

Original Article

Interdisciplinary Protocols for Timely Assessment and Management of Delirium Symptoms

Danly D^{1*}, Thomas AB² and Corbett CF²¹Department of Geriatric Medicine, St. Louis University, USA²College of Nursing, Washington State University, USA***Corresponding author:** Danly D, Department of Geriatric Medicine, St. Louis University, 1402 South Grand Ave, M238, St. Louis, Missouri 63104, USA**Received:** May 25, 2017; **Accepted:** June 13, 2017;**Published:** June 20, 2017**Abstract****Purpose:** To evaluate a population-based performance improvement pilot project to prevent and better treat acute delirium symptoms.**Methods:** An interdisciplinary taskforce was convened for protocol development. Protocols and data collection were implemented for three years in three sequential phases. Length of stay, discharge disposition, and frequency of delirium diagnosis were identified as outcome measures. Administrative data was obtained and evaluated for patients pre-and-post protocol phase. Chi-squared tests of independence as well as absolute and relative risk rates were compared between the two cohorts.**Results:** There was no difference in the relative or absolute risk of delirium diagnosis in either cohort. Statistically and clinically significant differences in length of stay were observed in patients hospitalized with delirium during the 12 months of the project as compared to the 24-month baseline period. The reduction in length of stay was 1.79 days, which correlated to a cost savings of \$1033.58 per patient on the orthopedic unit. There was no significant difference in the patient discharge disposition outcome (home, skilled nursing facility, or rehabilitation).**Conclusion:** The delirium protocols used in the pilot project were associated with reductions length of stay and cost. These findings support more widespread adoption of evidence-based protocols to improve outcomes for patients diagnosed with delirium.**Keywords:** Delirium; Protocol; Encephalopathy; Management

Introduction

Delirium is an epidemic among hospitalized adult patients, with an incidence of up to 64% in high risk populations such as patients in intensive care who are ventilated and patients receiving anesthetics and sedation [1-5]. It is one of the most common neuro-psychiatric complications experienced by palliative care patients [6]. Patients predisposed to delirium tend to be ill, frail and/or elderly. Delirium is generally the result of multiple contributory factors [7] which are easily recognized and potentially modifiable (Table 1) [2,3,8-14]. Yet, symptoms are under recognized and delirium is under-diagnosed, with up to 84% of physicians and 30% of nurses missing the diagnosis in hospitalized patients [15-19]. Variable symptom presentation contributes to the challenge of detecting delirium [20], and it is frequently misdiagnosed as “sedation”, “confusion” or “anxiety” [3,21].

Delirium increases per patient cost by approximately \$24,000 and results in up to 8 additional hospital days [4,22,23]. Total United States health care costs for delirium are estimated to be as high as \$152 billion dollars [22], which is equal to the combined annual cost of both nonfatal falls and diabetes. This fiscal cost does not consider the suffering endured by afflicted patients and families [8,24,25]. Up to 80% of those who remember their delirious episode report it to be the worst nightmare of their lives [26]. Some patients experience a post delirium cognitive decline that may be permanent or progressive,

especially in the case of preexisting dementia [7,10,11,27]. The distress that occurs in delirium is multidimensional for all involved. Severe distress has been reported by 76% of family members and 73% of nurses caring for patients with delirium [28]. There may be worry on the part of patients’ families that their loved one is “going crazy” and that the change will be permanent. Delirium may also result in the loss of patient dignity and complicates discharge planning. Family members often feel a sense of helplessness, frustration and guilt. For the health professional, delirium symptoms are difficult to assess and manage.

The Food and Drug Administration (FDA) has not approved any treatment for delirium. Antipsychotics, such as Haloperidol, may be associated with worsening symptom severity and increased mortality [29,30]. Medications such as opiates, which are designed to assuage discomfort, may inadvertently contribute to sedation which can be confused with delirium. Therefore, patients with delirium require an abundance of resources, emotional energy, and time [9,26,30,31]. ICU protocols have been developed that address pain, agitation, and preventative strategies. However, these are not widely available to medical surgical units [32], and while there are protocols that have been developed, they are only based on “expert opinion” as there is a paucity of high-level evidence [33]. However, a significant body of evidence recommends preventative and supportive measures as the most effective approach. Prevention strategies may also reduce delirium severity and length of hospitalization [9,34,35]. Early

