Standardizing Management of Adults with Delirium Hospitalized on Medical-Surgical Units

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ABSTRACT

Context: Delirium is common among inpatients aged 65 years and older and is associated with multiple adverse consequences, including increased length of stay (LOS). However, delirium is frequently unrecognized and poorly understood. At one hospital, baseline management of delirium on medical-surgical units varied greatly, and psychiatric consultations focused exclusively on crisis management.

Objective: To implement a multidisciplinary program for rapid identification and proactive management of patients with delirium on medical-surgical units.

Design: A pilot from September 2010 to July 2012 included 920 unique patients, of whom 470 were seen by the delirium management team. A delirium management team included a redesigned role for consulting psychiatrists and a new clinical nurse specialist role; the team provided assistance with diagnosis and recommendations for nonpharmacologic and pharmacologic management of delirium. Multidisciplinary education focused on delirium identification and management and nurses' use of appropriate assessment tools. Electronic health record functions supported accurate problem list coding, referrals to the team, and standardized documentation.

Main Outcome Measure: Length of stay.

Results: During the study period, average LOS in the target population decreased from 8.5 days to 6.5 days (p = 0.001); average LOS for the Medical Center remained stable. Compared with patients whose delirium was diagnosed during the baseline period, patients who received a delirium diagnosis during the pilot period had a higher illness burden and were likelier to have a history of delirium and diagnosed dementia.

Conclusion: Program implementation was associated with reduced LOS among older inpatients with delirium. The delirium team is an effective model that can be quickly implemented with few additional resources.

INTRODUCTION

In 2010, a dementia task force at Kaiser Permanente (KP) San Rafael Medical Center (SRMC) recognized a need to improve the management of delirium among adults on medical-surgical units. Scarce inpatient psychiatry resources were directed at crisis intervention, with little proactive management of delirium.

Delirium is an acute confusional state characterized by inattention, abnormal level of consciousness, cognitive impairment, and a fluctuating course.[1] Delirium is frequently unrecognized. Clinicians may miss subtle signs, such as inattention, memory impairment, and difficulty following conversations and may not recognize acute delirium co-occurring with chronic dementia. Delirium and dementia are distinct clinical entities, but delirium superimposed on dementia may account for 50% of cases.[2] Misidentification of delirium is common; it is appropriately coded in just 3% of instances.[3] Accurate diagnosis and coding are essential to providing optimal care, identifying the affected population, understanding incidence and prevalence, and developing population-level interventions.

The prevalence of delirium on hospital admission is 10% to 31%, and the incidence of delirium during hospitalization is 3% to 56%, with variations in the populations being assessed accounting for the broad range.[4,5] In addition to advanced age, many factors influence the development of delirium. In a meta-analysis, 10 factors were consistently associated with incident delirium: dementia, comorbid illness, illness severity, diminished ability to perform activities of daily living, urinary catheterization, polypharmacy, low serum albumin, urea-creatinine ratio abnormalities, hyper- or hyponatremia, and prolonged hospital stay.[6] Other predisposing factors may include male sex, geriatric syndromes (eg, history of falls, pressure ulcers, sensory impairment, and malnutrition), social isolation, and immobility.[7] Precipitating factors may include acute insults, such as dehydration, fracture, hypoxia, infection, ischemia, surgery, uncontrolled pain, and urinary or stool retention, and inpatient experiences, such as sleep deprivation and the use of restraints.[7] Medications are a common iatrogenic cause of delirium.[2]

Adverse outcomes of delirium include longer hospital stays, a need for postdischarge custodial care, and increased morbidity and mortality.[8] In one study, length of stay (LOS) increased by 7.8 days after incident delirium among all inpatients aged 65 years and older.[9] Inpatients with baseline cognitive impairment and incident delirium stayed 3.3 days longer than cognitively impaired seniors without delirium.[10] Total direct annual health care costs in the US attributable to delirium are an estimated $143 to $152 billion, which include the costs of longer stays.[11]

