Table 1. Search Strategy

<table>
<thead>
<tr>
<th>DATABASE SEARCHED &amp; TIME PERIOD COVERED:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The following databases have been searched for relevant information:</td>
<td></td>
</tr>
<tr>
<td>CINAHL (Cumulative Index to Nursing and Allied Health Literature)</td>
<td>Searched September 10, 2012</td>
</tr>
<tr>
<td>Cochrane Library</td>
<td>Searched September 10, 2012</td>
</tr>
<tr>
<td>EMBASE (Excerpta Medica)</td>
<td>1999 – September 7, 2012</td>
</tr>
<tr>
<td>MEDLINE</td>
<td>1999 – September 7, 2012</td>
</tr>
<tr>
<td>PreMEDLINE</td>
<td>1999 – September 7, 2012</td>
</tr>
<tr>
<td>PubMed</td>
<td>Searched September 7, 2012</td>
</tr>
</tbody>
</table>

HAND SEARCHES OF JOURNAL & NONJOURNAL LITERATURE
Journals and supplements maintained in ECRI Institute’s collections were routinely reviewed. Nonjournal publications and conference proceedings from professional organizations, private agencies, and government agencies were also screened. Other mechanisms used to retrieve additional relevant information included review of bibliographies/reference lists from peer-reviewed and gray literature. (Gray literature consists of reports, studies, articles, and monographs produced by federal and local government agencies, private organizations, educational facilities, consulting firms, and corporations. These documents do not appear in the peer-reviewed journal literature.)

TOTAL NUMBER OF RESULTS: 673
<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Description of Patient Safety Strategy</th>
<th>Study Design and Patients</th>
<th>Theory or Logic Model</th>
<th>Contexts</th>
<th>Implementation Details</th>
<th>Outcomes: Benefits</th>
<th>Outcomes: Harms</th>
<th>Influence of Contexts on Outcomes</th>
<th>Overall Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombo et al. 2012 (19) Italy</td>
<td>Reorientation strategy where patients are 1) called by their first name, 2) given information on the ward, hospital, and illness progression; 3) mnemonically stimulated. Additional environmental, acoustic, and visual stimulation is provided.</td>
<td>Prospective controlled before-after (CBA) study 314 critically-ill patients admitted to a mixed medical-surgical ICU</td>
<td>Not reported, but the authors cite a recent review by key opinion leaders that proposed the strategy used in this study for critically-ill patients.</td>
<td><strong>External:</strong> None mentioned. <strong>Organizational Characteristics:</strong> Mixed medical-surgical ICU in a University hospital. <strong>Teamwork:</strong> Four research nurses were trained to assess delirium, collect and input data into an electronic database, and to apply the Confusion Assessment Method for the ICU (CAM-ICU). Other team members not reported. <strong>Leadership:</strong> The lead author supervised proper application of the shared interventional reorientation algorithm. <strong>Culture:</strong> Not reported. <strong>Implementation Tools:</strong> Nurse training in application of algorithm.</td>
<td>Phase 1 involved implementing a sedation algorithm (used in Phase II as well). Mechanically-ventilated patients underwent daily interruption of sedation along with spontaneous breathing trial when clinically possible. Delirium assessment with CAM-ICU was performed twice daily (10 am and 10 pm) after sedation interruption. Pain was also assessed. Phase 1 lasted 5 months. Phase II was the intervention phase, where the reorientation strategy described under Description of Patient Safety Strategy was implemented. Phase II lasted 6 months.</td>
<td>Delirium incidence decreased from 35.5% during observational phase of study to 22% in the interventional phase (p&lt;0.020). Reorientation was the only protective predictive variable for delirium prevention (Hazard ratio 0.504, 95% CI 0.31-0.89, p=0.034).</td>
<td>Not reported</td>
<td>Not reported</td>
<td>High</td>
</tr>
<tr>
<td>Study</td>
<td>Intervention</td>
<td>Design</td>
<td>Country</td>
<td>Setting</td>
<td>Eligibility</td>
<td>Study Sample</td>
<td>Intervention Details</td>
<td>Control Group Details</td>
<td>Outcomes</td>
</tr>
<tr>
<td>-------</td>
<td>--------------</td>
<td>--------</td>
<td>---------</td>
<td>---------</td>
<td>------------</td>
<td>--------------</td>
<td>----------------------</td>
<td>-----------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Deschot et al. 2012 (11)</td>
<td>Inpatient geriatric consultation team (IGCT)</td>
<td>Controlled clinical trial</td>
<td>Belgium</td>
<td>Emergency department</td>
<td>171 patients aged ≥ 65 years admitted to an academic hospital emergency department with a hip fracture</td>
<td>IGCTs are intended to advise, sensitize, and educate healthcare professionals on issues related to older adults and geriatric medicine, and to provide expertise for older adults on non-geriatric wards.</td>
<td>None reported</td>
<td>Standard care (including clinical assessment and pain medication) was administered to both groups. The intervention group received an IGCT consult managed as follows: 1. Team nurse administers preoperative comprehensive geriatric assessment 2. Geriatrician assesses medical status 3. Further evaluations are requested postoperatively based on team recommendations 4. &quot;Multidimensional image&quot; of the patient is developed 5. A detailed report is generated (inserted in electronic and paper files); discussed with primary nurse, head nurse and traumatologist 6. IGCT nurse responsible for feedback and follow through with recommendations or new issues</td>
<td>Delirium incidence: Intervention: 21/74 (28.4%) Control: 25/57 (43.9%) Relative risk (RR): 0.65 (95% CI 0.41 to 1.03, p=0.067)</td>
</tr>
<tr>
<td>Martinez et al. 2012 (20)</td>
<td>Prophylactic environmental management of in-hospital</td>
<td>Single-blind randomized controlled trial (RCT)</td>
<td>Not reported</td>
<td>None mentioned</td>
<td>A non-pharmacological intervention included the following six</td>
<td>Not reported</td>
<td>No harms reported for intervention. Four patients</td>
<td>Not reported</td>
<td></td>
</tr>
</tbody>
</table>