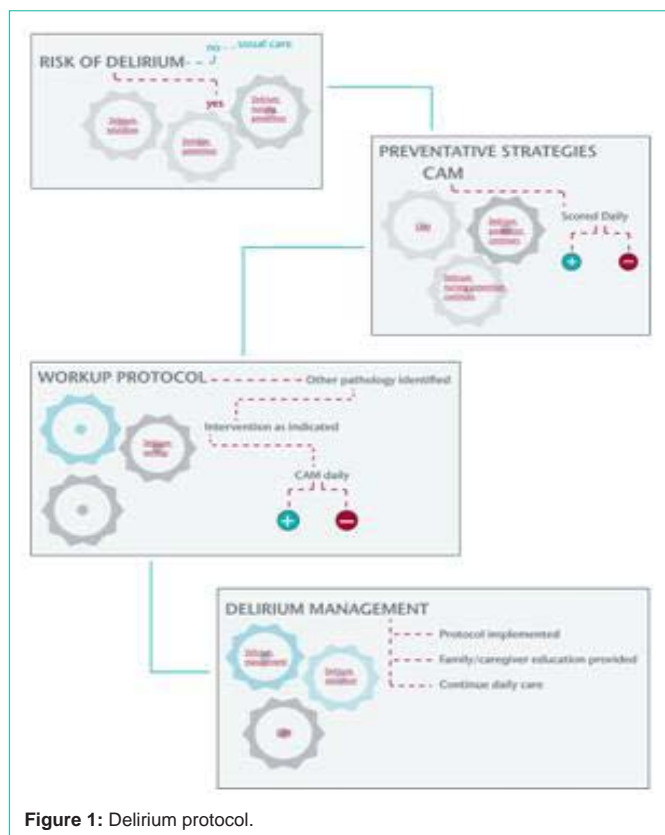


Figure 1: Delirium protocol.

mobilization, reorientation strategies, allowance for adequate sleep, and decreased sleep interruption are preventative interventions that have been shown to have benefit [30,35,36]. Treating symptoms, including the judicious use of opiates for painful conditions [37], reduces delirium.

Available evidence suggests that comprehensive protocols for delirium include: (a) an assessment of those with risk factors; (b) a modified approach to minimize iatrogenic contributors; (c) a standardized workup when symptoms occur and; (d) discontinuation of precipitating medications such as anticholinergics, benzodiazepines, and opiates when patients experience opiate intolerance or when opiate-induced toxicity is present. Despite the prevalence of delirium, there are few protocols that take into consideration all of the above issues on general medical/surgical units [36,38]. Therefore, we reviewed current practice and evidence in extant literature and designed a performance improvement project that addressed this gap. We identified patients at-risk for developing delirium, implemented preventative measures for high-risk patients, and employed order sets for diagnostic workup and delirium management.

Methods

An exempt determination was received from the health system's Institutional Review Board for this pre-post design, population-based performance improvement project. An interdisciplinary taskforce was convened to address the gap in prevention, identification, and treatment of delirium in two local hospitals of a large, non-profit health system. Our task force was comprised of physicians, nurses, pharmacists, social workers, and therapists. Project goals were

identified as follows: (1) determine evidence-based practices for delirium prevention, screening, and treatment; (2) develop delirium protocols based on the evidence; (3) pilot test protocols on orthopedic units of two hospitals; and (4) encourage adoption of protocols throughout the two local hospitals and the larger health system, if protocols were effective in the pilot test.

Protocol development

To meet the first goal, an evidence library was created and the interdisciplinary task force reviewed the literature to determine current best practices in delirium screening, prevention, and management. Evidence-based prevention and treatment strategies for delirium were formulated. The Confusion Assessment Method (CAM) was chosen as our screening tool for its reliability, validity, brevity, and simplicity in implementation as a routine screening measure in clinical practice [29,36,39]. Sub-groups of the larger task force drafted protocols. Protocols included physician order sets for diagnostic workup, prevention, and goal-directed delirium management. Once finalized, protocols were reviewed and approved by the Medical Executive Committee, Orthopedic Service Line, and Nurse Leaders at both hospitals. Since the completion of this project, an analytical framework that contains many components similar to this project has been published.

Implementation

An implementation flow chart was developed and used to educate staff on each unit. Letters about the project, signed by the Chief Medical Officer, were sent to all health care professionals. A physician task force member produced a video which was delivered to hospitalists, orthopedic physicians, and nursing staff. Nurses on the orthopedic units were required to view the video and complete a set of case presentations as part of their continuing education. General announcements and discussion to clarify the goals, nature, and structure of the project were made available to physicians, nurse managers, and nursing staff. We compared collected data to the 2-year baseline phase, January 1, 2009 to December 31, 2010, to evaluate whether patient outcomes related to delirium had improved.