Limited evidence exists about multidisciplinary management of delirium outside intensive care units (ICUs). Comprehensive multidisciplinary and environmental interventions may reduce delirium duration and LOS,[12] but reports assessing the impact of multidisciplinary delirium teams outside the ICU yield conflicting results. Psychiatric or geriatric consultation and liaison nurse follow-up provided minimal benefits.[13,14] Individualized geriatric treatment was associated with improved quality of life but unchanged costs of care.[15] An intervention incorporating dedicated delirium beds was associated with lower mortality and fewer falls but increased LOS.[16] A specialized geriatric unit was associated with shorter LOS,

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improved functional status, less restraint use, lower antipsychotic medication doses, and fewer adverse events.[17]

The purpose of this quality-improvement project was to implement a multidisciplinary program for rapid identification and proactive management of patients with delirium on medical-surgical units.

METHODS

At SRMC, a 116-bed adult medical-surgical and intensive care hospital, 16 full-time equivalent (FTE) hospitalists and 600 FTE registered nurses and ancillary staff care for an annual average of 6320 discharged patients. An integrated electronic health record (EHR), KP HealthConnect, is available in all settings. The

Medical Center serves a higher proportion of adults older than age of 65 years (16.7%) than in KP Northern California (KPNC) as a whole (11.4%). The SRMC Medicare case mix index of 1.67 is also higher than for KPNC as a whole (1.56).

Before the project reported here, inpatient psychiatric coverage consisted of one FTE shared by two half-time consulting psychiatrists available four hours each weekday. They provided consultation for all inpatient psychiatric needs, including assessment for mood, anxiety and thought disorders, eating disorders, chemical dependency, delirium, and advanced dementia. Hospitalists identified and managed inpatients with delirium, typically requesting a psychiatric consultation only when patients became

Nonpharmacologic Delirium Management Protocol	
Hospital administration	**Patient care technician/nursing activities**
Bed and staff assignments	*Safety*
• Try to maintain continuity of care (nurses, patient care technicians, physicians)	• high-visibility room
• Avoid room changes	• low bed
• Try to adhere to a routine as much as possible and communicate the routine frequently to the patient	• bed alarm
	• fall risk wristband
• Patient should be in a private or semiprivate room. If not possible, the patient should be placed to either of the end beds, not the middle bed	• removal of street clothing and shoes from room
	Environment
	• Provide soothing music or the Care Channel on the TV when appropriate (during day)
	• Remove unnecessary equipment and clutter
Nursing assessment	• Hide IV lines and catheters as much as possible
• Delirium team referral: Add patient name to the "Delirium Rounds" patient list in the EHR.	*Orientation*
• Social worker referral: Assess for home management, coping; perform long-term planning	• Call patient by preferred name
	• Provide orientation cue using dry-erase board in patient room
• Add CAM-ICU flowsheet to shift assessment and perform every shift	• Obtain patient's glasses, dentures, and hearing aids from family if used and have available
• Assess patient for common causes of delirium	• Encourage family to stay with patient during day as much as possible to improve orientation; encourage social interaction and family visits during visiting hours
H: hypoxia or hypercapnia	• Allow patient to have personal items from home (photos, blankets, pillows, etc)
E: electrolyte imbalance or ethanol withdrawal	• Reorient the patient frequently using the script above and explain care and activities
M: medications (see medication list) or acute myocardial infarction	• Have a clock visible and provide frequent verbal reminders of time and date
I: infection	*Maintain sleep-wake cycle*
• Use inpatient nursing notes to chart behavior, sleep, and need for and effect of as-needed behavior medications using SmartPhrase from Epic	• Limit unnecessary awakenings
	• If clinically stable, hold temperature and blood pressure checks from 11 pm to 7 am to maintain optimal sleep and rest
• Use a script with patients: "Hi, Mr/Mrs (name). What a shame you wound up in the hospital because you (diagnosis). Your doctor says you're better and you might be going home tomorrow. I am your nurse and my name is (name), and I'll be taking care of you until (time) today."	• Turn lights off at 10 pm and back on during the day while the patient is awake
	• Turn TV off and keep room dark and quiet between 10 pm and 7 am to prevent sleep deprivation
	• Pull curtains open to allow sunlight in the room during daylight hours
	• Put patient in a private or semiprivate room if possible to avoid excess noise
	• Withhold caffeine after noon
• Screening questions for confusion	*Elimination*
– What brought you here?	• Assist with toileting hourly during the day, then every 2 to 4 hours while awake in the evening
– How long have you been here?	• If unable to void after 8 hours, perform bladder scan and notify physician
	• On Day 3 of admission, notify morning rounding physician to consider discontinuation of Foley catheter if inserted on admission
	• Monitor for constipation. Try prevention measures such as prune juice, stewed prunes, or bran cereal if the patient is taking food by mouth
	• For patients who do not have a Foley catheter and are drinking oral liquids, allow no liquids after 8 pm if possible
	Ambulation
	• Keep a walker and commode at bedside as indicated
	• If patient is ambulatory, ambulate three times a day, with assistance if patient is unsteady or mentation is abnormal
	• Assist patient out of bed to chair for all meals

