

AMENDING the Care of the Critically Ill Older Adult: a Quality Improvement Project

Karleena Twitchell

Oregon Health & Science University

AMENDING the Care of the Critically Ill Older Adult: a Quality Improvement Project

In 2014, older adults accounted for about 15% of the total United States population, and this total is projected to increase to 21% by the year 2030 (Federal Interagency Forum on Aging-Related Statistics, 2016). As this population continues to grow, there is a rising prevalence of older patients within the United States' healthcare system. Currently, older adults make up more than half of patients and account for 48% to 58% of Intensive Care Unit (ICU) admissions (Casey, 2013). It has been shown that the severity of illness in older adults in the ICU has increased, mortality has risen slightly from 11.3% to 12%, and more patients are being discharged to places other home (Sjoding, Prescott, Wunsch, Iwashyna, & Cooke, 2016; Chang, Chen, & Su, 2012). The increase in amount of older adult patients in the ICU and their severity of illness has necessitated that providers be knowledgeable about the complex physiologic changes of aging when combined with critical illness or injury.

A variety of checklist style tools have been developed for use by ICU providers to assist clinicians in identifying patients at high risk of complications, and to assist them in recalling specific interventions to reduce these risks. These tools have often been compared to those used in an aviation cockpit to improve safety and have been shown to be helpful in caring for patients within the ICU (Vincent, 2005). Current ICU clinical tools, such as FastHug and the ABCDEF Bundle, have been shown to improve awareness of specific clinical risks and improve overall clinical care within the ICU. These tools have been created to serve most patients within the ICU, but not specific populations of concern such as the critically ill older adult population. The older adult ICU population has specific clinical needs and risks that vary from the younger ICU patient population. Many articles focus on individual geriatric syndromes that need to be improved in the care of the older adult, but few articles tie them all together in the overall care of

the older adult patient in the ICU. Providers who care for these patients in the ICU could benefit from the development of a tool designed to identify and treat common geriatric syndromes in the ICU, including pain, mobility, elimination, nutrition, delirium, and medication selection/dosing. These areas, if not managed appropriately, can increase morbidity, mortality, hospital length of stay and healthcare costs. The available literature supports the development of an ICU tool specific to geriatric related syndromes that complicate care in the ICU.

The purpose of this project was to create a checklist that could be used in the ICU to give providers evidence-based, age-appropriate suggestions to help guide the care of the critically ill older adult. The checklist was then tested in one ICU to determine if providers found it to be useful and if it could help them give better care to this specific population.

Approach to the Project

Setting

The setting for this quality improvement project took place within Oregon Health & Science University Hospital's Cardiovascular Intensive Care Units (CVICU) which is a 26-bed unit within the tertiary academic medical center in Portland, Oregon. This ICU does not routinely have access to a geriatrics consult service, and the providers regularly care for patients aged 65 and older with a multitude of various critical illnesses and injuries. As OHSU is an academic medical center, the CVICU has a variety of providers with various levels of knowledge and experience caring for the patients.

Population

There were two target populations being looked at within this project: the providers and the patients. Patient inclusion criteria included: patients aged 65 or older who are cared for

within the CVICU, with any diagnosis, for at least 24 hours. Patient exclusion criteria: any patient transferred out of the ICU within 24 hours and therefore did not have time to have the tool applied to them, and patients younger than 65 years old. Provider inclusion criteria included: any CVICU faculty member (physicians, nurse practitioners, physician assistants) and resident physician. Provider exclusion criteria: students (MD, NP, and PA) and any provider who were not available to receive the education on the checklist tool. The study did not have a size limit and included any patient that met the inclusion criteria within the dates the project ran. This was designed to allow for a large enough sample to allow providers time to create opinions on the use of the tool.

Provider Demographics

On a typical day, the CVICU has five to six providers managing the care of the patients, which are split into two teams that are each led by an attending physician. The CVICU employs 15 Advanced Practice Providers (APPs), including eight Physician Assistants (PAs) and seven Nurse Practitioners (NPs). Four providers are male (three PAs, one NP), and the remaining are female (five PAs, six NPs). Eighty-seven percent of the APPs work in the ICU full time, and the other 13% are part time. The rest of the unit's providers are made up of medical residents (fellows, residents, interns) that rotate through the unit every four weeks. Only the residents who would be there during the project's timeframe were educated about the checklist and the suggested interventions. The residents were encouraged to participate, but the APPs were the main focus of the project as they do the majority of direct patient care.

Patient Demographics

The patients in the CVICU have a variety of diagnoses that are co-managed by multiple different specialty services: cardiac surgery, heart failure (including advanced mechanical support), cardiology, thoracic surgery, vascular surgery, head and neck surgery (ENT/OMFS), orthopedic surgery, urology, and OB/GYN. Between January 16 and March 16, the CVICU providers cared for 316 total patients [118 female (37%), 198 male (63%)]. Of those 316 patients, 155 (49%) were 65 or older [57 female (37%), 98 male 63%]. The average hospital length of stay for the total 316 patients was 8.3 days, with an average ICU length of stay of 4 days. For those that were 65 and older, the average hospital length of stay was 6.97 days, with an average ICU length of stay of 3.2 days.

Project Details

The project's intervention was a checklist-style tool called AMEND-Med. It included evidence based suggested interventions involving analgesia, mobility, elimination, nutrition, delirium, and medication prescribing for the older adult. The initial format of the tool was designed to be applied within an electronic medical record (Figure 1). The tool was then adjusted and created in paper format (Figure 2), which was the format ultimately used for the project. Prior to implementing the checklist, an email was sent to all potential users (residents and APPs) and other CVICU staff (MDs and RNs) so that they were aware of the checklists usage. This email also included a PowerPoint presentation giving a description of the project, the checklist, and the evidence behind the multiple suggestions (Appendix 1).

Analgesia. The analgesia section prompted providers to: consider scheduling acetaminophen to help limit the need for higher doses of opioids (Schofield, 2014; Pharmacological management of persistent pain in older persons, 2009); consider alternative treatments like non-opioid pain medications, ice, heat, massage, and acupuncture/pressure as

appropriate (Schofield, 2014); lower the dose of as-needed opioids (Herr, 2010; McLachlan et al, 2011; Coldrey, Upton, & Macintyre, 2011); and avoidance of opioids that are not metabolized well in the older adult (Coldrey, Upton, & Macintyre, 2011). Education included information about pain treatment in the older adult, including the "start low and go slow" approach with dosing analgesics (Herr, 2010; McLachlan et al, 2011).

Mobility. The mobility section prompted providers to: find out what the patient's baseline functional status is and to document if this has been altered; to change activity orders and allow for early mobilization if appropriate (Casey, 2013; Richmond & Jacoby, 2007); and it encouraged the use of physical and occupational therapy referrals if needed. Education included interventions and ways to prevent functional decline. Some specific interventions that can help prevent decline include a routine walking schedule, activities to prevent sensory deprivation, and timely hospital discharge (Graf, 2006). Lach, Lorenz, & L'Ecuyer (2014) feel that there are four factors that are essential in early mobilization for an older adult in the ICU: inclusion of a mobility plan for every ICU patient, individualized patient assessment, provider's judgment, and interprofessional consultation.

Elimination. The elimination section focused on assessing for and preventing constipation, incontinence, and urinary retention. It suggested prevention and treatment strategies for each of the items selected that apply to the specific patient. Education also included similar details. If constipation was selected, it suggested addressing risk factors and ordering a bowel regimen for prevention and treatment (McKay, Fravel, & Scanlon, 2012; Woodward, 2012; Gandell et al, 2013). The selection of incontinence prompted providers to focus on prevention of skin breakdown and suggested the use of a toileting schedule. Selecting urinary retention prompted providers to consider multiple causes of the retention (including anesthesia, chronic

BPH, and medications), suggested utilizing a toileting schedule and as-needed bladder scanning and straight catheterization, and only using medications if the cause was felt to be chronic and not likely to improve in the next 48 hours (due to the risks associated with alpha blockers) (Foster, Mohorn, & Luis, 2015; Darrah, Griebing, & Silverstein, 2009).

Nutrition. Preventing malnutrition was the focus of this section. It prompted providers to consider screening the patient if unsure of nutrition status; adjust the diet order and encourage PO intake as appropriate; and consider supplementation if needed (Finocchiaro & Hook, 2015; Harrington, 2004; Dimaria-Ghalili & Nicolo, 2014; Nestle Nutrition Institute, n.d.; Reid & Allard-Gould, 2004; Hegerova, Dedkova, & Sobotka, 2015). It also encouraged an early dietician consult if the patient was felt to be malnourished or had new dietary restrictions ordered due to their disease processes (Reid & Allard-Gould, 2004; Ferrucci & Studenski, 2015). Education included ways to assess for malnutrition, and suggestions to prevent and treat it in the hospitalized patient.