We used a phased approach for protocol implementation. The first phase, the Roll-Out Phase, was completed during the first 6 months of the project. During that time, staff members were trained to use the CAM, protocol, and associated documentation. Months 7-18 comprised the Intervention Phase. During the Intervention Phase, the delirium protocol was actively implemented (Figure 1). The Data Collection Phase involved collecting administrative data about patient outcomes relevant to delirium for the 2 years prior to the Roll-Out Phase (i.e., baseline data) and for the 12-month Intervention Phase in order to evaluate whether patient outcomes related to delirium had improved.

Roll-out phase

During the Roll-Out Phase, we utilized a train-the-trainer approach to teach delirium screening to nurses, monitored the units to provide education, reminded staff to complete CAM screening, and implemented the protocols. The evening shift was designated as the best time for CAM screening because the onset of delirium tends to be greater during that time compared to other shifts. Furthermore, if orders were required a request could be made to the physician during

Table 1: Delirium risk factors.

Delirium Modifiable Risk Factors	Delirium Non-Modifiable/Minimally Modifiable Risk Factors
Hypoalbuminemia	Dementia
Use of restraints	Age
BUN/creatinine ratio >20	Acute coronary syndrome
Loss of sleep	Acute cerebral vascular accident
Use of benzodiazepines or anti-cholinergic medications	Prior brain injury
Hypoxia	Pre-existing poor functional status
Electrolyte abnormalities	History of psychiatric illness
Hypercarbia	Previous history of delirium
Urinary retention	Postsurgical status
Fecal impaction	Multiple comorbidities
Use of catheters	Critical illness
	Pre-existing poor nutritional status
	Use of sedatives
	Use of mechanical ventilation
	Pneumonia diagnosis
	Cancer diagnosis
	Prolonged hospitalization

morning rounds the next day. During this phase, clinical vignettes served as ongoing education and were placed on flyers in the report and break rooms. The Roll-Out Phase also offered an opportunity for the interdisciplinary task force to refine the processes and protocols. Delirium carts stocked with supplies to address patients' cognitive and sensory needs (e.g., reading glasses, large print crossword puzzles) were made available on each orthopedic unit, and an educational pamphlet about delirium was designed and made available to family members.

Implementation phase

During the Implementation Phase project assistants continued to monitor project implementation by rounding on the units 2-3 times per week and providing reminders to staff to complete the CAM and initiate protocols when necessary. In addition, we sent a survey to the orthopedic unit clinicians to gain further feedback on quality, ease, and satisfaction of the protocol.

Data collection phase

Length of Stay (LOS), discharge disposition (e.g., home, nursing home, death in hospital), and frequency of delirium diagnosis were identified as outcome measures. The best fields from which to retrieve the data from the electronic record were determined and reports for the data were requested from made from the hospital system's information technology department.

Data analysis

Administrative data reports from both hospitals were evaluated for the patient population that had a diagnosis of major orthopedic surgery. Patients hospitalized during the 12-month Implementation Phase (n=2,731) were compared to those hospitalized during the pre-roll-out 24-month baseline phase (n=5,140). Chi-squared tests of independence and absolute and relative risk rates were compared between the two cohorts. Key outcome measures were delirium (based

on the diagnostic code of "encephalopathy") among all patients with major orthopedic surgery and, for those with a diagnosis of delirium, LOS, discharge disposition, and mortality were evaluated. In addition, clinician surveys related to protocol use were evaluated using descriptive statistics.

Results

Clinical outcomes

There was no difference in the relative or absolute risk of a delirium (encephalopathy) diagnosis in either cohort. For patients with encephalopathy who had major orthopedic surgery, LOS in the baseline cohort was 7.91 days whereas the LOS in the implementation cohort was 5.89 days ($p=0.003$). The reduction in LOS was 1.79 days, which correlated to a cost savings of \$1033.58 per patient on the orthopedic unit. Mortality rates were low in both cohorts of patients with major orthopedic surgery and delirium. The baseline cohort had 7 deaths in 173 patients (4.04%) whereas there was 1 death in 85 patients (1.18%) during the implementation phase ($p=0.11$). There was no significant difference in outcomes among patients discharged to home, a skilled nursing facility, or rehabilitation.

Clinician satisfaction with protocols

Physicians and registered nurses (n=717) were surveyed regarding delirium protocols used during the performance improvement project, and 209 surveys were returned (29.2%). From among the 209 respondents, 134 (64.1%) reported utilizing the delirium protocols. Of those that had used the protocols, 85.1% reported the protocols were easy to use, 89.6% reported they were easy to understand, 94.8% reported the protocols were effective, and 92.5% reported they were of high quality. There was 1 physician respondent that reported a concern about the safety of the order set, which was rectified immediately.