CAM-ICU = Confusion Assessment Method for the Intensive Care Unit; EHR = electronic health record; IV = intravenous.

hyperactively delirious. A robust protocol for nonpharmacologic strategies for managing delirium was inconsistently used. On weekends, hospitalists managed patients with psychiatric needs, including delirium. Consulting psychiatrists returning on Monday invested substantial effort into improving pharmacologic management of patients with delirium.

Approach to Improving Delirium Management

The goal was to implement a systematic multidisciplinary process for proactive and timely identification and treatment of delirium among hospitalized adults. Objectives were to 1) raise awareness about delirium by educating clinicians and emphasizing the benefits of a team approach, 2) provide consultation to hospitalists for working up the cause of the delirium and appropriate medical management, and 3) reduce the impact of the hospital environment on delirium.

Measures for Improvement

The target population, which was assessed retrospectively, included all inpatients discharged with an International Classification of Diseases, Ninth Revision (ICD-9) code of 293.0 (delirium due to conditions classified elsewhere) or 780.09 (other alteration of consciousness). Measured outcomes included average LOS, days of restraint use, and fall (assisted and found on floor) rates. Data also were collected on age, sex, previous history of delirium, diagnosed dementia, and discharge disposition. Diagnosis-related group (DRG) cost weights measured disease burden; they reflect the average level of resource use for an average Medicare patient in the DRG, relative to the average resource use for all Medicare patients.[18] More complex conditions have higher DRG weights.[19] Baseline data were collected from January 2009 to August 2010.

Baseline data validated the perceived opportunity to improve management of delirium in inpatients. Among 419 patients meeting inclusion criteria, baseline LOS averaged 8.5 days, more than the reported average LOS for patients with incident delirium.[9] Restraint use occurred on 1.7% of patient days, and falls occurred in 0.2% of hospital admissions. Statistical process control software was used to monitor outcomes. This quality-improvement project was not subject to research oversight.

The Delirium Team

A delirium team was created by redesigning existing staff roles. One of the two half-time psychiatrists began focusing primarily on managing delirium among inpatients. A new half-time clinical nurse specialist (CNS) position was filled by a CNS already on staff. On weekdays, the psychiatrist/CNS team rounded on all referred patients, following them up until delirium resolved. Referrals were based on the clinical judgment of hospitalists and nurses; a positive screening test was not required. From the beginning, the team encouraged hospital staff to promptly refer older adults with fluctuating or sudden onset of confusion and not wait until they became, for example, combative or delusional.

The delirium team recommended interventions including medication management and a nonpharmacologic management protocol (see Sidebar: Nonpharmacologic Delirium Management Protocol). The latter addresses the following: 1) monitoring for common causes (eg, medications, dehydration, constipation, hypoxia, electrolyte imbalance); 2) reducing environmental triggers (eg, bright lights at night, loud noises, intravenous lines); 3) therapeutic strategies for patient care and communication (eg, normalizing sleep-wake cycles, frequent reorientation); and 4) addressing sensory deficits (eg, ensuring the use of eyeglasses, hearing aids, and dentures).