*Calculated by reviewers based on reported data
Chile delirium (PEMID), a multicomponent management protocol

287 patients > 70 years admitted to an internal medicine ward and considered to have at least one risk factor for delirium

Characteristics:
Naval hospital

Teamwork:
3 independent observers assessed patients

Leadership:
Not reported

Culture:
Not reported

Implementation Tools:
Educational pamphlet, interviews with family members, familiar items (e.g., photos) and items necessary for daily living (e.g., glasses)

1. Education: During a 10 minute interview, family members were educated on clinical features and prognostic implications of acute confusional syndrome. Educational pamphlet also distributed.
2. A clock and calendar was placed in the patients room
3. Patients glasses, dentures and hearing aids made available
4. Familiar objects such as photographs, cushions and radios placed in the room
5. Family members reorient patient with current date, time and events
6. Families allowed 5 hour visitations

Physicians provided delirium treatments.

Control: 19 (13.3%)

RR = 0.41 (95% CI 0.19-0.92, p=0.027) in the control group experienced falls, one of which resulted in a fracture.

Allen et al. 2011(17) USA System-wide quality improvement (QI) project to prevent delirium in hospitalized patients

Prospective CBA study

199 patients

External: None mentioned

Organizational Characteristics:
6 community hospitals (part of Summa Health System), over 2,000 licensed beds. Acute Care for Elders (ACE) unit had prior experience using

First obtained stakeholder agreement, then multidisciplinary workgroup devised strategy and carried out the pilot project. It involved education of ACE unit staff on delirium screening, prevention and treatment protocols that were then

Delirium incidence decreased from 8.8% in pre-implementation group to 7.2% in implementation group (not statistically significant).
Mean length of stay decreased from 7.6 days to 4 days (difference 3.6)

No harms reported for intervention. Deaths, ICI transfers, and 30-day readmissions all decreased in intervention group.