Delirium. The delirium section: prompted providers to ensure it was being assessed for; suggested prevention by reorientation, removing restraints, promoting sleep hygiene, implementing early mobilization, and thorough medication review (Brummel & Girard 2015; Garpestad & Devlin, 2017); and suggested treatment if needed by discontinuing medications that can lead to delirium (i.e. benzodiazepines, anticholinergics), giving supportive care, and using haldol if felt to be a harm to self or others (Ferrucci & Studenski, 2015; Brummel & Girard, 2015; Balas et al., 2012; VUMC, 2013; Garpestad & Devlin, 2017). Education included rationale behind the areas focused on, along with more detail than was included within the tool.

Medication prescribing. The section on medication prescribing in the older adult included prompts to go through the home medication list and continue needed medications,

encouraged providers to go through the hospital medication list and de-prescribe as able to help prevent polypharmacy, and suggested ordering a pharmacist consult for assistance if needed. Education included a review of the definition of polypharmacy, the risks associated with it, and a review of the STOPP/START and Beer's list criteria.

Methods

Project data included quantitative data from the checklists and qualitative data derived from the surveys. Measures of the quality improvement project included gauging providers' feelings and opinions on the use of the tool, specifically if they felt it helped them improve management of the critically ill older adult. It also looked at the usage of the tool and the barriers that kept providers from using the it. Provider opinions were obtained by the use of a survey that included yes and no questions, Likert-type scale questions, select-all-that-apply questions, and space to provide comments (Figure 3). Accuracy of the data collected was ensured by encouraging only those providers who used the tool to complete the survey. Patient outcomes were not assessed during this specific project.

Implementation

The checklists were implemented from January 16th to March 16th 2018 within the CVICU. After the initial introductory email, two additional emails were sent, spaced a few weeks apart, to encourage continued use of the checklist. Boxes were placed in the provider workroom; one contained blank checklists and the other was for the completed forms. They were allowed to complete the checklist at any time during their shift; it was not specifically used during ICU rounds and was not included in the electronic progress notes. If they had the same older adult patient for multiple days, they were told that only one checklist was needed unless

more changes were made that would require another form to be filled out. The paper forms were collected every two weeks and the data was entered into an Excel spreadsheet. At the end of the two months, the checklists were removed and the surveys were supplied. Another email was sent to all the providers encouraging them to complete the anonymous paper survey and return it to the box in the provider workroom. The surveys were made available for two weeks (March 26, 2018 – April 8, 2018).

Results

The project ran for 60 total days; of those, 30 days had checklists filled out. There were 103 checklists completed which represented 76 unique older adult patients. The checklist was filled out on 49% (76/155) of eligible patients.

Once the timeframe of completing the checklist was done, the surveys were distributed. There was a potential of having 14 APPs and four medical residents fill out the survey; seven surveys (39%) were returned, analyzed, and compared with the checklist data.

The survey asked the providers about the potential barriers for completing the checklist in a select-all-that-apply format. All of the responses indicated that remembering to do it was the biggest barrier (100%), with using the paper form (42%), time (29%), and the applicability to the patient (29%) as other responses. When asked what would cause them to be more willing to use the checklist (in a select-all-that-apply format), using it during rounds (43%) and having it within the Electronic Medical Record (43%) were the most common responses. One provider indicated that the paper format worked well, and one provider indicated that there would be no format that would cause them to be willing to use it. Seventy-one percent (5/7) of providers somewhat agreed that the checklist helped them provide more age-appropriate care to their older adult

patients (two somewhat disagreed, and none strongly agreed or disagreed), and 57% (4/7) felt that they changed their plans based on suggestions from the checklist.

Data from the checklists showed that 55% of the older adult patients had acute/chronic pain. Many comments written onto the individual checklists involved the analgesia section. Providers often wanted to explain why they were not doing the suggested interventions, or they included additional options that were not listed (i.e. patient had an epidural). Only 26% of checklists had the box checked indicating that they lowered the dose of oxycodone. Due to the higher number of surgical patients seen in the CVICU, providers may not have felt that a lower dose of oxycodone was appropriate. As a result of the incidence of physiological age- and disease-related changes in an older adult, an individualized pain regimen may need to be considered for each patient (Falzone, Hoffmann, & Keita, 2013). However, the “start low and go slow” philosophy should be considered in the older adult due to the pharmacokinetic and pharmacodynamic changes and the higher incidence of polypharmacy and comorbidities (Falzone et al., 2013).

In regards to mobility, 57% of providers felt that they knew their patients’ baseline pre-hospital level of mobility. The checklist had providers indicate if their patient had an altered level of mobility, of which 52% responded “yes.” It is a possibility that the patients could have had more alteration from baseline than providers were able to assess and then appropriate interventions may not have been applied (only 13% adjusted the activity order to minimize bedrest, and 27% encouraged mobilization). Due to the high surgical population in the CVICU many patients automatically have a physical therapy consult placed, so it was not surprising to see that the box for the PT consult was not often checked (35%).

Sixty-one percent had *no* suspected problems with elimination, and of those with problems, the most commonly reported was constipation at 17%. Due to multiple risk factors such as limited physical activity, inadequate diet, polypharmacy, and comorbid diseases, prevalence rates of constipation can be up to 75% in institutionalized older adults (McKay, Fravel & Scanlon, 2012; Woodward, 2012). Constipation in CVICU patients is either being underestimated or providers are doing a better job at preventing it than the average. Many of the comments written on the checklist in the elimination section seemed to be related to keeping the foley catheter in place postoperatively or due to aggressive diuresis in a critically ill patient. The “remove foley” intervention was only checked 9% of the time, though this could also indicate that not many patients had one in to be removed in the first place.

Providers were asked to rate how they agreed or disagreed with the statement “I felt like malnutrition was an issue with a lot of my patients.” Seventy-one percent of providers reported that they somewhat agreed with this statement (29% somewhat disagreed). The checklist asked if patients had evidence of malnutrition and 19% of the forms had the box checked “yes.” The prevalence of malnutrition in older adults admitted to an ICU has been reported at being 50% or more (Finocchiaro & Hook, 2015). Patients in the CVICU may have been less malnourished compared to what studies have shown due to the fact that many were there following elective surgical procedures and not due to debilitating chronic illness. There is also the possibility that providers were unsure if their patients were malnourished at the time of filling out the checklist, as the criteria for malnutrition can be vague and not easily assessed for. Taking the time and learning how to assess for malnutrition could allow for more appropriate application of the suggested nutrition checklist interventions.

Providers felt that the delirium interventions were already being applied to their patients. Many of those interventions were nursing focused, and not always clearly documented, so it would be difficult to determine if they were truly being applied. Only 14% of patients were documented as being delirious when the checklist was filled out. Eighty-six percent of those that were delirious had at least one intervention selected that was being applied. Some of the interventions were helpful with preventing delirium, and many providers checked those boxes appropriately (when indicating that the patient did not have delirium).

Results of the checklist indicated that 89% of patients were taking more than four medications. One of the suggestions on the checklist was to evaluate the home and hospital medication lists for potentially inappropriate medications; 84% of the checklists indicated that this was done. Eighteen percent of checklists had the box checked to indicate that a pharmacist consult was obtained to help with the medication lists. The survey asked if providers were familiar with medications on the Beer's List; 42% of providers responded "somewhat agree," 29% responded that they "somewhat disagree," and another 29% responded that they "strongly disagree." More than half of the survey responses suggested that providers were unfamiliar with the medications that may be inappropriate for their patients and may have benefited more from a greater involvement of the ICU pharmacist. The prevalence of potentially inappropriate medications (PIMs) in older adults has been shown to occur in up to one-third of hospitalized patients (Hubbard, O'Mahony, & Woodhouse, 2013). The number of PIMs has also been found to directly correlate with the duration of the ICU stay (Garpestad & Devlin, 2017). Critically ill older adults in the ICU are often on at least 12 different medications at the time of admission, with more added on during the duration of the hospitalization (Garpestad & Devlin, 2017). Older adults taking multiple medications are more at risk for adverse drug reactions, delirium,

falls, and malnutrition (Hubbard, O'Mahony, & Woodhouse, 2013; Dimaria-Ghalili & Nicolo, 2014; Le Couteur et al., 2004). Involving the ICU pharmacist more frequently than was indicated as being done on the checklists (18%) may benefit these critically ill older adult patients.

Survey Comments

The survey left space for comments and suggestions. Three providers left the following comments:

1. "Many of the things were already applied to my patients with the exception of home medication eval by pharmacist."
2. "I liked the checklist but it was difficult to remember. But it made me reassess the need for certain meds and doses that I am prescribing for my geriatric patients."
3. "Often we were doing the opposite your checklist interventions. Patient with postop pain requiring more pain meds. Foley having to be replaced."

