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Development of a Delirium Educational Program for Hospital Medicine Providers

Abstract

Hospital medicine providers were surveyed to evaluate baseline delirium attitudes and behaviors. An educational program was then shared, and a follow up survey was given to determine if their delirium attitudes and practices were impacted by the educational intervention. Follow up survey results indicated that providers perceived more of a change in their attitudes than practices, and overall found the education to be useful and felt more confident in treating delirium as a result.

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Development of a Delirium Educational Program for Hospital Medicine Providers

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BACKGROUND

Delirium is a serious hospital-induced morbidity that is estimated to occur in 50% of critically ill non-ventilated patients and 14 to 56% of all hospitalized patients > 65 years of age, and carries a mortality rate of 25 to 33%[1-3]. Studies have shown that 30-40% of delirium is avoidable, making prevention a priority for the future[4].

The short and long-term consequences of delirium are significant. Delirious patients often experience adverse events such as aspiration, decreased mobility and loss of independence, with cognitive deficits occurring in approximately one third to one half of all patients who develop delirium[5,6]. The effects of delirium and its symptoms can persist for beyond a year after the onset, and the resultant long-term cognitive impairment is directly related to the duration of delirium[1,7]. A 2009 study found a 30% mortality rate after 1 year, and persistent delirium in over one third of their cohort after 6 months[8]. There is also a significant correlation between delirium and hospital length of stay, as well as post-hospital institutionalization, thus increasing health care expenditures beyond the inpatient stay[1,3,7,9-15].

Healthcare costs associated with delirium can increase patient expenses by 20% or more per stay, and are estimated to be between $16,000 and $64,000 per patient, or $143 billion to $152 billion annually worldwide[3,16]. This is very significant when it is compared to other healthcare costs, including hospitalizations for a hip fracture costing $7 billion annually, and diabetes mellitus costing $91.8 billion each year[3]. It was estimated that in 2004, Medicare paid an additional $2,500 per patient or $6.9 billion for delirium[12].

Literature Review

There is a body of literature to support implementation of delirium monitoring and best practice guidelines to reduce the incidence of delirium and its sequelae[11,17-20], however there is

currently no regulation of delirium practices, and these techniques are not implemented on a consistent basis[3]. At present, institutions are left to implement delirium monitoring and treatment guidelines individually, and there are no repercussions for not carrying out these best practices. Hospitals are accredited and certified without addressing delirium, third party payers reimburse institutions regardless of their involvement in the development of delirium, and the resources allocated to this problem are scarce so the incentive to minimize delirium is virtually nonexistent.

There is an abundance of literature to support delirium prevention strategies in the critically ill population[21], however delirium is a problem hospital-wide. Studies recommend implementation of multicomponent non-pharmacologic interventions to decrease the incidence and duration of delirium, reduce length of stay as well as utilization of physical restraints. These interventions also reduce the rate of falls, lower overall health care costs, and reduce mortality without causing any associated harms[14,22,23]. Literature also supports engagement of front-line clinical staff as well as interdisciplinary education to reinforce and embed these interventions into clinical practice[24-26].

Problem Identification

Between June 2014 and June 2015, there were 2,269 Medicare inpatients admitted to medicine service in a large tertiary care medical center in Western New York[27]. Using statistics from the literature regarding the prevalence and cost of delirium, it was estimated to have occurred in 318 to 1,271 of this small subset of patients, costing the institution an additional $5,088,000 and $81,344,000 in this one year alone[3]. Overall, that same institution had almost 35,000 total hospital discharges that same year so the actual magnitude of delirium was actually much more significant[27].

The hospital system identified this as a problem, so an interdisciplinary delirium team composed of physicians, advanced practice nurses, pharmacists, nurse educators, registered nurses, nurse educators, nurse administrators, geriatric resource nurses, education coordinators, social workers and volunteers worked together to develop a strategy to address it. An interdisciplinary approach was beneficial because it allowed collaboration and integration of knowledge from various experts in order to provide the highest quality outcomes for this complex disorder[25,26]. Monthly meetings were held and a delirium prevention and treatment guideline was developed, revised, and approved for use through the institution's clinical council. The guideline included a description of the Confusion Assessment Method (CAM), a prevention and treatment algorithm composed of multicomponent non-pharmacologic interventions, medication considerations for the treatment of agitated delirium, and a sleep protocol.

The institution was planning to introduce the CAM, a highly validated and widely used "gold standard" delirium assessment tool, hospital-wide during 2017. The traditional CAM is 82% sensitive and 99% specific in the detection of delirium, while the ICU specific algorithm, the CAM-ICU is 81% sensitive and 98% specific[15]. With the implementation of the CAM, nurses and providers would be able to correctly identify delirium from other differential diagnoses resulting in an anticipated increased awareness of delirium throughout the hospital[6]. Primary prevention is suggested to be the best approach to reduce the overall incidence of delirium among older adults on medical-surgical units[28], therefore proper delirium education is mandatory to ensure prevention, screening, and treatment are consistent and appropriate. Knowledge deficit is a significant barrier to effective delirium management, making education paramount[29,30].