Downloaded From: http://annals.org/pdfaccess.ashx?url=/data/journals/aim/926462/ on 04/08/2017
delirium prevention guidelines.

Teamwork: Multidisciplinary delirium workgroup with physicians and ACE nurses, director of hospital quality. Nurse quality management and leadership, clinical informatics nurses, geriatric pharmacy, and geriatric medicine fellows.

Leadership: 3 of the authors led the pilot in the ACE unit.

Culture: Statement that Summa Health System “maintains a strong commitment to patient safety and quality”

Implementation tools: Staff education and training, use of audit and feedback implemented.

Black et al. 2011(18) Northern Ireland
Nurse-facilitated family participation
Prospective CBA study 170 patients aged ≥18 years admitted to a general ICU
Neuman’s system model for nursing interventions
External: None mentioned
Organizational Characteristics: Inner city public hospital with 7-bedded general ICU
Teamwork: Researchers, nurses, and family members work together.
Leadership: Researchers (Director of School Nurses gave family members the information booklet at admission to the unit; researcher provided explanation of the study and booklet on Day 1; from Day 2 to transfer to ward, nurses facilitated family access to patient, and families implemented the booklet’s advice.

Incident delirium: Not reported

Intervention: 25/87 (29%)
Control: 64/83 (77%)
OR = 0.12
(95% CI: 0.06-0.24)
P<0.0001
Authors also state “there were no significant differences in mean scores between groups.”

Downloaded From: http://annals.org/pdfaccess.ashx?url=/data/journals/aim/926462/ on 04/08/2017
| Chen et al. 2011(6) | Taiwan | Modified Hospital Elder Life Program (HELP); modified to include 3 shared risk factors (functional, nutritional, and cognitive status) targeted by 3 modified HELP protocols (early mobilization, nutritional assistance, and therapeutic cognitive activities) | CBA study (historical control) 189 patients aged ≥65 years admitted to a gastrointestinal ward for elective surgery, with expected length of stay >6 days | Prior evidence suggests the HELP model can prevent and reduce older patients’ post-surgical functional decline. The authors’ earlier work suggests that 3 key elements are the most relevant for surgical patients and those were used in this study. | The trained HELP nurse helped (sometimes with family members) mobilize patients and simultaneously engaged them in cognitive activities (such as discussing things that interested the patient); the nurse also provided nutritional assistance (oral care, assisted feeding if necessary). | Delirium at discharge: HELP: 0/102 (0%) Control: 12/77 (15.6%) OR = 0.03 (95% CI: 0.001-0.44) P<0.001 | Not reported | High |
HELP provides skilled interdisciplinary staff and trained volunteers to conduct intervention protocols targeted toward 6 delirium risk factors: orientation, therapeutic activities, early mobilization, vision and hearing protocols, oral volume repletion, and sleep enhancement; it has been shown to be effective for delirium prevention.

External:
None mentioned

Organizational Characteristics:
Community teaching hospital (500 beds)

Leadership:
The project director was primarily responsible for implementation

Teamwork:
Interdisciplinary staff and trained volunteers

Culture:
Not reported

Implementation tools:
Volunteers were trained by staff; some received additional training by speech therapists and physical therapists

HELP was first implemented in one 40-bed medical unit in 2002; by 2008 it had spread to 6 units with a total of 184 beds; The project director initially worked with hospital leadership to determine metrics for measuring success; initial success in the proposed metrics was demonstrated, so the hospital agreed to continue funding and allowed expansion to additional units; before starting in a new unit, the project director solicited input from each nursing unit director; the project director worked with the Chief Nursing Director to identify subsequent units to target; as patient volume increased, paid HELP staff and volunteers were added; one Elder Life Specialist became the lead volunteer coordinator; weekly meetings of staff were held to maintain quality and document modifications to the original HELP protocols

Delirium rate:
Pre-HELP (2001): 41%
HELP (2002): 26%
HELP (2005): 16%
HELP (2008): 18%

Nurse satisfaction:
Nurses and nurses aides reported benefit and satisfaction with HELP and agreed with a questionnaire item that their job was “more satisfying due to HELP.”
Inouye et al.  
2003(7), 1999(10)  
USA