The same three providers left the following suggestions:

1. "In the EMR would be more helpful."
2. "I think adding a section for blood pressure. A lot of times we medicate elderly patients for a BP goal of 120/80, but that is not necessary and could cause issues when a patient discharges home. Do I really need to give/increase this antihypertensive med considering the patient is 85 and her blood pressure is 135/80?"
3. "Maybe this would be beneficial in medical patients; not so much cardiac patients."

Thematic Assessment

Observations of overarching themes were recorded after each checklist data entry period and again after surveys were reviewed. It was quickly noted that many checklists were filled out on days that the primary investigator was also working on the unit, likely due to reminders that were given during the shifts. There would be groups of days at a time where no checklists were completed, that also fell on the PI's days off. There was less delirium and malnutrition in the patient population than expected. Most providers checked the box that they evaluated the patients' medication lists, but there wasn't any way to verify that occurred. There were many comments written on the paper checklist forms which suggested that the available interventions may not always be adequate for the patients seen in the CVICU. There was also some need for clarity about whether the providers should only check the box if they implemented the intervention or if the box should be checked even if it had already been applied.

Discussion

It was difficult to determine the significance of the results when the surveys and checklists were compared due to the poor response rate (50% of checklists done, and less than half of providers completing the survey). The results of the survey could suggest that there were significant barriers preventing providers from completing the checklists, though a majority still felt that it was at least somewhat helpful in providing more age-appropriate care.

There were multiple factors that seemed to limit full compliance of providers completing the checklist. In the survey, all of the providers indicated that remembering to complete the checklist was the most common reason it was not done, with it being on a paper form as the second most common reason. This leads to suspicion that adding a paper form goes against the usual norms of an ICU that is accustomed to doing all documentation within the electronic medical record. The burden of completing a paper checklist may have been an unrealistic

expectation to ask of these ICU providers that have their time already filled with managing a variety of critically ill patients and documenting all that was done.

The timing of the project may have been a confounding factor in the success of utilizing the checklist. The CVICU was going through some change in management, providers were experiencing burnout due to having to rotate day and night shifts, and having a few providers give notice of leaving the practice, with others out on FMLA, requiring an increase in overtime needs. These changes have led to some decreased morale among the APP team. Adding more work to providers who are experiencing burnout could cause more burnout and a decreased willingness to complete a task that was strictly voluntary.

As described in the results, many providers felt that the interventions were often already being done for their patients. Due to the way many of these interventions are documented, it would be difficult to track if the interventions were always being completed as the providers indicated in the survey. Providers naturally want to do what is best for their patients, but it is often difficult to ensure this is happening when there are so many different, complex patients to care for within each shift. Utilizing a checklist can help ensure that certain aspects of evidence-based care are acknowledged and managed for specific patient populations. Within the CVICU progress notes there is the FASTHUG mnemonic that helps remind providers to address feeding, analgesia, sedation, thromboprophylaxis, head of bed, ulcer prophylaxis, and glucose control. Each of these areas have been shown to be important in the care of the critically ill patient, regardless of age. Adding a specific checklist, such as the AMEND-Med checklist, to electronic progress notes could be beneficial in helping to address specific areas that are important in managing the care of the critically ill older adult and may be more successful than doing this in paper format as shown in the results of this project.

Limitations

Many of the limitations of the project have been discussed within each topic, though the biggest limitation was felt to be due to the limited number of survey responses. Due to it not being reported how often the providers filled out the checklist, there is a possibility that the providers who used the checklist the most did not fill out the survey. One provider indicated on the survey that they did not use the checklist, however they still filled out the remaining questions (and these responses were still counted). Lastly, some of the results from the checklist did not match the results of the survey as would have been expected (as described above).

Practice-related Implications

The aim of this quality improvement project was to determine if a checklist was felt to help ICU providers give more age-appropriate care to their critically ill older adult patients. As shown in the previous sections, the suggested interventions have evidence behind them in showing the importance of application for older adult patients. However, as suggested by one of the provider's comments, the interventions may not always be appropriate for every type of patient population. Each checklist should be filled out with consideration for the individual patient's circumstances and needs. It may be beneficial to apply this checklist to an even more narrow patient population (i.e. medical patients as one provider suggested) to see if it would be more useful.

The survey indicated that another format or utilization of the checklist may be beneficial when compared to the paper form; it could be implemented within the EMR and/or during ICU rounds to see if that would improve its use and helpfulness. If giving providers more work to do in an already complex, stressful environment, it should be formatted in a way that does not

become overly burdensome to complete. More work needs to be done to determine if this checklist, when applied more frequently in a format that is easy to complete, can improve the outcomes in the critically ill older adult.

Conclusion

Providers seemed to find the checklist helpful for managing the care of the critically ill older adult, but overall compliance of the checklist was poor, likely due to having it in a paper format. Despite evidence that checklists can improve patient outcomes and healthcare delivery, many checklists remain underutilized due to time, practicality, concern about the patients' individual needs, and sustaining the discipline needed to fill them out (Newkirk et al, 2012). The AMEND-Med checklist quality improvement project showed that the checklist was only completed about half of the time and remembering to fill out the paper form seemed to be the biggest barrier, which aligns with the previous statement. While 71% felt that the checklist somewhat helped them provide more age-appropriate care, that result was only based on a 39% survey response rate. Utilizing the checklist in daily ICU rounds or implementing it in the EMR (i.e. imbedded in a progress note template) may be helpful in increasing compliance. Once utilization of the checklist is improved, future studies could be done to determine if the AMEND-Med checklist and its suggested interventions could improve outcomes for this critically ill older adult population.

Figure 1.

AMEND-Med EMR Design

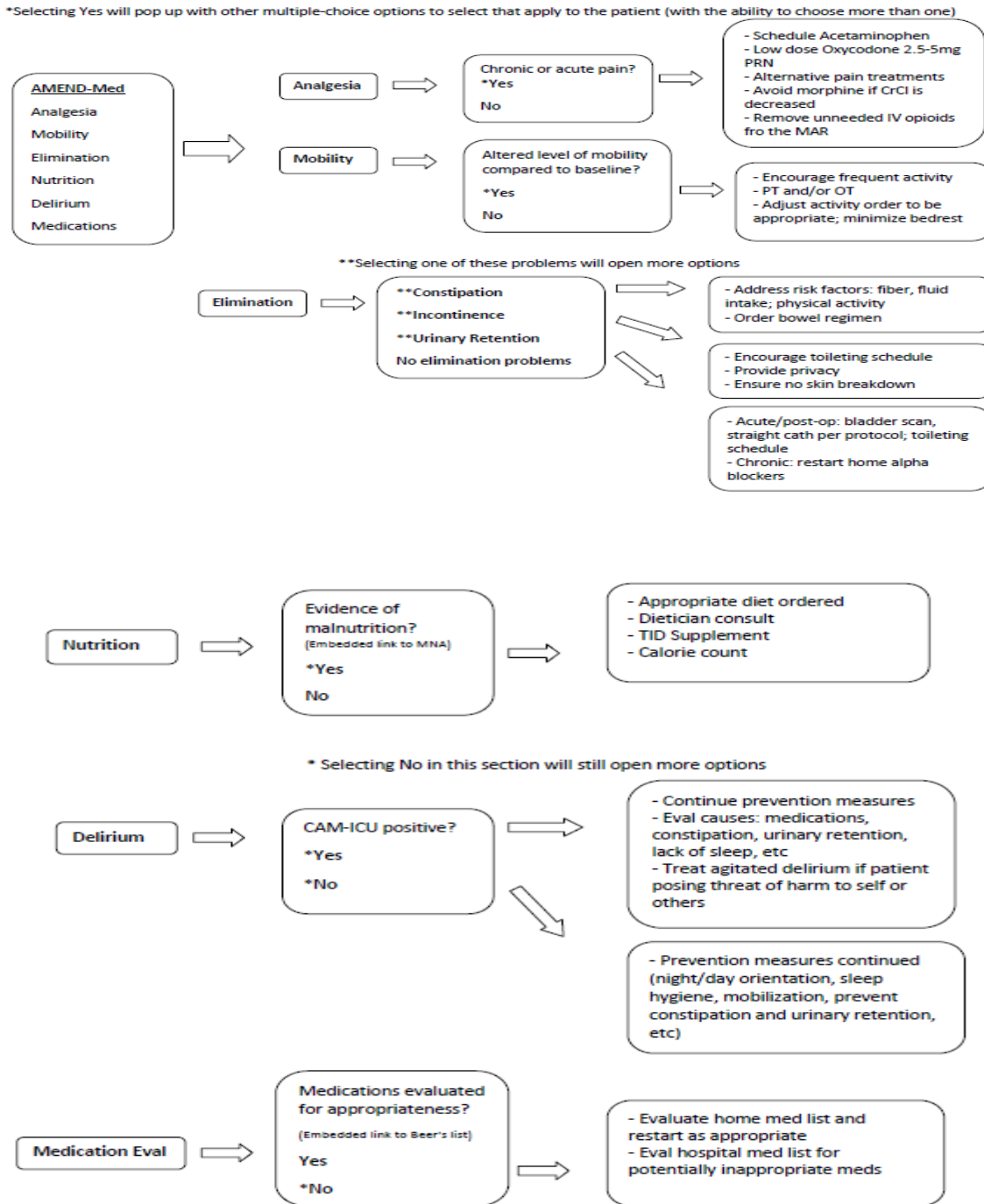


Figure 2.