Discussion

Despite being under-resourced and underpenetrated as reported elsewhere [31], the delirium performance project appeared to positively impact important population-based outcomes, including length of stay and mortality. During the protocol implementation, no other projects were concurrently deployed; therefore, our confidence is high that the protocol contributed to the decline in length of stay and mortality. Without a comparison group, it is impossible to definitively attribute these outcomes to the delirium protocol. Performance improvement projects, such as the one we report here, have variable rates of uptake by healthcare staff and are, therefore, not analogous to clinical studies which generally have strong protocol fidelity. As such, this project demonstrates the common challenges of translating research evidence into clinical practice.

Some of the aforementioned barriers to implementation were addressed during the protocol rollout. The CAM form has now been built into the hospitals' electronic medical record. It is user-friendly and should facilitate routine integration into clinical practice. Further, initiation of a new electronic medical record should ease implementation of complex order sets, and provide point of care feedback to healthcare professionals about possible risk factors for each patient thereby reducing iatrogenic contributions. An additional way to improve the orders may be to include a checkbox on the treatment form for a palliative care consult to address patients with refractory or terminal delirium who may have the most to benefit [28]. There are frequently unidentified palliative care needs in patients who develop this troublesome symptom, especially in the case of refractory delirium, where goals of care and prognosis are essential considerations. To meet the diverse needs of our patients at risk for delirium, it is important to change the hospital culture in such a way that we are "wired" to implement these changes [9,31].

There have been additional unexpected positive benefits of the project. There is a heightened awareness of delirium by healthcare professionals at the involved hospitals. Medical team members not originally on the task force now serve as champions to its implementation. High quality delirium education is now available for nursing staff, physicians, patients, and families. Further, when delirium was targeted as 1 of 10 safety priorities by the Washington State Leading Edge Advanced Practice Topics (LEAPT), this pilot performance improvement project positioned our hospitals to lead the statewide initiative. LEAPT project results, funded by the Washington State Hospital Association, are expected to positively impact patient care standards in multiple states.

Limitations

We found that the incidence of delirium in our performance improvement project was significantly lower compared to rates identified in other delirium studies. One of the limitations of performance improvement projects is that consent is not obtained from participants and individuals cannot be followed over time. Administrative data that is based on a population of patients must be used to evaluate outcomes and it is significantly less precise than data that can be obtained from follow-up with individual patients. Our performance improvement project had limited resources for oversight; therefore, not all eligible patients received the protocol. Consequently, there was a reduction in the overall power of the

intervention because the pool of administrative data was comprised of patients who received the protocol and those who did not. It is expected that if the intervention was applied to all at-risk patients, greater benefits would be realized. Another potential limitation is the CAM may not have been consistently scored correctly. Significant effort was expended in teaching nurses to correctly complete the CAM; however, it was not possible to validate each nurse's screening skills due to time and resource constraints. If CAMs were incorrectly scored, interventions may have been inconsistently applied which would dilute power. There was a lack of provider support for initiation of structured pain evaluation and opiate starting dose algorithms, thereby reducing the effectiveness of the prevention strategies as a whole.

Our results indicated that patients having delirium during the intervention phase had significantly lower hospital lengths of stay than patients in the baseline phase. This reduction may have been related to national trends addressed at reducing lengths of stay and was unlikely solely attributed to implementation of the delirium protocols. However, we obtained data about the average length of stay for all adult patients having hip and knee surgery prior to and after the delirium protocol implementation. The pre-protocol average length of stay for all adult patients having hip and knee surgery was 3.56 days, and the post-protocol average length of stay was 3.13 days, for a total overall reduction of 0.43 days. In contrast, adult patients with hip or knee surgery and a diagnosis of delirium had a 1.36 day decrease in length of stay from pre- to post-protocol implementation. This finding provides us with more confidence that much of the perceived reduction in length of stay for orthopedic patients diagnosed with delirium can be attributed to protocol implementation.

Conclusion

In summary, we conducted a population-based performance improvement pilot project to prevent and to better treat delirium. The pilot project was implemented on the orthopedic unit of two hospitals over a 12-month period. Using administrative data, we evaluated the incidence of delirium as well as length of stay, discharge disposition, and mortality as outcome measures among patients with a diagnosis of delirium. Statistically and clinically significant differences in length of stay were observed in patients hospitalized with delirium during the 12 months of the project as opposed to the 24-month baseline period. Further, the pilot project positioned interdisciplinary staff at our hospitals to lead a statewide multi-hospital effort to prevent and treat delirium.

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