**HELP for prevention of delirium in elderly patients**

**Prospective matched CBA study**

- 852 patients at least 70 years old admitted to general medicine floor (later study included 422 patients from the HELP arm of the study)

**Delirium** has been associated with several risk factors; the HELP targets 6 of these risk factors (cognitive impairment, sleep deprivation, immobility, visual impairment, hearing impairment, and dehydration)

**External:**
- None mentioned

**Organizational Characteristics:**
- Urban teaching hospital (900 beds)

**Teamwork:**
- Interdisciplinary team including a geriatric nurse-specialist, two Elder Life specialists, a certified therapeutic-recreation specialist, a physical therapy consultant, a geriatrician, and trained volunteers.

**Leadership:**
- Not reported

**Culture:**
- Not reported

**Implementation tools:**
- All staff and volunteers underwent quarterly standardization to ensure consistent application of all intervention protocols

With oversight by a geriatric nurse specialist and geriatrician, the Elder Life specialists implemented 6 interventions: orientation, therapeutic activities, mobility, sleep, hearing or vision, and volume repletion (for dehydration); they were assisted by trained volunteers; all patients were assigned orientation, therapeutic activities, and mobility; other protocols were targeted to a subgroup of patients with the identified risk factor.

In the earlier publication, incident delirium was significantly lower in the intervention group vs. the usual care group (9.9% vs. 15%, OR: 0.60 (95% CI: 0.39–0.92); P = 0.02

**Adherence** (each 1 point increase):
- OR: 0.69 (95% CI: 0.56–0.87)
- P = 0.001

**High patient adherence to individual interventions significantly reduced incident delirium rates.**

| Not reported | Moderate |
Björkelund et al. 2010(3) Sweden

Multifactorial intervention including pre-hospital and perioperative treatment and care of patients with hip fracture. Components include supplemental oxygen 3-4l/min, IV fluid supplementation and extra nutrition, increased monitoring of vital physiological parameters, adequate pain relief, avoid delay in transfer logistics, daily delirium screening using Organic Brain Syndrome (OBS) scale, avoid polypharmacy, and perioperative/anesthetic period protocol.

Authors cite prior multifactorial intervention studies; they added pre-hospital component because prior studies have identified preop risk factors for delirium.

Components:
- Supplemental oxygen 3-4l/min
- IV fluid supplementation and extra nutrition
- Increased monitoring of vital physiological parameters
- Adequate pain relief
- Avoid delay in transfer logistics
- Daily delirium screening using OBS scale
- Avoid polypharmacy
- Perioperative/anesthetic period protocol

External:
- None mentioned

Organizational Characteristics:
- Academic hospital, also pre-hospital ambulance care

Leadership:
- Researchers in charge

Teamwork:
- Nurses and orthopedic surgeons were part of the team

Culture:
- Not reported

Implementation tools:
- Two of the authors were in charge of implementation

Patients underwent pre-hospital care, nurse assessment immediately after admission, orthopedic surgeon assessment 30 min before referral to X-ray department, then transfer to orthopedic ward, then surgery for hip fracture with general or spinal anesthesia. Delirium was assessed by researchers within 4 hrs of admission and 8 hr after the end of anesthesia.

Post-op delirium:
- **Intervention:** 28/131 (21.4%)
- **Control:** 44/132 (33.3%)
- **OR:** 0.54 (0.31-0.95)
- **P:** 0.03

Any complications:
- **Intervention:** 66/131 (50.4%)
- **Control:** 70/132 (53.0%)
- **P:** 0.67