AMEND-Med Checklist Paper Format

Improving the Care of the Critically Ill Older Adult: AMEND-Med

Please fill out for each patient who is 65 years or older. Check the boxes if they have been applied to the patient. Place in basket in workroom when finished.

Contact Karleena Twitchell if you have questions: p16392, 702-343-2966, twitchel@ohsu.edu

Patient MRN:

Date:

<p>Analgnesia</p>	<p>Chronic or acute pain? Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p><input type="checkbox"/> Schedule Acetaminophen <input type="checkbox"/> Lower dose of Oxycodone (2.5-5mg PRN) <input type="checkbox"/> Alternative pain treatments <input type="checkbox"/> Avoid morphine if CrCl is decreased <input type="checkbox"/> Remove unneeded IV opioids from the MAR</p>
<p>Mobility</p>	<p>Altered level of mobility compared to baseline? Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p><input type="checkbox"/> Order PT and/or OT <input type="checkbox"/> Adjust activity order to help minimize bedrest <input type="checkbox"/> Ambulate, out of bed, cardiac chair, passive range of motion</p>
<p>Elimination</p>	<p><input type="checkbox"/> Constipation? <input type="checkbox"/> Incontinence? <input type="checkbox"/> Urinary Retention? <input type="checkbox"/> No Problems</p>	<p><input type="checkbox"/> Address risk factors: fiber, fluid, activity <input type="checkbox"/> Order bowel regimen -avoid fleet enema and milk of magnesium <input type="checkbox"/> Remove foley <input type="checkbox"/> Toileting schedule q2h, provide privacy <input type="checkbox"/> Ensure there is no skin breakdown <input type="checkbox"/> Bladder scan, straight cath per protocol <input type="checkbox"/> No Tamsulosin; only consider after 48 hrs <input type="checkbox"/> Restart alpha blocker if takes at home</p>
<p>Nutrition</p>	<p>Evidence of Malnutrition? Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p><input type="checkbox"/> Liberalize diet if appropriate <input type="checkbox"/> Dietician consult <input type="checkbox"/> TID Supplement <input type="checkbox"/> Calorie count if high risk</p>
<p>Delirium</p>	<p>CAM-ICU Positive? Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p><input type="checkbox"/> Sleep Hygiene at night (eye masks, ear plugs?) <input type="checkbox"/> Remove drains and lines as soon as possible <input type="checkbox"/> Treat possible causes (pain, constipation, urinary retention, etc) <input type="checkbox"/> Mobilization, activity during the day <input type="checkbox"/> Treat if posing threat of harm to self/others <input type="checkbox"/> Haldol</p>
<p>Medications</p>	<p>Has more than 4 home and/or hospital medications? Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p><input type="checkbox"/> Evaluate home and/or hospital med list and restart appropriate medications or remove inappropriate medications <input type="checkbox"/> Pharmacist consult</p>

Figure 3.

AMEND-Med Checklist Survey (2 pages)

AMEND-Med (Older Adult in ICU) Checklist Survey

Please answer the questions and provide feedback about using the AMEND-Med Checklist for patients (65 or older) in the CVICU. Please return survey to the checklist box in the workroom or by emailing it to twitchel@ohsu.edu

1. Did you utilize the checklist on your older adult patients? (circle one)

Yes No

2. I felt that the checklist helped me to provide more age-appropriate care to my older adult patients. (Circle response that correlates to your level of agreement with this statement)

Strongly agree Somewhat agree Somewhat disagree Strongly disagree

3. Did you ever change your plan based on suggestions from the checklist? (circle one)

Yes No

4. What do you feel were the biggest barriers that kept you from using the checklist for every older adult patient you cared for? (check any that apply and/or provide your own answer)

Time

Remembering to do it

Applicability to the patient

Filling out the paper form

Other _____

5. In regards to Analgesia, the suggested interventions... (check the one that applies most closely to your experience)

Often prompted me to change orders

Were often already applied to my patients

Were not often applicable

6. Did you know what your patient's pre-hospital level of mobility was? (circle one)

Yes No

7. In regards to Elimination (constipation, urinary retention, incontinence), the suggested interventions... (check the one that applies most closely to your experience)

Often prompted me to change orders

Were often already applied to my patients

Were not often applicable

8. I felt like malnutrition was an issue with a lot of my patients. (Circle response that correlates with your level of agreement with this statement)

Strongly agree Somewhat agree Somewhat disagree Strongly disagree

9. In regards to Delirium, the suggested interventions... (check the one that applies most closely to your experience)

- Often prompted me to change my practice
- Were often already applied to my patients
- Were not often applicable

10. I am familiar with medications used in the ICU that are also on the Beer's List (Circle response that correlates with your level of agreement with this statement)

Strongly agree Somewhat agree Somewhat disagree Strongly disagree

11. I might be more willing to use this checklist and implement its suggestions if... (check any that apply)

- It was in the EMR as a part of the progress note (similar to FASTHUG)
- It was used during rounds
- N/A: The paper checklist worked well
- N/A: I would not be more willing to use it in any form

12. Comments about your experience using the checklist:

13. Suggestions for improving the checklist:

Appendix 1.

Powerpoint (3 pages)


AMENDING THE CARE OF THE CRITICALLY ILL OLDER ADULT: A QUALITY IMPROVEMENT PROJECT

KARLEENA TWITCHELL, PHILAGACHIP



THE AMEND-MED CHECKLIST

- Focused on improving care for the older adult (>65 years old) using evidence-based suggestions in 6 specific categories:
 - Analgesia
 - Mobility
 - Elimination (bowel/bladder)
 - Nutrition
 - Delirium
 - Medication prescribing



VULNERABLE POPULATION


- Older adults make up more than half of patients and account for 48% to 58% of Intensive Care Unit (ICU) admissions (Cain, 2017).
- The severity of illness in older adults in the ICU has increased, mortality has risen slightly from 11.3% to 12%, and more patients are being discharged to places other home (Siding, Puccio, Wessch, Leahy, & Guile, 2016; Chang, Chen, & Li, 2017).
- Due to the complexity of these patients, many ICU providers struggle in providing care to the critically ill older adult (Cullinan et al. 2015; Lundberg, 2006; Sawyer et al. 2008).
- With less than 300 physicians becoming geriatricians each year in the US, there are not many specialists available to assist ICU providers in the care of the complex, critically ill older adult (Lundberg, 2006).

PROJECT IN THE CVICU

- APPs (primarily) and Residents (if interested)
- Fill out the form on patients >65 years old
 - Check the boxes that are being applied to your patient
 - Fill out the date and MRN
 - If you have the patient multiple days in a row, and nothing is changed, then no need to fill out a new form
 - If patient is new to you, even if has been there for multiple days, it is requested that the form is filled out
- Can be done during rounds so that orders can be updated, and/or while working on progress notes
- Place finished form in box in workroom (will be placed on shelf under Karleena's cubby)

CHECKLIST TOOLS IN THE ICU

- Checklists have been shown to improve patient outcomes and enhance communication among healthcare providers (Pawlik et al. 2012; Dyer et al. 2017).
- Fast-Tag and the ABCDEF bundle have been shown to improve specific areas of care in the critically ill patient, and variations of these tools continue to be created and utilized.
- At this time there have been no ICU tools/checklists created that are specific to caring for the older adult patient.



OUTCOMES

- Aim is to have >500 forms filled out over the next couple months
- A survey will then be sent out to providers; it will ask your opinion on the usefulness of the form (i.e. did it help you provide more age-appropriate care to this population?), and will ask for suggestions on how to improve the checklist
- The goal is incremental improvements in the tool and ultimately improved outcomes for patients >65 years old

EVIDENCE BEHIND THE AMEND-MED SUGGESTIONS

ELIMINATION: CONSTIPATION

- Constipation seen in the hospital in the older adult has many risk factors: limited physical activity, inadequate diet (reduced fiber and fluid intake), history of chronic constipation, polypharmacy, and various comorbid diseases (diabetes, IBS, heart failure, stroke, neurologic dysfunction, and cancer) (Hawthorn, 2012; McKay, Powell, & Scatton, 2012).
- Address risk factors and order a bowel regimen for prevention and treatment (McKay, Powell, & Scatton, 2012; Woodward, 2012; Gaskill et al., 2012).
- Bulk-forming laxatives are considered first line in the treatment of constipation in the older adult, with other options including emollients/lubricants (primarily used for prevention), osmotic laxatives, stimulants, and chloride-channel stimulators (McKay, Powell, & Scatton, 2012).
- It is recommended that mineral oil is avoided due to the risk of side effects (i.e. reduced absorption of fat-soluble vitamins with prolonged use, lipid pneumonia with aspiration) (McKay, Powell, & Scatton, 2012).