Within one month, SRMC expanded psychiatric consultation on weekends, as part of a larger initiative to provide service seven days per week, as well as to better manage patients with delirium. In addition, hospital social workers screened all referred patients for psychosocial needs, and a dedicated dementia social worker role was created in January 2011. Because of frequent co-occurrence of delirium and dementia, this role provided key support for the program.[2]

Multidisciplinary Education

Evidence-based best practices for identifying and managing delirium were presented at monthly hospitalist meetings and distributed to physicians.[2,20] In April 2011, SRMC grand rounds focused on dementia and delirium. Consulting psychiatrists also provided real-time education for staff hospitalists while collaborating on patient care.

A medication dosing guide was developed and distributed to hospitalists and Emergency Department physicians. It included guidelines for scheduled and as-needed use of olanzapine, quetiapine, risperidone, and haloperidol, restricting lorazepam use to alcohol withdrawal-related delirium (Table 1). In addition, consulting psychiatrists recommended adding or adjusting bowel care and avoiding sedatives and hypnotics for sleep, benzodiazepines in delirium unrelated to alcohol withdrawal, anticholinergics, and other delirogenic medications. Individualized pain management recommendations adjusted and lowered opioid dosages, allowing for as-needed escalation.

Mandatory training for registered nurses addressed identification and management of delirium and use of the Confusion Assessment Method for the ICU (CAM-ICU) tool. Although the tool was developed for ICU use, it was selected for its high sensitivity and specificity and existing availability in the EHR.[21,22] Nurses were expected to complete the CAM-ICU as part of shift assessments for medical-surgical patients referred to the delirium management team. The delirium CNS audited CAM-ICU use, providing feedback, coaching, and targeted education to nursing staff.

Interventions in Delirium Care Quality-Improvement Initiative

- Delirium management team consisting of a psychiatrist and a clinical nurse specialist providing consultation seven days a week
- Social work support
- Pharmacologic and nonpharmacologic management protocols
- Multidisciplinary education to improve delirium diagnosis, ongoing assessment, and documentation in the EHR
- "Drag and drop" referrals in the EHR to the delirium management team
- Standardized documentation templates

EHR = electronic health record.

Health Information Technology Support

Before the quality-improvement project, hospitalists used varying diagnostic codes for patients with delirium; a key objective was increasing the appropriate coding of delirium on the EHR problem list. To facilitate coding, a drop-down menu appeared when hospitalists matched *delirium* in the EHR problem list, listing 11 ICD-9 options that included acute delirium and combinations of delirium and dementias. Hospitalist education emphasized selecting either Code 293.0 or 780.09.

Hospitalists and nurses could refer patients for delirium assessment and management by adding their names to a shared EHR list. The delirium team reviewed the list and provided daily consultation to all referred inpatients. An electronic template standardized assessment, recommendations, and treatment plan documentation. A template for follow-up consultations standardized documentation of changes in clinical condition and recommended medication adjustments. An electronic delirium order set was later created, but an existing paper-based order set for nonpharmacologic management was used during the pilot. The Sidebar: Interventions in the Delirium Care Quality-Improvement Initiative summarizes delirium management strategies.

Implementation

A pilot from September 2010 to July 2012 included 920 patients who were discharged with a qualifying diagnostic code, approximately half of whom were seen by the delirium management team. Some patients were not referred to the delirium management team, and a separate prevention and management protocol was used for delirium in the ICU.

Program enhancements occurred during the pilot. After an initial lack of cross-coverage, SRMC leadership mandated that the Psychiatry Department provide seven-day coverage and allocated trained psychiatric and CNS coverage to the program. The medication dosing guide was updated. Recommendations to prevent pneumonia and falls were added to documentation templates. An EHR SmartPhrase (Epic software from Intergalactic; Verona, WI) was created for nurses to document the effect of medications for hyperactive behaviors (Figure 1).

RESULTS

During the pilot, 920 patients met inclusion criteria, of whom 470 received care from the delirium management team. The pilot data from September 2010 to July 2012 were compared with the baseline data for 419 patients in January 2009 to August 2010. Those in the pilot period were more likely to have a history of delirium and a diagnosis of dementia. Patients in the pilot period had a higher median DRG weight and a different mix of discharge dispositions compared with patients in the baseline period (Table 2).