High
<table>
<thead>
<tr>
<th>Study</th>
<th>Authors</th>
<th>Setting</th>
<th>Intervention</th>
<th>Control Group</th>
<th>Outcomes</th>
<th>Other Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needham et al. 2010(12) USA</td>
<td>Structured quality improvement (QI) model with components including: understanding the problem within the larger healthcare system, creating a multi-disciplinary improvement team, enlisting all stakeholders to identify barriers to change and appropriate solutions, and creating a change in practice through engagement, education, execution, and evaluation</td>
<td>The QI model was based on a “4 Es” model (engage, educate, execute, and evaluate). Previous studies have shown that early physical medicine and rehabilitation (PM&amp;R) in the ICU provides benefits for critically ill patients, and the QI model applied this evidence to patients in the medical ICU (MICU).</td>
<td>Standardized MICU admission modified to change default activity from “bed rest” to “as tolerated;” change in sedation practice from continuous intravenous infusions to “as needed” bolus doses; establishing guidelines for PT and OT consultation; developing safety-related guidelines for PM&amp;R-related consultation; including a full-time PT and OT assistant; and increasing consultations to neurologists for MICU patients with severe or prolonged muscle weakness.</td>
<td>Incident delirium: QI period: 125/482 (28%) MICU patient days Pre-QI period: 107/312 (36%) MICU patient days P = 0.003 New delirium episodes: Intervention: 20/170 (11.7%) Usual care: 69/372 (18.5%) OR = 0.59 (95% CI: 0.34-1.00) P = 0.05</td>
<td>External: None mentioned Organizational Characteristics: Academic hospital with 16-bed MICU Leadership: The lead author was the project leader. Researchers were in charge. Teamwork: A multidisciplinary QI team with representatives from each relevant clinician group in the MICU and PM&amp;R. Culture: Not reported Implementation tools: Education and training of nurses, physical therapists, occupational therapists, and respiratory therapists to obtain specific skills related to rehab of mechanically ventilated patients.</td>
<td></td>
</tr>
<tr>
<td>Vidán et al. 2009(14) Spain</td>
<td>Education measures and specific actions in 7 risk areas (orientation, sensory impairment, sleep, mobilization, hydration, nutrition, drug use), with daily monitoring of controlled clinical trial 542 patients aged ≥70 years admitted to a geriatric acute care unit and two internal medicine wards</td>
<td>Authors discuss the HELP program as inspiration, but the new protocol was designed to be implemented in daily practice without extra staff (unlike intervention implemented within first 24 hours of admission to geriatric ward by geriatricians, residents, and nurses. A specialist geriatric nurse coordinated the intervention and monitored adherence.</td>
<td>Not reported</td>
<td>External: None mentioned Organizational Characteristics: Academic hospital Leadership: A specialist geriatric nurse coordinated the intervention and monitored adherence. Teamwork: Intervention implemented within first 24 hours of admission to geriatric ward by geriatricians, residents, and nurses. A specialist geriatric nurse coordinated the intervention and monitored adherence.</td>
<td>Not reported Not reported High</td>
<td></td>
</tr>
<tr>
<td>Authors</td>
<td>Year</td>
<td>Country</td>
<td>Setting</td>
<td>Study Design</td>
<td>Sample Size</td>
<td>Characteristics</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
<td>---------</td>
<td>---------</td>
<td>--------------</td>
<td>-------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Harari et al. 2007(15)</td>
<td>U.K.</td>
<td>Proactive care of older people undergoing surgery (POPS); multidisciplinary preoperative comprehensive geriatric assessment (CGA) service with post-operative follow-through</td>
<td>CBA study (historical control)</td>
<td>108 patients aged ≥65 years undergoing elective surgery</td>
<td>The authors hypothesized that preoperative CGA “incorporating prediction of adverse outcomes combined with targeted interventions, would reduce post-operative complications and hence length of stay (LOS) in older people undergoing elective surgery.” This strategy did not target delirium alone, but any factor that might contribute to complications or longer LOS.</td>
<td>The multidisciplinary QI team implemented POPS. Most patients received pre-op home visits from occupational therapist and physiotherapist. Social worker provided inputs if needed. Patients were educated in optimizing post-op recovery. The geriatrician and nurse reviewed patients in surgical wards and provided staff education in post-op early detection and treatment of medical complications, early mobilization, pain management, bowel-bladder function, nutrition and discharge planning. Follow-up therapy home visits were provided to those with functional difficulties, and outpatient clinical review in those with only reported complications were related to surgery, not POPS</td>
</tr>
<tr>
<td>Study</td>
<td>Intervention</td>
<td>Design</td>
<td>Sample Size</td>
<td>Intervention Characteristics</td>
<td>Leadership</td>
<td>Teamwork</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------</td>
<td>-------------</td>
<td>------------------------------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>Lundström et al. 2007(4) Sweden</td>
<td>Postoperative multifactorial intervention to reduce delirium and improve outcomes in patients with femoral neck fractures</td>
<td>RCT</td>
<td>199 patients ≥70 years with femoral neck fractures</td>
<td>None mentioned</td>
<td>Not reported</td>
<td>A multidisciplinary team including RNs, LPNs, registered physiotherapists, registered occupational therapists, a dietician and geriatricians</td>
</tr>
<tr>
<td>Lundström et al. 2005(16) Sweden</td>
<td>Education program and reorganization of nursing and medical care</td>
<td>Quasi-RCT</td>
<td>400 patients aged ≥70 years admitted to two wards (intervention and usual)</td>
<td>None mentioned</td>
<td>Not reported</td>
<td>Two of the authors</td>
</tr>
</tbody>
</table>