ANALGESIA

- 55-65% of older adults experience pain, compared to only 17% of young adults (<30 years old) (Brewer, 2011; Schaffner, 2014).
- Consider scheduling acetaminophen to help limit the need for higher doses of opioids (Schaffner, 2014; Pharmacological management of persistent pain in older persons, 2009).
- Consider alternative treatments like non-opioid pain medications, ice, heat, massage, and acupuncture/pressure as appropriate (Schaffner, 2014).
- Lower the dose of as-needed opioids (Brewer, 2010; McLaughlin et al., 2011; Cahney Upson, & Hadravsky, 2011).
- Avoidance of opioids that are not metabolized well in the older adult, i.e. Morphine (Cahney Upson, & Hadravsky, 2011).
- Use the "start low and go slow" approach with dosing analgesics (Brewer, 2010; McLaughlin et al., 2011).

ELIMINATION: URINARY RETENTION AND INCONTINENCE

- At least 15% of community-dwelling older adults and up to 50% of institutionalized older adults have significant incontinence (Hegerston, Hegerston, & Cook, 2014).
- Focus on prevention of skin breakdown and use of a toileting schedule in incontinent patients.
- Factors found to be related to urinary retention include: constipation, general anesthesia, anticholinergic medications, benzodiazepines, high fluid volume administered intraoperatively, postoperative pain, opioid pain medications, and NSAIDs (pain), Gelling & Swenson, 2009).
- Tamsulosin and the like are not benign therapies as they have some serious adverse potential side effects in the older adult: orthostatic hypotension, dizziness, QTc prolongation, headache, and retrograde ejaculation (Fleiss, Mahon, & Lutz, 2012). Avoid use unless it is a chronic medication for the patient. Most postoperative urinary retention will resolve within 24-48 hours without the use of Tamsulosin.
- Treatment of urinary retention may require intermittent catheterization depending on the volume of the residual urine in the bladder (Sagall, Tracy, & Jones, 2012).
- Maintaining privacy, creating an environment conducive to normal voiding and having a timed voiding schedule may also help improve retention (Peggel et al., 2012).

MOBILITY

- Functional deconditioning is common in a critically ill patient, often due to older age in combination with having surgery (Cahney, 2012). Effects of being in a hospital can begin immediately after admission, with functional decline occurring by the second day (Cahney, 1992).
- Find out what the patients' baseline functional status is and document if this has been altered.
- Change activity orders and allow for early mobilization if appropriate (Cahney, 2012; Robinson & Janda, 2007).
- Use physical and occupational therapy referrals if needed.
- Some specific interventions that can help prevent decline include a routine walking schedule, activities to prevent sensory deprivation, and timely hospital discharge (Cahney, 2004).
- There are four factors that are essential in early mobilization for an older adult in the ICU: inclusion of a mobility plan for every ICU patient, individualized patient assessment, provider's judgment, and interprofessional consultation (Cahney, 2004; Cahney, 2012).

NUTRITION

- The prevalence of malnutrition in older adults admitted to an ICU has been reported as being between 23 to 34% (Dinarello-Galli & Naidu, 2014) or closer to 50% or more (Procacciano & Hunt, 2012).
- Consider screening the patient if unsure of nutrition status (Tool available online: <http://www.mna-elderly.com/>)
- Adjust the diet order and encourage PO intake as appropriate.
- Consider supplementation if needed (Procacciano & Hunt, 2012; Harrington, 2004; Dinarello-Galli & Naidu, 2014; Health Nutrition Institute, n.d.; Reid & Altieri-Gould, 2004; Hegerston, DeLeon, & Schaffner, 2012).
- Consider early dietitian consult if the patient is felt to be malnourished or has new dietary restrictions ordered due to their disease processes (Reid & Altieri-Gould, 2004; Ferrucci & Studer, 2012).

DELIRIUM


- ICU interventions for prevention can include: reorienting patients, removing restraints and catheters as soon as possible, minimizing sleep interruptions, decrease noise during nighttime hours, implement early mobilization protocols, ensure patient's vision and hearing assist devices are available, and do a thorough medication review (Brouneel & Grant, 2015; Cepeda & Davis, 2017)
- Immediate identification and treatment of precipitating factors, discontinuing medications that may cause delirium, and supportive care (managing hypoxia, hydration, nutrition, mobilization, and environmental modifications) can help prevent and treat it.
- Treat if needed by discontinuing medications that can lead to delirium (i.e. benzodiazepines, anticholinergics), giving supportive care (managing hypoxia, hydration, nutrition, mobilization, and environmental modifications), and using haloperidol if felt to be a harm to self or others (Renaud & Boulet, 2015; Brouneel & Grant, 2015; Biale et al., 2012; VAPIC, 2013; Cepeda & Davis, 2017)
- The Society of Critical Care Medicine and the American Psychiatric Association recommend the use of haloperidol for delirium treatment (Brouneel & Grant, 2015; Biale et al., 2012). Researchers at Vanderbilt University have done a lot of study into delirium and they currently have no recommendations for or against the use of antipsychotics (haloperidol or atypicals, such as quetiapine) to treat delirium due to the lack of high quality data on the subject (VAPIC, 2013). The 2015 Beers criteria advocate that antipsychotics not be used in the treatment of delirious older adults, and the Centers for Medicare and Medicaid Services (CMS) proposed that the use of antipsychotics only be used if the patient is a harm to themselves or others (Cepeda & Davis, 2017).

REFERENCES

- Gambel, D., Straus, S. A., Bouchard, M., Tait, V., & Alford, S. H. (2017). Treatment of delirium in older people. *Coq*, 16(9), 468-475. doi:10.1033/cog.128019
- Gambel, S. B., Davis, J. W. (2017). Polypharmacy and Delirium in Critically Ill Older Adults: Identification and Prevention. *Crit Care Med*, 45(2), 399-203. doi:10.1097/ccm.0000000000001732
- Grant, C. (2016). Functional decline in hospitalized older adults. *Am J Geriatr Psychiatry*, 24(2), 164-174. doi:10.1176/appi.ajgp.1201.018
- Herington, L. (2016). Nutrition in critically ill adults: top processes and outcomes. *Critical Care Nursing Clinics of North America*, 16(4), 459-463. doi:10.1016/j.ccn.2016.06.006
- Herington, L., Chaboyer, L., & Roberts, L. (2011). Early nutritional support and physiotherapy interventions in self-administered activity in older patients. *Nutrition*, 27(1), 104-110. doi:10.1016/j.nut.2010.07.018
- Hunt, K. (2015). Pain in the older adult: an experience of health care settings. *Pain Management Nursing*, 12(2), 101-110. doi:10.1016/j.pmn.2015.03.005
- Hunt, K. (2011). Pain assessment strategies in older patients. *J Am Geriatr Soc*, 59(1), 101-111. doi:10.1111/j.1532-5415.2010.2183.x
- Kane, R. L., Chaboyer, L. G., Alvaro, L. B., & Naciri, R. (2015). Chapter 3. Clinical Indicators of the Aging Process. *Handbook of Clinical Geriatrics*, New York, NY: The McGraw-Hill Companies.
- Lachin, A. M., Ferris, A. B., & Phelan, A. A. (2011). Ten steps to improve the care of elderly patients in the hospital. *Age Ageing*, 40(1), 101-107. doi:10.1093/agea/afq090
- Lachin, A. M., Ferris, A. A., & Phelan, A. A. (2010). Risk factors and outcomes in older patients. *Critical Care Nursing Clinics of North America*, 10(1), 101-110. doi:10.1016/j.ccn.2010.03.006
- Lavin, M. C. S. (2016). Care of hospitalized older patients: opportunities for hospital-based physicians. *Acad Med*, 91(1), 45-47. doi:10.1093/acmed/bam011
- Le Grange, D. G., Wilson, J. N., Glasgow, N., Herington, L., & Cooney, N. G. (2016). Prescribing in older people. *Age Ageing*, 45(1), 77-81.
- Pinsky, S. L., Hunt, K., & Kasper, C. (2015). Management of constipation. *Journal of Geriatric Psychiatry and Neurology*, 28(5), 315-321. doi:10.1097/JGP.0000000000000266
- Pothoche, J., Ben, S., Herington, L., Wilson, J. N., Le Grange, D. G., Cooney, N. G., & Hunt, K. H. (2011). Clinical pharmacology of analgesic medicines in older people: impact of kidney and cognitive impairment. *PLoS ONE*, 6(12), e28111. doi:10.1371/journal.pone.0028111
- Herington, L., Herington, K., & Clark, G. (2014). Rural and Lower-Urban Travel Clinicians in the Elderly: Status in the Elderly Age-Related Disease and Pathophysiology (pp. 117-145). Cham: Springer International Publishing.
- Food & Nutrition Institute. (n.d.). *MMR Aba National Assessment Report* (July 1, 2017). From <http://www.mmr.gov/assess/assess.html>

