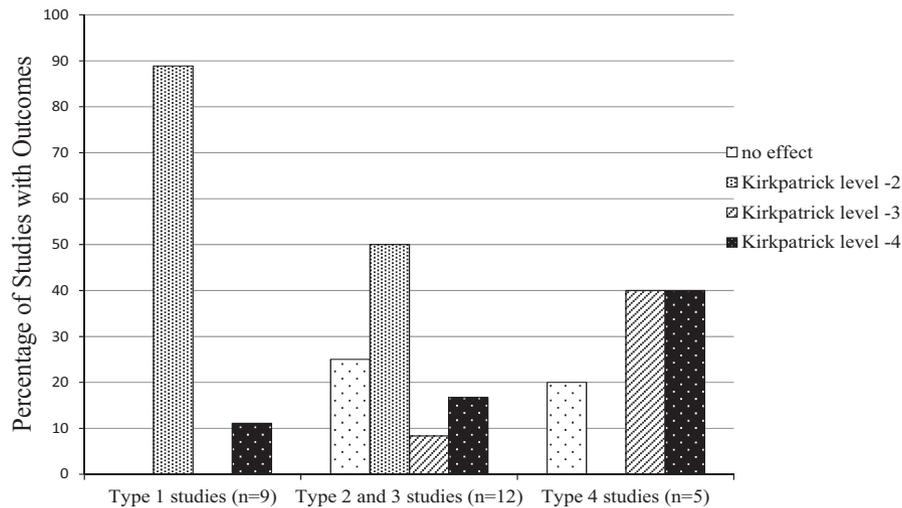


Figure 2. Effect of PRECEDE type interventions on Kirkpatrick level outcomes.

strong conclusions about their effectiveness from being made. Nonetheless, assessment tools appeared to be helpful in knowledge gain and practice change and improved recognition of delirium as seen in prior studies, confirming prior findings that the majority of individuals with delirium are missed when an assessment tool is not used.³¹

In this review educational interventions to recognize delirium were classified according to factors that can facilitate learning and change practice and patient outcomes. A similar approach has recently been used in two other reviews^{38,39} to understand educational interventions in the prevention and management of delirium. Both reviews concluded that the most effective delirium education programs were multifaceted and comprehensive and included enabling and reinforcing techniques in addition to knowledge transmission. This is the only review to the knowledge of the authors that has focused on educational interventions aiming to improve recognition of delirium. Some argue that efforts at delirium recognition are futile until appropriate treatments are identified,³² but in certain studies, authors identified providers who felt that awareness of delirium improved the care they delivered despite the absence of abundant evidence-based delirium prevention and treatment options.³²

Limitations

Inclusion of studies with various approaches to education and evaluation presented difficulty in combining results and drawing strong conclusions. Also, it was not possible to include unpublished studies in this review, increasing the potential for publication bias. Some studies that involved improved recognition of delirium were excluded because of inadequate description of their educational interventions.^{40,41} Nonetheless, the search was comprehensive, and the studies identified represented the best evidence available to answer the question.

An adaptation of the PRECEDE model was used to study the effectiveness of continuing medical education for physicians, but it is not known whether the same classifi-

cation can be applied to most of the studies in this review that focus on interventions for nurses and allied health professionals. This point is significant because most of the interventions focused on nonphysician professionals, but use of the PRECEDE model has strong precedent in this type of review and provides an effective framework for characterizing educational interventions.^{38,39}

Recommendations for Research

The heterogeneity of educational methodologies in the articles included in this review made it hard to draw strong conclusions on what interventions would be effective in recognizing delirium. In this review and the others that focused on managing delirium, comprehensive interventions proved to be more effective for all four Kirkpatrick levels of outcomes. These results are consistent with education literature, which revealed that comprehensive multifaceted strategies including reinforcing and enabling approaches were more effective in improving patient outcomes^{18,31,36,37} than purely didactic experiences, which can improve competence in knowledge, skills, and attitudes but are less likely to bring behavior change or improved outcomes.¹⁸

Methods of evaluation fell short in using validated tools for evaluation of knowledge gain, practice change, and patient outcomes in some of the of the studies included in this review. Studies often used self-evaluation of performance without any objective measurements to confirm behavior change. Future studies should therefore be designed to develop and validate strong evaluation techniques focusing on all Kirkpatrick levels, including endpoints such as patient outcomes, cost-effectiveness, and time efficiency.

It is likely that following some basic educational principles⁴² would enhance the effect of many of these programs, including making the education programs relevant to the perceived needs of the participants, using teaching methods that emphasize the integration of new information into what is already known, and providing partici-

pants with nonjudgmental feedback on what they have learned. Most of these principles were achievable in some of the studies through the use of nurse champions because they were able to interact on a personal level and had an understanding of the needs.^{24,31} One illustrative example from this review²⁴ demonstrated improvement in outcomes at all Kirkpatrick levels by recruiting working groups from staff who volunteered to participate, and these groups identified important questions on delirium relevant to their setting and produced a variety of resources and customized solutions for each setting.

Case studies, which are an integral part of education in health care, give learners the opportunity to consider multiple facets of a clinical situation, to expand their knowledge base, and to develop problem-solving and critical-thinking skills.¹⁹ Simulation and script concordance techniques use case studies and are well supported in learning theory to train healthcare providers as it promotes active engagement in thinking, analyzing, acquiring in-depth understanding, and applying knowledge.^{9,17,19} These techniques may prove especially effective for assessing complex clinical conditions such as delirium because, in an unfolding case study, learners can experience the clinical situation as it progresses over time; they are exposed to the full context and complexity of the evolving setting and disease progression.¹⁹

Educational interventions should be implemented with buy-in from leadership because the success of the intervention depends on administrative understanding, belief, and support. In several cases from this review, hospital leadership was vital in promoting and sustaining educational programs directed at improving outcomes.¹⁸ One study indicated that senior management support (or lack thereof) was viewed as the most important factor determining whether their intervention program was successfully implemented and sustained.¹⁸

Assessment for delirium appears to be most effective if clinicians are trained in the use of standardized tools, because the ability to identify delirium improves when a validated delirium assessment scale is used.⁹ Using validated assessment tools as part of the interventions should be feasible because the mean assessment time with most of the validated tools is 2 to 5 minutes.³¹ Although optimal adherence to assessment is not known, some of the studies used 80% adherence as acceptable.³¹

CONCLUSION

Improving the recognition of delirium in older adults is a complex problem requiring a sophisticated solution. Many experts argue that the recognition of delirium is the fundamental obstacle to better care of individuals with delirium.⁴³ Educational interventions designed to improve recognition of delirium by increasing knowledge of delirium and skills in methods of its detection are important but inadequate. Educational interventions to recognize delirium are most effective when formal teaching is interactive and combined with enabling and reinforcing strategies. Effective strategies include providing feedback, clinical pathways, and reminders combined with small-group or individual case-based discussions. The role of champions appears to help with outcomes. Valuable

insights from health education literature on how clinicians learn should be used to identify effective interventions when designing programs to enhance efforts in improving delirium recognition.

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