With imminent implementation of delirium monitoring and a prevention and treatment guideline hospital-wide, it was important to evaluate providers' attitudes and behaviors related to delirium, and provide education accordingly. A 2016 study evaluating providers knowledge, attitudes, and practices regarding delirium identified the following barriers to guideline compliance: disbelief that guidelines results in best practice, lack of desire to change practices to follow delirium guideline, lack of time, and perception that guideline is cumbersome[31]. The purpose of this project was to evaluate if an educational program for hospital acquired delirium in the acute care/non-ICU setting could impact providers' perceptions about their attitudes and practices regarding delirium.

METHODOLOGY

Design and Participants

Institutional Review Board approval was obtained prior to initiating this quantitative study. Descriptive statistics were used to determine if a convenience sample of roughly 70 nurse practitioners and physician assistants working for the hospital medicine service in a large academic medical center recognized a change in their attitudes and practices regarding delirium after an educational intervention was shared. A pre and post-intervention survey were utilized for data collection.

Procedure and Implementation

Baseline attitudes and behaviors regarding delirium were collected via voluntary participation in a cross-sectional survey prior to the educational intervention. This survey was adapted for use in this population of providers with consent from the original authors[13]. The final electronic survey contained a total of seventeen questions. The first three questions addressed demographics, and the following four asked subjective questions about delirium

incidence and practices within the institution. These first seven questions were multiple choice with some fill in the blank options. The last ten were used to gauge each providers' delirium attitudes and beliefs using a five-point likert scale ranging from "strongly agree" to "strongly disagree". This survey was distributed electronically via the medical center's list-serve email and available for completion for six weeks.

An interactive educational podcast was developed by the researcher and evaluated for accuracy by a group of delirium and geriatric experts. The podcast was in PowerPoint format with voice-over content to give comprehensive education. Altogether, the education took a minimum of 30 minutes to complete, depending on the pace of the learner. The podcast incorporated a background on delirium, including its epidemiology and societal cost, followed by a basic instruction on the use of the CAM. Following this, a prevention and treatment algorithm modeled after the American Psychiatric Association's (APA) Delirium Guideline was shared, which closely resembled the delirium guideline the institution was simultaneously working to have approved for use through their clinical council. Also included in this presentation were a total of ten questions used to evaluate knowledge of the learners. Five of the questions were scattered throughout the presentation to encourage learner engagement, and were used to evaluate pre-education knowledge. The last five were given at the end of the presentation to evaluate effectiveness of the educational process. A score of 80% on the final five questions was required to "pass" the educational program, otherwise the learner needed to re-attempt it again until a passing score was achieved. Since this delirium content was important for all providers hospital-wide, this was made mandatory for all APPs within the institution aside from OB and pediatrics, because it was not applicable to those populations.

This presentation was disseminated via MyPath, a Talent Management System that was a companion system with the Human Resources Management System at the institution. The purpose of the software is to bring performance management, employee education and development, competency assessments, and career planning into one central location[32]. The presentation was made available after the initial survey was completed, and learners were given a total of six weeks to complete the mandatory training.

Eight weeks after the educational program deadline had passed, a nine question researcher-developed follow up survey was distributed to the same convenience sample of hospital medicine providers to evaluate whether they perceived a change in their attitudes and practices regarding delirium since the educational intervention. The survey utilized the same three multiple-choice demographic questions as the initial survey, followed by four questions evaluating whether the learner perceived a change in their delirium attitudes and practices since the educational intervention using a five-point likert scale ranging again from "strongly agree" to "strongly disagree". There were also two optional fill in the blank questions at the end asking what the learner liked about the education, and if there were any suggestions to make it more useful. This survey was again distributed electronically via the medical center's list-serve email and available for six weeks.

Survey Instrument

Both the pre and post-education surveys were given via REDCap[TM] software, which is a secure-web based application for building and managing surveys[32]. Consent to anonymous participation in the REDCap™ surveys was implied and described in an embedded page on the website upon initiating each of the surveys.

Data Analysis

Data analysis was performed using SPSS-version 19 software. Descriptive statistics were calculated for demographics of participants along with the providers' attitudes and beliefs related to delirium. Fisher's Exact 1-sided Test was also used to compare provider type (nurse practitioner versus physician assistant) as well as years practiced (less than ten years versus greater than eleven years) to the respondents beliefs related to delirium, as well as, the follow up survey evaluating whether the providers perceived a change in their attitudes and practices related to delirium after the educational intervention. A *p* value of 0.05 or less was used in all analyses to determine statistical significance and guide inference.