MEDICATION PRESCRIBING

- Polypharmacy, often defined as the use of 4-5 or more medications, occurs in 20-40% of older adults and is also associated with negative outcomes (a Cooney et al., 2006).
- Lack of involvement of a critical care pharmacist and the patient's family in daily ICU care, failure to account for age and critical care related pharmacokinetic changes, and failure to regularly discontinue or down-titrate medications are a few of the factors that have been determined to cause adverse drug events related to polypharmacy in the ICU (Cepeda & Davis, 2017; Cooper et al., 2015)
- Daily evaluation of the patient's hospital medication list; remove inappropriate or unneeded medications
- Evaluate the patient's home medication list and order those that should be continued
- Pharmacy consult to help with medication reconciliation if needed
- Beer's Criteria: <http://bcphpsd.ca/docs/pars-1/PrintableBeersPocketCard.pdf>
- STOPP/START Criteria: https://gcri-em.com/wp-content/uploads/2013/05/STOPP_START_criteria.pdf



REFERENCES

- Havelick, M., Pinsky, J. C., Kaminski, R., Allen, D. A., & Chung, K. K. (2011). Checklist change communication about key elements of patient care. *J Trauma Acute Care Surg*, 71(2 Suppl 1), S75-80. doi:10.1097/TA.0b013e3181f6a629
- Pharmacological management of geriatric patients in older persons. (2009). *J Am Geriatr Soc*, 57(8), 1321-1344. doi:10.1111/j.1532-5415.2009.02325.x
- Pham, P. A. (2018). Considerations in caring for the critically ill older patient. *J Intensive Care Med*, 33(1), 43-49. doi:10.1177/0885066618782940
- Rhee, H. S., & Albert-Gould, F. (2016). Polypharmacy and the critically ill elderly patient. *Critical Care Nursing Clinics of North America*, 14(4), 521-526. doi:10.1016/j.ccn.2016.06.007
- Robinson, T. J., & Justice, S. L. (2007). Collecting requirements systems for the care of acutely and critically ill older adults. *Critical Care Nursing Clinics of North America*, 11(2), 243-268. doi:10.1016/j.ccn.2007.02.005
- Salovey, R. C., Straus, S. A., Herington, L. C., & Bell, L. L. (2008). A challenge in academic teaching the bedside needs of the growing number of older adults. *J Am Acad Nurse Pract*, 20(9), 471-476. doi:10.1177/1548109908326554
- Schaffel, P. A. (2016). The assessment and management of polypharmacy in older adults. *Academy of Nursing*, 47(Suppl 1), S40-S45. doi:10.1111/anae.12320
- Spillig, B. W., Herington, K. C., Wilson, J. N., Herington, L., & Cooney, N. G. (2014). Longitudinal Changes in G2I Admissions Among Minority Patients in the United States. *Crit Care Med*, 42(7), 1342-1348. doi:10.1097/CCM.0b013e3182a90001.424
- Herington, L., Chaboyer, L., & Roberts, L. (2011). Nutritional support and physiotherapy interventions in self-administered activity in older patients. *Nutrition*, 27(1), 104-110. doi:10.1016/j.nut.2010.07.018
- Tsim, J., & Chan, S. (2015). Preventing, assessing, and managing constipation in older adults. *Nursing*, 45(12), 53-58. doi:10.1016/j.nurs.2015.04.003
- VAPIC Center for Health Services Research. (2013). *Management of delirium in the ICU: Practice Guideline*. 2017. From <http://www.vapic.com/vapic/managementofdelirium/>
- Woodcock, S. (2012). Assessment and management of constipation in older people. *Nurs Older People*, 14(5), 21-26. doi:10.7748/nop.2012.14.5.21-26

REFERENCES

- Biale, M. C., Grant, M., Cepeda, C., Sells, M., Doherty, M., & Fuchs, B. (2015). Management of delirium in critically ill older adults. *Critical Care Nursing Clinics of North America*, 15(4), 515-526. doi:10.1016/j.ccn.2015.03.005
- Brouneel, M. S., Biale, M. C., Herington, L., Ferris, L. S., Gao, T. F., & By, S. H. (2015). Underreporting and reducing disability in older adults following critical illness. *Crit Care Med*, 43(9), 1765-1771. doi:10.1097/CCM.0b013e3182c00004
- Cooney, N. G. (2010). The study of ability in older ICU patients: an integrative review. *Journal of Gerontological Nursing*, 24(9), 12-21. doi:10.1016/j.jgn.2010.06.003
- Chung, K. K., Chan, Y. T., & Fu, C. C. (2015). Care needs of older patients in the intensive care unit. *Journal of Clinical Nursing*, 26(15), 855-863. doi:10.1111/jocn.13011
- Collins, J. C., Lippman, R. L., & Pheasant, R. A. (2011). Addressing challenges in the elderly patient. *Best Pract Res Clin Geriatr Med*, 2(1), 163-170.
- Cooney, N. G., Cepeda, C., A. Naranjo, S. D., Ferris, M., Sells, M. C., Fuchs, B., & Herington, L. (2015). Interventions to improve the appropriate use of polypharmacy in older patients: a systematic review. *PLoS ONE*, 10(1), e0117111. doi:10.1371/journal.pone.0117111
- Crebman, M. C. (1978). Hazards of hospitalization of the elderly. *Am J Geriatr Psychiatry*, 11(6), 319-323.
- Collins, L., Herington, L., Cepeda, C., A. Naranjo, S. D., Ferris, M., Sells, M. C., Fuchs, B., & Herington, L. (2015). Discontinuation of polypharmacy in hospitalized patients: a randomized study. *PLoS ONE*, 10(1), e0117111. doi:10.1371/journal.pone.0117111
- Daniels, D. M., Gendreau, T. L., & Shewchuk, H. (2009). Postoperative urinary retention. *Acad Med*, 34(7), 465-484. doi:10.1093/acmed/bam011
- D'Amico, G. M., & Nadeau, R. A. (2014). Nutrition and hydration in older adults in critical care. *Critical Care Nursing Clinics of North America*, 14(4), 521-526. doi:10.1016/j.ccn.2014.06.007
- Davis, J. W., Cepeda, C., Doherty, M., Chan, Y. T., Herington, L., & Cooney, N. G. (2015). Prevalence and Risk Factors for Polypharmacy in Older Patients in the Intensive Care Unit. *Critical Care Medicine*, 43(1), 111-117. doi:10.1097/CCM.0b013e3182c00004
- Fuchs, B., & Hunt, K. (2011). National medical support of the critically ill older adult. *Crit Care Med*, 39(12), 2252-2258. doi:10.1097/CCM.0b013e3182222222
- Foster, J. L., Harkin, P. L., & Lutz, A. J. (2015). Complicated Urinary Retention in the Intensive Care Unit. *Am Surg*, 81(9), 319-318.