**External:** Not reported

**Organizational Characteristics:**
- Academic hospital with 24-bed geriatric unit (used only for intervention group)
- Leadership: Not reported
- Teamwork: A multidisciplinary team including RNs, LPNs, registered physiotherapists, registered occupational therapists, a dietician and geriatricians
- Culture: Not reported
- Implementation tools: All nursing and medical staff members attended a 2-day course focusing on dementia and delirium in geriatric patients. Staff were also trained in the care of such patients.

**Post-op delirium:**
- Intervention: 56/102 (54.9%)
- Control: 73/97 (75.3%)
- OR = 0.40 (0.22-0.73)
- p = 0.003

**Days with post-op delirium:**
- Intervention: 5.0 ±7.1 days
- Control: 10.2±13.3 days, p = 0.009
Teamwork: A multidisciplinary team including all staff in the intervention ward
Culture: Not reported
Implementation tools: All nursing and medical staff members attended a 2-day course focusing on dementia and delirium in geriatric patients. Staff was also trained in the caregiver-patient interaction.

Nursing care was reorganized to support individualized care, and nursing staff received guidance once a month by a supervisor observing a nursing action.

---

**Deterioration (care)**

---

**Point prevalence of delirium:**

<table>
<thead>
<tr>
<th></th>
<th>Intervention ward</th>
<th>Usual care ward</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12/122 (9.8%)</td>
<td>25/128 (19.5%)</td>
</tr>
<tr>
<td>OR</td>
<td>0.45 (95% CI: 0.21-0.94, P&lt;0.05)</td>
<td></td>
</tr>
</tbody>
</table>

---

**Delirium on Day 7:**

<table>
<thead>
<tr>
<th></th>
<th>Intervention: 19/63 (30.2%)</th>
<th>Control: 37/62 (59.7%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td>0.29 (0.14-0.61)</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>0.001</td>
<td></td>
</tr>
</tbody>
</table>

---

**Educational package for medical and nursing staff to reduce incidence of delirium in hospitalized elderly patients; a control ward did not receive the educational package and performed usual practice.**

**CBA study (concurrent control):** 250 patients aged ≥70 years admitted to two acute admission wards

**The authors cite prior studies of educational programs directed at staff that have influenced nursing practice in relation to mental health issues in elderly people.**

**External:** None mentioned

**Organizational Characteristics:**

- Two acute admission wards in an inner-city teaching hospital
- Geriatric psychiatrist educated staff, who altered their practice based on the education.

**Leadership:**

- The lead investigator (a geriatric psychiatrist) supervised the project.

**Culture:** Not reported

**Implementation tools:**

- Education program

The educational package, which highlighted delirium risk factors, was delivered on site and at various times to ensure all staff were involved. There was an initial 1 hr formal presentation, written information on guidelines for delirium prevention and management, and regular follow-up meetings to reinforce learning; researchers did not intervene in day-to-day management or provide specific advice pertaining to specific patients.