RESULTS

Baseline Survey

The initial survey evaluating baseline delirium attitudes and behaviors had 19 respondents, 84.2% were nurse practitioners, 15.8% were physician assistants. A little over 26% had worked with hospital medicine for less than five years, 31.6% for five to ten years, and the remaining 42.1% had worked on the service for more than eleven years. Nine respondents felt that less than 25% of hospitalized patients experienced delirium, while 8 believed that 25-50% of hospitalized patients become delirious. Descriptive statistics of the responding providers' beliefs related to delirium are available in Table 1. Fisher's exact test did not reveal any statistically significant differences comparing provider type or years in practice to their beliefs related to delirium.

Nearly 95% of the sample reported treating delirious patients with Haloperidol, 73.6% reported treating with atypical antipsychotics, 5% reported using narcotics, and 21% responded that they treat delirium with benzodiazepines. Using Fisher's exact 1-sided test comparing nurse practitioner versus physician assistant to medications used to treat delirium in practice, there was

no statistical significance between the two groups. When comparing years of practice however (Table 2), 100% of providers working for more than eleven years reported treating delirium with atypical antipsychotics; whereas 54.5% of those practicing for less than ten years did (*p* = .040).

Educational Intervention with Knowledge Test

The educational intervention was mandatory for a total of 239 APPs, and there was a 78.6% compliance rate. Every learner who completed the training got a score of 100% on the five question post-education knowledge test with one attempt; no one needed to repeat the training for a passing grade.

Follow-up Survey

The follow up survey had a total of 20 completed responses, 20% were physician assistants, and 80% were nurse practitioners. Half of the participants had been working with hospital medicine for less than 5 years, 15% for give to ten years, and the remaining 35% for greater than eleven years. Eighty percent work primarily in hospital medicine, 15% work mostly in outpatient medicine, while the remaining 5% works primarily for another inpatient service. Descriptive statistics for the responding perceptions of their change in attitudes and practices are available in Table 4.

Participants who utilized the comment portion of the survey reported liking the fact that the presentation was evidence-based, explained the different presentations of delirium, was informative, practical, and an overall good review, and was easily understood. Another respondent reported liking the fact that there was audio along with the presentation. One other participant liked the medication recommendations outlined in the presentation. Some suggestions to improve the presentation included developing a hospital algorithm or guideline, a smart-phrase to utilize for documenting delirium precautions, and a pocket-resource containing

this information. Another participant reported disliking the audio that went along with the presentation, and another felt the education would need to be reinforced.

DISCUSSION

This study examined the perceived improvement in providers' attitudes and behaviors regarding delirium after a brief educational intervention. The results indicated that the education was effective in increasing knowledge, at least in the short term, as evidenced by every participant scoring 100% on the immediate post-test as part of the educational program. Seventy percent of respondents reported that they found the educational intervention useful in the follow up survey, and 60% reported being more confident in treating the disorder a result of the intervention.

Consistent with the literature, all participants responded that they believed delirium prolonged hospital length of stay[1,3,7,10-15], and as the literature suggests, the majority of participants (84.2%) believed that delirium was an under-diagnosed syndrome[6,11,12,16,20-22]. Only 44.5% of respondents however felt that delirium was preventable. This fact, that 30-40% of delirium cases are preventable[4] was reinforced in the educational intervention, so providers could feel like their efforts were effective in avoiding the occurrence of delirium. Over half of the participants (61.3%) disagreed that delirium was a normal part of hospitalization, and 94.7% of respondents were aware that it requires active intervention, demonstrating that this group of providers are generally aware of delirium and agree that this is a significant problem for the hospital medicine population.

More respondents (73.7%) believed delirium was a risk factor for dementia in patients > 65 than in patients < 65 (52.7%), however literature suggests that delirium can result in increased risk for dementia due to permanent neuronal damage, with the risk of cognitive decline

increasing with age[33,34]. The majority of providers in this study recognized the correlation between delirium and dementia, so the educational intervention would be more helpful for providers addressing patients with or at increased risk for dementia due to age.

Two thirds of respondents agreed or strongly agreed that delirium increased the risk for self-inflicted injury, the most prevalent of which is falls[11,23]. Falls are the most common iatrogenic adverse event, with costs estimated to reach $40 billion by 2020[35]. Delirium is a complex and high-risk syndrome that tends to have a cascading effect. The waxing and waning of mental status leads to impulsive behaviors which increases the risk for falls, thus further increasing healthcare costs, length of stay, and risk for functional dependence.