References

- Anderson, B. J., & Mikkelsen, M. E. (2017). Bringing the ABCDEF Bundle to Life and Saving Lives Through the Process. *Crit Care Med*, *45*(2), 363-365.
doi:10.1097/ccm.0000000000002124
- Atalay, B. G., Yagmur, C., Nursal, T. Z., Atalay, H., & Noyan, T. (2008). Use of subjective global assessment and clinical outcomes in critically ill geriatric patients receiving nutrition support. *JPEN J Parenter Enteral Nutr*, *32*(4), 454-459.
doi:10.1177/0148607108314369
- Balas, M. C., Happ, M. B., Yang, W., Chelluri, L., & Richmond, T. (2009). Outcomes Associated With Delirium in Older Patients in Surgical ICUs. *Chest*, *135*(1), 18-25.
doi:10.1378/chest.08-1456
- Balas, M. C., Rice, M., Chaperon, C., Smith, H., Disbot, M., & Fuchs, B. (2012). Management of delirium in critically ill older adults. *Critical Care Nurse*, *32*(4), 15-26.
doi:https://dx.doi.org/10.4037/ccn2012480
- Brummel, N. E., Balas, M. C., Morandi, A., Ferrante, L. E., Gill, T. M., & Ely, E. W. (2015). Understanding and reducing disability in older adults following critical illness. *Crit Care Med*, *43*(6), 1265-1275. doi:10.1097/ccm.0000000000000924
- Casey, C. M. (2013). The study of activity in older ICU patients: an integrative review. *Journal of Gerontological Nursing*, *39*(8), 12-25; quiz 26-17. doi:10.3928/00989134-20130603-02
- Cerri, A. P., Bellelli, G., Mazzone, A., Pittella, F., Landi, F., Zambon, A., & Annoni, G. (2015). Sarcopenia and malnutrition in acutely ill hospitalized elderly: Prevalence and outcomes. *Clin Nutr*, *34*(4), 745-751. doi:10.1016/j.clnu.2014.08.015

- Chang, C. W., Chen, Y. M., & Su, C. C. (2012). Care needs of older patients in the intensive care units. *Journal of Clinical Nursing, 21*(5-6), 825-832.
doi:<https://dx.doi.org/10.1111/j.1365-2702.2010.03611.x>
- Coldrey, J. C., Upton, R. N., & Macintyre, P. E. (2011). Advances in analgesia in the older patient. *Best Pract Res Clin Anaesthesiol, 25*(3), 367-378. doi:10.1016/j.bpa.2011.06.003
- Cooper, J. A., Cadogan, C. A., Patterson, S. M., Kerse, N., Bradley, M. C., Ryan, C., & Hughes, C. M. (2015). Interventions to improve the appropriate use of polypharmacy in older people: a Cochrane systematic review. *BMJ Open, 5*(12), e009235. doi:10.1136/bmjopen-2015-009235
- Creditor, M. C. (1993). Hazards of hospitalization of the elderly. *Ann Intern Med, 118*(3), 219-223.
- Cullinan, S., Fleming, A., O'Mahony, D., Ryan, C., O'Sullivan, D., Gallagher, P., & Byrne, S. (2015). Doctors' perspectives on the barriers to appropriate prescribing in older hospitalized patients: a qualitative study. *Br J Clin Pharmacol, 79*(5), 860-869.
doi:10.1111/bcp.12555
- Darrah, D. M., Griebeling, T. L., & Silverstein, J. H. (2009). Postoperative urinary retention. *Anesthesiol Clin, 27*(3), 465-484, table of contents. doi:10.1016/j.anclin.2009.07.010
- Dimaria-Ghalili, R. A., & Nicolo, M. (2014). Nutrition and hydration in older adults in critical care. *Critical Care Nursing Clinics of North America, 26*(1), 31-45.
doi:10.1016/j.ccell.2013.10.006
- Dykes, P. C., Rozenblum, R., Dalal, A., Massaro, A., Chang, F., Clements, M., . . . Bates, D. W. (2017). Prospective Evaluation of a Multifaceted Intervention to Improve Outcomes in Intensive Care: The Promoting Respect and Ongoing Safety Through Patient Engagement

- Communication and Technology Study. *Crit Care Med*, 45(8), e806-e813.
doi:10.1097/ccm.0000000000002449
- Ely, E. W. (2017). The ABCDEF Bundle: Science and Philosophy of How ICU Liberation Serves Patients and Families. *Crit Care Med*, 45(2), 321-330.
doi:10.1097/ccm.0000000000002175
- Falzone, E., Hoffmann, C., & Keita, H. (2013). Postoperative analgesia in elderly patients. *Drugs Aging*, 30(2), 81-90. doi:10.1007/s40266-012-0047-7
- Federal Interagency Forum on Aging-Related Statistics. (2016). *Older Americans 2016: Key indicators of well-being*. Retrieved June 18, 2017, from <https://agingstats.gov/docs/LatestReport/Older-Americans-2016-Key-Indicators-of-WellBeing.pdf>
- Ferrante, L. E., Pisani, M. A., Murphy, T. E., Gahbauer, E. A., Leo-Summers, L. S., & Gill, T. M. (2015). Functional trajectories among older persons before and after critical illness. *JAMA Intern Med*, 175(4), 523-529. doi:10.1001/jamainternmed.2014.7889
- Ferreira, C. R., de Souza, D. F., Cunha, T. M., Tavares, M., Reis, S. S., Pedroso, R. S., & Roder, D. V. (2016). The effectiveness of a bundle in the prevention of ventilator-associated pneumonia. *Braz J Infect Dis*, 20(3), 267-271. doi:10.1016/j.bjid.2016.03.004
- Ferrucci, L., & Studenski, S. (2015). Clinical Problems of Aging. In D. Kasper, A. Fauci, S. Hauser, D. Longo, J. L. Jameson, & J. Loscalzo (Eds.), *Harrison's Principles of Internal Medicine, 19e*. New York, NY: McGraw-Hill Education.
- Finocchiaro, D., & Hook, J. (2015). Enteral nutritional support of the critically ill older adult. *Crit Care Nurs Q*, 38(3), 253-258. doi:10.1097/cnq.0000000000000068

- Foster, J. L., Mohorn, P. L., & Luis, A. J. (2015). Constipation-Induced Acute Urinary Retention in the Intensive Care Unit. *Am Surg*, *81*(8), 316-318.
- Gandell, D., Straus, S. E., Bundookwala, M., Tsui, V., & Alibhai, S. M. (2013). Treatment of constipation in older people. *Cmaj*, *185*(8), 663-670. doi:10.1503/cmaj.120819
- Garpestad, E., & Devlin, J. W. (2017). Polypharmacy and Delirium in Critically Ill Older Adults: Recognition and Prevention. *Clin Geriatr Med*, *33*(2), 189-203.
doi:10.1016/j.cger.2017.01.002
- Gibson, S. J., & Lussier, D. (2012). Prevalence and relevance of pain in older persons. *Pain Med*, *13 Suppl 2*, S23-26. doi:10.1111/j.1526-4637.2012.01349.x
- Graf, C. (2006). Functional decline in hospitalized older adults. *Am J Nurs*, *106*(1), 58-67, quiz 67-58.
- Harrington, L. (2004). Nutrition in critically ill adults: key processes and outcomes. *Critical Care Nursing Clinics of North America*, *16*(4), 459-465. doi:10.1016/j.ccell.2004.06.005
- Herr, K. (2010). Pain in the older adult: an imperative across all health care settings. *Pain Manag Nurs*, *11*(2 Suppl), S1-10. doi:10.1016/j.pmn.2010.03.005
- Hegerova, P., Dedkova, Z., & Sobotka, L. (2015). Early nutritional support and physiotherapy improved long-term self-sufficiency in acutely ill older patients. *Nutrition*, *31*(1), 166-170. doi:10.1016/j.nut.2014.07.010
- Herr, K. (2011). Pain assessment strategies in older patients. *J Pain*, *12*(3 Suppl 1), S3-s13.
doi:10.1016/j.jpain.2010.11.011
- Hill-Taylor, B., Walsh, K. A., Stewart, S., Hayden, J., Byrne, S., & Sketris, I. S. (2016). Effectiveness of the STOPP/START (Screening Tool of Older Persons' potentially inappropriate Prescriptions/Screening Tool to Alert doctors to the Right Treatment)

- criteria: systematic review and meta-analysis of randomized controlled studies. *J Clin Pharm Ther*, 41(2), 158-169. doi:10.1111/jcpt.12372
- Hubbard, R. E., O'Mahony, M. S., & Woodhouse, K. W. (2013). Medication prescribing in frail older people. *Eur J Clin Pharmacol*, 69(3), 319-326. doi:10.1007/s00228-012-1387-2
- Jeitziner, M. M., Zwakhalen, S. M., Burgin, R., Hantikainen, V., & Hamers, J. P. (2015). Changes in health-related quality of life in older patients one year after an intensive care unit stay. *Journal of Clinical Nursing*, 24(21-22), 3107-3117. doi:10.1111/jocn.12904
- Kane, R. L., Ouslander, J. G., Abrass, I. B., & Resnick, B. (2013). Chapter 1. Clinical Implications of the Aging Process *Essentials of Clinical Geriatrics, 7e*. New York, NY: The McGraw-Hill Companies.
- Kane, R. L., Ouslander, J. G., Abrass, I. B., & Resnick, B. (2013b). Chapter 6. Delirium and Dementia *Essentials of Clinical Geriatrics, 7e*. New York, NY: The McGraw-Hill Companies.
- Labella, A. M., Merel, S. E., & Phelan, E. A. (2011). Ten ways to improve the care of elderly patients in the hospital. *J Hosp Med*, 6(6), 351-357. doi:10.1002/jhm.900
- Lach, H. W., Lorenz, R. A., & L'Ecuyer, K. M. (2014). Aging muscles and joints: mobilization. *Critical Care Nursing Clinics of North America*, 26(1), 105-113. doi:10.1016/j.ccell.2013.10.005
- Landefeld, C. S. (2006). Care of hospitalized older patients: opportunities for hospital-based physicians. *J Hosp Med*, 1(1), 42-47. doi:10.1002/jhm.11
- Le Couteur, D. G., Hilmer, S. N., Glasgow, N., Naganathan, V., & Cumming, R. G. (2004). Prescribing in older people. *Aust Fam Physician*, 33(10), 777-781.