The educational package was found to more effectively prevent delirium in men (OR: 0.17, 95% CI: 0.05-0.65) than in women (OR: 1.04, 95% CI: 0.38-2.81).

---

**Educational package for medical and nursing staff to reduce incidence of delirium in hospitalized elderly patients; a control ward did not receive the educational package and performed usual practice.**

**CBA study (concurrent control):** 250 patients aged ≥70 years admitted to two acute admission wards

**The authors cite prior studies of educational programs directed at staff that have influenced nursing practice in relation to mental health issues in elderly people.**

**External:** None mentioned

**Organizational Characteristics:**

- Two acute admission wards in an inner-city teaching hospital
- Geriatric psychiatrist educated staff, who altered their practice based on the education.

**Leadership:**

- The lead investigator (a geriatric psychiatrist) supervised the project.

**Culture:** Not reported

**Implementation tools:**

- Education program

The educational package, which highlighted delirium risk factors, was delivered on site and at various times to ensure all staff were involved. There was an initial 1 hr formal presentation, written information on guidelines for delirium prevention and management, and regular follow-up meetings to reinforce learning; researchers did not intervene in day-to-day management or provide specific advice pertaining to specific patients.

The educational package was found to more effectively prevent delirium in men (OR: 0.17, 95% CI: 0.05-0.65) than in women (OR: 1.04, 95% CI: 0.38-2.81).
<p>| Study | Delirium education for hospital staff plus recommendations by geriatric registrar for up to 10 possible targeted intervention strategies to prevent delirium after hip fracture | CBA study (historical control) | This strategy had been successfully used at a U.S. hospital in a previously-published study; targeted recommendations include regulation of bladder and bowel function, early detection/treatment of major complications, correction of fluid and electrolyte imbalance, discontinuation of unnecessary medications, provision of oxygen, severe pain treatment, agitated delirium treatment, use of appropriate environmental stimuli, adequate nutritional intake, and early mobilization and rehabilitation. | External: None mentioned | Organizational Characteristics: Urban teaching hospital (460 beds) | Teamwork: Multidisciplinary committee with medical, nursing, and allied health members of the orthopedic, geriatric, and anesthetic depts. | Leadership: The lead investigator supervised the project. | Culture: Not reported | Implementation tools: The leader educated frontline staff (interns, ward nurses, and allied health staff) on delirium every 10 weeks | The lead investigator educated staff, supervised data collection and assessed patients; the project team met fortnightly to supervise the program; the intervention was implemented over a 3-month period; the major barrier was a high turnover of nursing staff that was partly overcome by the nurse manager of the orthopedic unit ensuring that all nursing staff attended the tutorials and received education about the use of the CAM. | Incident delirium: None reported | Pre-intervention: 10/28 (37.5%) | OR = 0.26 (95% CI: 0.09-0.74) | P = 0.012 |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participants</th>
<th>Intervention</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marcantoni o et al.</td>
<td>Single-blind RCT</td>
<td>126 patients aged ≥65 years admitted emergently for surgical repair of hip fracture</td>
<td>Geriatrics consultation with target recommendations based on a structured protocol for patients after hip fracture (target recommendations same as in Wong et al. 2005)</td>
<td>Post-op delirium: Consult: 20/62 (32%) Usual care: 32/64 (50%) P = 0.04 No significant between-group difference in days of delirium per episode</td>
</tr>
</tbody>
</table>

