## Table 1. Search Strategy

### DATABASE SEARCHED & TIME PERIOD COVERED:
The following databases have been searched for relevant information:

<table>
<thead>
<tr>
<th>Database</th>
<th>Search Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>CINAHL (Cumulative Index to Nursing and Allied Health Literature)</td>
<td>September 10, 2012</td>
</tr>
<tr>
<td>Cochrane Library</td>
<td>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>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 2. Delirium Prevention – Multi-component Interventions

<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>External: None mentioned Organizational Characteristics: Mixed medical-surgical ICU in a University hospital Teamwork: 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. Leadership: The lead author supervised proper application of the shared interventional reorientation algorithm. Culture: Not reported Implementation Tools: 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).</td>
<td>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>
</tr>
</tbody>
</table>
Deschot et al. 2012
Belgium
Inpatient geriatric consultation team (IGCT)
Controlled clinical trial
171 patients aged ≥ 65 years admitted to an academic hospital emergency department with a hip fracture
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.

External:
None reported

Organizational Characteristics:
Academic hospital

Teamwork:
The team included a geriatrician, a nurse, a social worker, an occupational therapist and physiotherapist, all with geriatric care experience

Leadership:
Not reported

Culture:
Not reported

Implementation Tools:
An expert in geriatric assessment trained nurses to use the assessment tool during several sessions.

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. “Multidimensional image” 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

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)

*Calculated by reviewers based on reported data

Martinez et al. 2012
Prophylactic environmental management of in-hospital
Single-blind randomized controlled trial (RCT)
Not reported
External:
None mentioned

Organizational Intervention included the following six

A non-pharmacological intervention included the following six

Delirium incidence:
Intervention: 8 (5.6%)
No harms reported for intervention. Four patients

Not reported

Moderate
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.
| 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 | Not reported | High |
|---------------------|-----------------|--------------------------------------|----------------------|-------------------------------------------------|---------------------------------------------|----------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|

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. Days, 95% CI: 0.66 to 6.49 days.

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: 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.”
| 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 | External: None mentioned | Organizational Characteristics: Urban medical hospital (2,200 beds, 36-bed gastrointestinal ward) | Leadership: Researchers designed program and led the study | Teamwork: Not reported | Culture: Not reported | Implementation tools: A full-time trained HELP nurse, blinded to the study hypothesis and not an outcomes assessor, implemented the program. | 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.

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. | 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 Not reported High patient adherence to individual interventions significantly reduced incident delirium rates. Adherence (each 1 point increase): OR: 0.69 (95% CI: 0.56-0.87) P = 0.001
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/anaesthetic period protocol.

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

**Prospective CBA study**

263 patients aged ≥65 years with hip fracture.

**External: None mentioned**

**Organizational Characteristics:**

Academic hospital, also pre-hospital ambulance care

**Leadership:**

Researchers were 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:**

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>28/131</td>
<td>21.4%</td>
<td>33.3%</td>
</tr>
<tr>
<td>OR = 0.54 (0.31-0.95)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P = 0.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Any complications:**

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>66/131</td>
<td>50.4%</td>
<td>53.0%</td>
</tr>
<tr>
<td>OR = Not reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P = 0.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Author(s)</td>
<td>Country</td>
<td>Study Type</td>
</tr>
<tr>
<td>-----------</td>
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<td>------------</td>
</tr>
<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 &quot;4 Es&quot; 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>
</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</td>
</tr>
</tbody>
</table>
A multidisciplinary QI team including geriatricians, residents and nurses who worked in the geriatric ward.

CBA study (historical control) 108 patients aged ≥65 years undergoing elective surgery

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.

External: None mentioned

Organizational Characteristics: Urban teaching hospital

Leadership: Not reported

Teamwork: A multidisciplinary QI team including a consultant geriatrician, nurse specialist in older people, occupational therapist, physiotherapist and social worker

Culture: Not reported

Implementation tools: Geriatrician and nurse provided staff education in post-op early detection and treatment of medical complications, post-op delirium:

POPS: 3/54 (5.6%)
Pre-POPS: 10/54 (18.5%)
OR = 0.26 (0.07-1.00)
P = 0.036

Only reported complications were related to surgery, not POPS

Post-op delirium: Only reported complications were related to surgery, not POPS

High

Downloaded From: http://annals.org/pdfaccess.ashx?url=/data/journals/aim/926462/ on 05/16/2018
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Intervention</th>
<th>Participants</th>
<th>Exclusion Criteria</th>
<th>Success Measures</th>
</tr>
</thead>
</table>
| Lundström et al., 2007(4) Sweden | RCT          | Early mobilization, pain management, bowel-bladder function, nutrition and discharge planning. | 199 patients aged ≥70 years with femoral neck fractures | Not reported | Post-op delirium: 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 |
| Lundström et al., 2005(16) Sweden | Quasi-RCT    | Education program and reorganization of nursing and medical care               | 400 patients aged ≥70 years admitted to two wards (intervention and usual)  
Leadership: Two of the authors | Not reported | Prevalent delirium within 24 hrs of admission:  
Intervention: 63/200 (31.5%)  
Control: 62/200 (31%)  
No harms related to intervention were reported |
were the leaders of the program.