The average LOS in the target population decreased from 8.5 to 6.5 days (p = 0.001); the average LOS for SRMC as a whole remained stable at 3.9 days. The rate of falls and the use of restraints were unchanged.

Assuming an improvement of 2.0 days in average LOS for 480 discharges annually and a variable cost per hospital day of $2700, the delirium management program avoided an estimated annual $2.6 million in costs. The incremental staffing cost of a 0.5 FTE CNS position and inpatient nursing staff training costs offset avoided costs, generating net annual savings of

Table 1. Neuroleptic dosing guide for delirium						
Medication	Route of administration	Initial dosing	PRN dosing	Indications	Contraindications	Cautions
Haloperidol (Haldol)	Oral, IV, IM	0.5-1 mg every day to twice daily	0.25-2.0 mg every hour for serious agitation	Delirium, agitation, psychosis	Parkinson disease, QTc > 500 ms	Avoid IV form if QT interval an issue; may cause dystonia/EPS, especially if given IM
Risperidone (Risperdal)	Oral, orally disintegrating tablet (M-tab); available in depot form but not a standard IM	0.5-1 mg every day or twice daily	0.5-1 mg every 4 hours; TD not to exceed 6 mg/d	Delirium, psychosis/ agitation, aggression; less sedating than quetiapine or olanzapine	Parkinson disease, QTc > 500 ms	May cause tachycardia, hypotension
Quetiapine (Seroquel)	Oral	25 mg twice daily or every HS, can increase to 50-100 mg/d	12.5-25 mg every 4-6 hours	Preferred for delirium in patients with Parkinson disease; lower risk of NMS	QTc > 500 ms	Can cause orthostatic hypotension and sedation
Olanzapine (Zyprexa)	Oral, orally disintegrating tablet (Zydis), IM	2.5-5 mg/d	2.5-5 mg every 4 hours; TD not to exceed 20 mg/d	Second choice for delirium in patients with Parkinson disease, psychosis, agitation; lower risk of NMS	QTc > 500 ms	Can cause hypotension, sedation
Lorazepam (Ativan)	Oral, SL, IM, IV	0.5-2 mg	0.5-1.0 mg every 6 hours as needed for signs/ symptoms of withdrawal	Anxiety, ethanol withdrawal	May have paradoxical reaction; monitor for withdrawal syndrome	Will worsen delirium unless delirium from alcohol or benzodiazepine withdrawal

EPS = extrapyramidal symptoms; HS = hora somni (bedtime); IM = intramuscular; IV = intravenous; min = minute; NMS = neuroleptic malignant syndrome; PRN = pro re nata (as needed); QTc = corrected QT interval; SL = sublingual; TD = total dose.

Figure 1. Sample electronic health record showing documentation of effect of medications for hyperactive behaviors.

Geodon = ziprasidone; IM = intramuscular; PRN = as needed.

$2.4 million. The cost of psychiatric coverage on weekends was not included because coverage was expanded to address several needs at SRMC.

DISCUSSION

The delirium management program was a resource-efficient and effective way to improve delirium management among older inpatients, as measured by LOS. The rate of falls and use of restraints did not change. Falls occurred too infrequently to detect statistically significant changes. Measuring changes in the use of restraints was confounded by a 2011 organizational change in staffing and safety-sitter standards that also had an impact on restraint use.

Limitations of the study include the fact that we did not include other measures, such as patient, family, and staff satisfaction, which could have provided additional evidence of benefits. In addition, we were unable to assess the effect of individual program components, such as education, increased emphasis on recognition and management of delirium, and seven-day availability of psychiatric consultations. Improved identification could have reduced LOS if more patients with less severe delirium were included; we did not measure delirium severity. However, a higher prevalence of dementia and a history of delirium and greater illness complexity among patients in the pilot suggest that the project led to accurate identification of delirium among some patients in whom it might otherwise have been overlooked in the context of more complex illness.