- Lee, J. C., Horst, M., Rogers, A., Rogers, F. B., Wu, D., Evans, T., & Edavettal, M. (2014). Checklist-styled daily sign-out rounds improve hospital throughput in a major trauma center. *Am Surg*, *80*(5), 434-440.
- Marcantonio, E. R., Flacker, J. M., Wright, R. J., & Resnick, N. M. (2001). Reducing delirium after hip fracture: a randomized trial. *J Am Geriatr Soc*, *49*(5), 516-522.
- Marra, A., Ely, E. W., Pandharipande, P. P., & Patel, M. B. (2017). The ABCDEF Bundle in Critical Care. *Crit Care Clin*, *33*(2), 225-243. doi:10.1016/j.ccc.2016.12.005
- Masson, S. C., Mabasa, V. H., Malyuk, D. L., & Perrott, J. L. (2013). Validity Evidence for FASTHUG-MAIDENS, a Mnemonic for Identifying Drug-Related Problems in the Intensive Care Unit. *Can J Hosp Pharm*, *66*(3), 157-162.
- McKay, S. L., Fravel, M., & Scanlon, C. (2012). Management of constipation. *Journal of Gerontological Nursing*, *38*(7), 9-15. doi:10.3928/00989134-20120608-01
- McLachlan, A. J., Bath, S., Naganathan, V., Hilmer, S. N., Le Couteur, D. G., Gibson, S. J., & Blyth, F. M. (2011). Clinical pharmacology of analgesic medicines in older people: impact of frailty and cognitive impairment. *Br J Clin Pharmacol*, *71*(3), 351-364. doi:10.1111/j.1365-2125.2010.03847.x
- Monares Zepeda, E., & Galindo Martin, C. A. (2015). Giving a nutritional fast hug in the intensive care unit. *Nutr Hosp*, *31*(5), 2212-2219. doi:10.3305/nh.2015.31.5.8668
- Nagaratnam, N., Nagaratnam, K., & Cheuk, G. (2016a). *Gastrointestinal System Diseases in the Elderly: Age-Related Changes and Pathophysiology* (pp. 53-79). Cham: Springer International Publishing.

- Nagaratnam, N., Nagaratnam, K., & Cheuk, G. (2016b). Renal and Lower Urinary Tract Disorders in the Elderly *Diseases in the Elderly: Age-Related Changes and Pathophysiology* (pp. 117-149). Cham: Springer International Publishing.
- Nestle Nutrition Institute. (n.d.). *MNA Mini Nutritional Assessment*. Retrieved July 3, 2017 from <http://www.mna-elderly.com/default.html>
- Newkirk, M., Pamplin, J. C., Kuwamoto, R., Allen, D. A., & Chung, K. K. (2012). Checklists change communication about key elements of patient care. *J Trauma Acute Care Surg*, 73(2 Suppl 1), S75-82. doi:10.1097/TA.0b013e3182606239
- Pandharipande, P. P., Girard, T. D., Jackson, J. C., Morandi, A., Thompson, J. L., Pun, B. T., . . . Ely, E. W. (2013). Long-term cognitive impairment after critical illness. *N Engl J Med*, 369(14), 1306-1316. doi:10.1056/NEJMoa1301372
- Papadimos, T. J., Hensley, S. J., Duggan, J. M., Khuder, S. A., Borst, M. J., Fath, J. J., . . . Buchman, D. (2008). Implementation of the "FASTHUG" concept decreases the incidence of ventilator-associated pneumonia in a surgical intensive care unit. *Patient Saf Surg*, 2, 3. doi:10.1186/1754-9493-2-3
- Pharmacological management of persistent pain in older persons. (2009). *J Am Geriatr Soc*, 57(8), 1331-1346. doi:10.1111/j.1532-5415.2009.02376.x
- Pisani, M. A. (2009). Considerations in caring for the critically ill older patient. *J Intensive Care Med*, 24(2), 83-95. doi:10.1177/0885066608329942
- Pisani, M. A., Kong, S. Y., Kasl, S. V., Murphy, T. E., Araujo, K. L., & Van Ness, P. H. (2009). Days of delirium are associated with 1-year mortality in an older intensive care unit population. *Am J Respir Crit Care Med*, 180(11), 1092-1097. doi:10.1164/rccm.200904-0537OC

- Pisani, M. A., Murphy, T. E., Araujo, K. L., Slattum, P., Van Ness, P. H., & Inouye, S. K. (2009). Benzodiazepine and opioid use and the duration of intensive care unit delirium in an older population. *Crit Care Med*, *37*(1), 177-183.
doi:10.1097/CCM.0b013e318192fcf9
- Pisani, M. A., Murphy, T. E., Araujo, K. L., & Van Ness, P. H. (2010). Factors associated with persistent delirium after intensive care unit admission in an older medical patient population. *J Crit Care*, *25*(3), 540.e541-547. doi:10.1016/j.jcrc.2010.02.009
- Reid, M. B., & Allard-Gould, P. (2004). Malnutrition and the critically ill elderly patient. *Critical Care Nursing Clinics of North America*, *16*(4), 531-536.
doi:10.1016/j.ccell.2004.06.007
- Richmond, T., & Jacoby, S. F. (2007). Cultivating responsive systems for the care of acutely and critically ill older adults. *Critical Care Nursing Clinics of North America*, *19*(3), 263-268, v. doi:https://dx.doi.org/10.1016/j.ccell.2007.05.004
- Scherer, Y. K., Bruce, S. A., Montgomery, C. A., & Ball, L. S. (2008). A challenge in academia: meeting the healthcare needs of the growing number of older adults. *J Am Acad Nurse Pract*, *20*(9), 471-476. doi:10.1111/j.1745-7599.2008.00350.x
- Schofield, P. A. (2014). The assessment and management of peri-operative pain in older adults. *Anaesthesia*, *69 Suppl 1*, 54-60. doi:10.1111/anae.12520
- Sennour, Y., Counsell, S. R., Jones, J., & Weiner, M. (2009). Development and implementation of a proactive geriatrics consultation model in collaboration with hospitalists. *J Am Geriatr Soc*, *57*(11), 2139-2145. doi:10.1111/j.1532-5415.2009.02496.x

- Sjoding, M. W., Prescott, H. C., Wunsch, H., Iwashyna, T. J., & Cooke, C. R. (2016). Longitudinal Changes in ICU Admissions Among Elderly Patients in the United States. *Crit Care Med*, *44*(7), 1353-1360. doi:10.1097/ccm.0000000000001664
- Steggall, M., Treacy, C., & Jones, M. (2013). Post-operative urinary retention. *Nurs Stand*, *28*(5), 43-48. doi:10.7748/ns2013.10.28.5.43.e7926
- Tate, J. A., Sereika, S., Divirgilio, D., Nilsen, M., Demerci, J., Campbell, G., & Happ, M. B. (2013). Symptom communication during critical illness: the impact of age, delirium, and delirium presentation. *Journal of Gerontological Nursing*, *39*(8), 28-38. doi:10.3928/00989134-20130530-03
- Thornlow, D. K., Auerhahn, C., & Stanley, J. (2006). A necessity not a luxury: preparing advanced practice nurses to care for older adults. *J Prof Nurs*, *22*(2), 116-122. doi:10.1016/j.profnurs.2006.01.015
- Toner, F., & Claros, E. (2012). Preventing, assessing, and managing constipation in older adults. *Nursing*, *42*(12), 32-39; quiz 40. doi:10.1097/01.nurse.0000422642.83383.17
- van Munster, B. C., & de Rooij, S. E. (2010). Hospitalization and cognitive function in older adults. *Jama*, *303*(21), 2137-2138; author reply 2138. doi:10.1001/jama.2010.700
- VUMC Center for Health Services Research. (2013). *Management of delirium in the ICU*. Retrieved June 18, 2017 from <http://www.icudelirium.org/delirium/management.html>
- Vincent, J. L. (2005). Give your patient a fast hug (at least) once a day. *Crit Care Med*, *33*(6), 1225-1229.
- Weston, C., & Weston, J. (2015). Applying the Beers and STOPP Criteria to Care of the Critically Ill Older Adult. *Crit Care Nurs Q*, *38*(3), 231-236. doi:10.1097/cnq.0000000000000077

Woodward, S. (2012). Assessment and management of constipation in older people. *Nurs Older People*, 24(5), 21-26. doi:10.7748/nop2012.06.24.5.21.c9115