**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.

**Point prevalence of delirium:**

<table>
<thead>
<tr>
<th></th>
<th>Intervention ward</th>
<th>Usual care ward</th>
<th>OR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delirium on Day 7</td>
<td>19/63 (30.2%)</td>
<td>37/62 (59.7%)</td>
<td>0.29 (0.14-0.61)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Educational package:**
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.

**Point prevalence of delirium:**

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**Delirium on Day 7:**

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<th>Control:</th>
<th>OR (95% CI):</th>
</tr>
</thead>
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<td>37/62 (59.7%)</td>
<td>0.29 (0.14-0.61)</td>
</tr>
</tbody>
</table>

**P = 0.001**

**Educational package:**
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).
<table>
<thead>
<tr>
<th>Study</th>
<th>Delirium education for hospital staff plus recommendations by geriatric registrar for up to 10 possible targeted intervention strategies to prevent delirium after hip fracture</th>
<th>CBA study (historical control) 99 patients aged &gt;50 years with hip fracture admitted to a general orthopedic unit</th>
<th>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.</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incident delirium:</strong></td>
<td>None reported</td>
<td>Not reported</td>
<td><strong>High</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Intervention:</strong></td>
<td>9/71 (12.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pre-intervention:</strong></td>
<td>10/28 (37.5%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OR:</strong></td>
<td>0.26</td>
<td>(95% CI: 0.09-0.74)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P:</strong></td>
<td>0.012</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marcantoni et al. 2001(8) USA</td>
<td>Proactive 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>Single-blind RCT</td>
<td>Not clearly stated, other than that geriatrics consultation is easily implementable and that a targeted, proactive strategy with intervention on defined outcomes has shown effectiveness, although it is not clear whether it has shown prior effectiveness in delirium prevention.</td>
<td>External: None mentioned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>126 patients aged ≥65 years admitted emergently for surgical repair of hip fracture</td>
<td>Teamwork: Geriatrician and orthopedics team worked together</td>
<td>Leadership: Not reported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Culture: Not reported</td>
<td>Implementation tools: Not reported</td>
</tr>
</tbody>
</table>

**Palliative care centers (dedicated hospital units and/or stand-alone hospices)**
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Country</th>
<th>Description and Intervention Details</th>
<th>Delirium Incidence</th>
<th>Other Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gagnon et al. 2012</td>
<td>Controlled clinical trial</td>
<td>Canada</td>
<td>Multi-component intervention to prevent delirium in terminal cancer patients; intervention included a patient/physician component</td>
<td>Not reported</td>
<td>Delirium incidence: Intervention: 49.1% Usual care: 43.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The multicomponent intervention was implemented at 2 of the 7 palliative care centers; the others provided usual care. At all centers, bedside nurses assessed the presence and intensity of symptoms at the end of each 8-hour shift. For the intervention, the research nurse recorded patient risk factors for delirium on a form that was sent to the physician so they could determine what further steps to take. Nurses also oriented the patient as early as possible in the nurse shift. 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></td>
<td>When adjusted for confounding variables, no between-group difference was found for delirium incidence (OR 0.94, p=0.66).</td>
</tr>
<tr>
<td>Lapane et al. 2011</td>
<td>Quasi-RCT</td>
<td>USA</td>
<td>Pharmacist-led Geriatric Risk Assessment MedGuide (GRAM) reports and automated monitoring plans focusing on medication</td>
<td>Not reported</td>
<td>Potential delirium indicator: In home 2003/04: Adjusted hazard ratio: 0.93 (0.80-1.09) New admits 2004: Adjusted hazard</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GRAM was designed to assist healthcare professionals with expertise in geriatric pharmaco-therapy in problem</td>
<td></td>
<td>No significant difference between groups for potential adverse-event related hospitalization, falls, or death</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. Omnicare 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.

<table>
<thead>
<tr>
<th>ACE – Acute care for elders</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADL – Activities of daily living</td>
</tr>
<tr>
<td>CAM – Confusion assessment method</td>
</tr>
<tr>
<td>CBA – Controlled before-after</td>
</tr>
<tr>
<td>CGA – Comprehensive geriatric assessment</td>
</tr>
<tr>
<td>GRAM – Geriatric risk assessment medguide</td>
</tr>
<tr>
<td>HELP – Hospital elder life program</td>
</tr>
<tr>
<td>ICU – Intensive care unit</td>
</tr>
<tr>
<td>IGCT – Inpatient geriatric consultation team</td>
</tr>
<tr>
<td>LOS – Length of stay</td>
</tr>
<tr>
<td>LPN – Licensed practical nurse</td>
</tr>
<tr>
<td>MICU – Medical ICU</td>
</tr>
<tr>
<td>OR – Odds ratio</td>
</tr>
<tr>
<td>OT – Occupational therapist</td>
</tr>
</tbody>
</table>
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.