Palliative care centers (dedicated hospital units and/or stand-alone hospices)
<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention Description</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>External</th>
<th>Organizational Characteristics</th>
<th>Teamwork</th>
<th>Leadership</th>
<th>Culture</th>
<th>Implementation Tools</th>
<th>Potential Delirium Indicator</th>
<th>Delirium Incidence</th>
<th>Potential Adverse-Event Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gagnon et al. 2012 (21) Canada</td>
<td>Multi-component intervention to prevent delirium in terminal cancer patients; intervention included a patient/physician component</td>
<td>Controlled clinical trial</td>
<td>1516 patients admitted to seven palliative care centers for terminally-ill patients</td>
<td>Not reported</td>
<td>Palliative care centers</td>
<td>Physicians, nurses, and family members worked together to implement the intervention</td>
<td>Principal investigators led the project; a research staff nurse oversaw study procedures in every participating center</td>
<td>Not reported</td>
<td>Bedside nurses attended training sessions on screening and monitoring for delirium symptoms using the Confusion Rating Scale.</td>
<td>Delirium incidence: Intervention: 49.1% Usual care: 43.9%</td>
<td>When adjusted for confounding variables, no between-group difference was found for delirium incidence (OR 0.94, p=0.66).</td>
<td>Not reported</td>
</tr>
<tr>
<td>Lapane et al. 2011(22) USA</td>
<td>Pharmacist-led Geriatric Risk Assessment MedGuide (GRAM) reports and automated monitoring plans focusing on medication</td>
<td>Quasi-RCT</td>
<td>3,202 patients (2003) 3,321 patients (2004) 25 nursing homes were</td>
<td>Not reported</td>
<td>25 nursing homes had stable contracts with</td>
<td>Bedside nurses educated the closest family member about delirium and provided them with the American College of Physicians recommendations for avoiding symptoms of confusion in patients with advanced cancer.</td>
<td>No significant difference between groups for potential adverse-event related hospitalization, falls, or death</td>
<td>Not reported</td>
<td>Adjusted hazard ratio: 0.93 (0.80-1.09) New admits 2004: Adjusted hazard</td>
<td>Not reported</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>
monitoring phase to prevent potential adverse drug events (falls and delirium) in nursing homes randomized to receive intervention or control

| Identification when evaluating complex medication regimens of older adults to identify, resolve, and prevent medication-related problems, aid in evaluation of medications as a cause or aggravating factor contributing to an older adult's physical, cognitive, or functional decline, and facilitate incorporation of medication monitoring information into the older adult's plan of care. | Omnicro and had few short stay residents

Teamwork: Pharmacists shared reports with facility nurses.

Leadership: Consultant pharmacists

Culture: Not reported

Implementation tools: The ASCP Foundation developed and delivered in-service programs for nursing staff and consultant pharmacists. Two of the authors were instructors.

generated on medications that contribute to falls and delirium, as well as medication monitoring care plans and flow records. Facility nurses received reports within 24 h of admission for new admissions; consultant pharmacists did on-site reviews of drug regimens for each resident once every 30 days.

| Teamwork: Pharmacists shared reports with facility nurses. Leadership: Consultant pharmacists Culture: Not reported Implementation tools: The ASCP Foundation developed and delivered in-service programs for nursing staff and consultant pharmacists. Two of the authors were instructors. | 0.42 (0.35-0.52)

ACE – Acute care for elders

ADL – Activities of daily living

CAM – Confusion assessment method

CBA – Controlled before-after

CGA – Comprehensive geriatric assessment

GRAM – Geriatric risk assessment medguide

HELP – Hospital elder life program

ICU – Intensive care unit

IGCT – Inpatient geriatric consultation team

LOS – Length of stay

LPN – Licensed practical nurse

MICU – Medical ICU

OR – Odds ratio

OT – Occupational therapist
Figure. Study flow diagram.

- Titles (n = 673)
  - Clearly irrelevant (n = 364)
  - Reviewed articles (n = 309)
    - Rejected studies (n = 219)
      - Commentaries, reviews, systematic reviews, protocols, letters, meeting abstracts, or studies that did not address a key question: 186
      - <20 patients per group: 6
      - No data on efficacy/effectiveness: 5
      - Other: 22
  - Prognostic studies (reviewed in full PSP report) (n = 55)
  - Comparative studies (multicomponent interventions) (n = 19)
  - Comparative studies (single-component interventions; reviewed in full PSP report) (n = 16)

PSP = patient safety practice.