Another limitation pertains to including all patients coded as having delirium: those in the ICU, where another delirium management program was in place; those receiving usual care in the baseline period; and those receiving usual care and the intervention in the pilot period. Including all patients with a diagnosis of delirium captured any broader intervention effects. For example, as hospitalists gained experience, they may have managed some patients without referral. However, we did not assess the extent to which this occurred.

Shorter LOS could have resulted from patients with delirium being transferred to other care settings. Compared with the baseline population, fewer patients in the pilot population returned home to routine care and more patients received home health or hospice care after discharge. A robust inpatient palliative care team was implemented during the pilot period, which may have affected discharge dispositions.

A benefit of reduced average LOS among older adults is avoided adverse events. For example, among medical inpatients of all ages in all settings, each additional hospital night increases by 1.6% the baseline risk of infection of 17.6%.[23] Adults aged 65 years and older have a 5-fold higher risk of an inpatient *Clostridium difficile* infection than those aged 45 to 64 years[24]; the benefit is evident of avoiding incremental increases in infection risk among older inpatients.

Delirium team members built collegial relationships that helped change the culture of delirium care at SRMC. The psychiatrist championed the program among physician peers. A psychiatry background is useful—but not essential—for this role. It could

Table 2. Characteristics of older adults with delirium[a]			
Characteristic	Baseline (n = 419)[b]	Follow-up (n = 920)[c]	p value
Age, median years (mean, SD)	81 (77, 15)	82 (79, 14)	0.163
Women	215 (51.3)	519 (56.4)	0.086
Previous history of delirium	134 (32.0)	379 (41.2)	0.001
Diagnosed dementia	89 (21.2)	304 (33.0)	0.001
DRG weight,[d] median (mean, SD)	1.16 (1.76, 1.99)	1.49 (1.80, 1.58)	< 0.0001
Discharge disposition			
Died	35 (8.4)	91 (9.9)	< 0.0001
Against medical advice	1 (0.2)	3 (0.3)	
Acute hospital	13 (3.1)	23 (2.5)	
Other inpatient care	10 (2.4)	16 (1.7)	
Long-term care	129 (30.8)	296 (32.1)	
Routine home	187 (44.6)	295 (32.0)	
Home health or hospice care	44 (10.5)	197 (21.4)	

[a] Data are no. (%) unless otherwise indicated.
[b] Collected January 2009 to August 2010.
[c] Collected September 2010 to July 2012.
[d] DRG weights reflect the average level of resources for all patients at baseline and follow-up, compared with the average level of resources for all Medicare patients.
DRG = diagnosis-related group; SD = standard deviation.

be filled by a hospitalist, geriatrician, or neurologist with inpatient experience who is comfortable consulting with peers and knowledgeable about delirium identification and management, particularly effective psychotropic medication use.

The delirium team is generalizable to other settings. The low cost and rapid speed of implementation pose lower economic and logistic barriers than do approaches such as dedicated care settings.[17] The model also can be transferred to Emergency Departments and skilled nursing facilities.

The delirium program continued after the pilot period. The average LOS among patients with a discharge diagnosis code of delirium was 7.2 days between July 2012 and November 2014. Factors affecting sustainability include turnover of delirium team members and competing time demands. The CNS role is pivotal; without feedback and coaching, nursing practice tended to drift from best practices. Sustainability could be enhanced with clinical decision-support tools in the EHR, such as best practice alerts and a simpler CAM-ICU algorithm.

Program enhancements occurred after the pilot. An electronic version of the nonpharmacologic management protocol replaced the paper-based version. The electronic delirium order set expanded to include scheduled and as-needed medication management and laboratory monitoring. These elements in the EHR can contribute to sustainability and enable spread to other settings. Efforts are under way across KPNC to use administrative data to automatically trigger the nonpharmacologic order set for patients at risk of delirium: those older than age 75 years or older than age 65 years and undergoing surgery; those with any history of dementia, cognitive impairment, or delirium; and those taking medications that increase delirium risk.

CONCLUSION

A program to improve delirium management could be quickly implemented with few additional resources and was associated with reduced LOS among older inpatients with delirium. Potential benefits to patient and staff satisfaction and safety as well as the cost savings associated with this program support an investment in implementation. ❖

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