APPs with more than eleven years of experience reported using atypical antipsychotics in the treatment of delirium more than those working with hospital medicine for less than ten years ($p = .040$). While haloperidol, a typical antipsychotic, is the most frequently studied pharmacologic intervention for the treatment of delirium, atypical antipsychotics such as risperidone and olanzapine are perfectly acceptable choices as well[17,18]. Also, the fact that over one quarter of the respondents of the baseline survey reported treating delirium with narcotics and benzodiazepines is clinically significant, because these classes tend to cause or worsen the course of delirium. These findings argue that ongoing delirium education is important for providers at all levels of practice to ensure the most current evidence-based practices are being utilized on a consistent basis.

While the education was effective in providing knowledge as evidenced by an average post-test score of 100%, the fact that only nurse practitioners and physician assistants were included in this education is a significant inadequacy. Interdisciplinary education of all front line clinical staff is key in really impacting patient safety related to delirium[14,24-26]. While it is

reasonable to consider educating nurses independently of providers given the difference in their scope of practice, advanced practice providers and physicians really should be getting the same educational content because they share similar duties. Training this group together would be most efficient and effective in embedding these practices into clinical practice as well as making these care routines sustainable over time.

On the follow up survey, more participants agreed that they perceived a change in their attitudes related to delirium (40%) compared to practices (30%). This may be partly due to the fact that the institution has not implemented the delirium practice guideline by the time this survey was given, so it is not surprising that providers were less likely to alter their practices. Practice change will likely be more prominent once nurses have been educated and all providers throughout the institution are utilizing the same prevention and treatment algorithm. The majority of respondents (70%) reported that they found the education to be useful, and over half (60%) responded that they feel more confident in treating delirium since the educational intervention. These results indicate that online learning methods are beneficial for the majority of this population, however some may still benefit from utilizing a different learning method, such as and in-person format. Unfortunately, these are not the practices of the institution, however would make for interesting research in the future.

Limitations

There were several limitations to this study. First, the sample size was small and homogeneous, coming from only one hospital site. Although literature supports utilizing interprofessional education to improve delirium care[24-26], there was an inability to recruit physicians caring for the hospital medicine population for either the surveys or the educational intervention. Advanced practice providers working for hospital medicine in other institutions

within the hospital system were not included because the other institutions do not utilize MyPath, so the education was given in a live format, and differing hospital practices could potentially skew survey data. Additionally, nurses were not included in the study because they were receiving a nursing specific delirium educational program. Not all of the advanced practice providers who received the educational intervention were included in the voluntary surveys because the baseline survey was adapted particularly for use within the hospital medicine provider population. Including surgical, critical care, outpatient, or oncology providers could have skewed the results of the surveys; however studying these providers in the future would be interesting. Staff turnover was another significant limitation for this study. Providers were asked not to participate in the follow up survey if they were not working on the service at the time the baseline survey was available.

The study design was another significant limitation. Given that the institution did not utilize delirium monitoring prior to this intervention, there was no way to determine true baseline delirium incidence, and, therefore could not be tracked after the intervention to evaluate whether there was an impact on patients related to the education. In addition, the short time frame limited the ability of the researcher to evaluate knowledge retention beyond an eight-week timeframe.

CONCLUSION AND RECOMMENDATIONS

Educating providers regarding a syndrome as complex as delirium is of critical importance, especially in times of large system wide changes like implementation of a new clinical practice guideline. Ensuring the training is effective with post-knowledge testing is very important and relatively easy, however impacting providers' attitudes and practices can be more challenging, and is more likely to be prevalent after hospital-wide implementation of guidelines. There is an abundance of literature to support utilizing interdisciplinary education in order to

maximize impact and sustainability of training, and this needs to be encouraged for future education within the institution being studied.

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Table 1. Descriptive Statistics of Providers' Baseline Delirium Beliefs

Question	Strongly Agree to Agree	Neutral	Disagree to Strongly Disagree
Delirium is an under-diagnosed syndrome	16 (84.2%)	1 (5.3%)	2 (10.6%)
Delirium is a normal part of hospitalization	2 (10.6%)	5 (26.3%)	12 (61.3%)
Delirium is a problem that requires active intervention	18 (94.7%)	1 (5.3%)	0 (0.0%)
Delirium is largely preventable	8 (44.5%)	9 (50.0%)	1 (5.6%)
We over-sedate most of our patients on the hospital medicine service in our institution	4 (21.1%)	6 (31.6%)	9 (47.4%)
Delirium is a risk factor for dementia in patients over 65	14 (73.7%)	3 (15.8%)	2 (10.6%)
Delirium is a risk factor for dementia in patients under 65	10 (52.7%)	7 (36.8%)	2 (10.6%)
Delirium prolongs length of stay	19 (100%)	0 (0.0%)	0 (0.0%)
Delirium is a risk factor for sepsis	10 (58.8%)	5 (29.4%)	2 (11.8%)
Self-inflicted patient injury is a complication of delirium	12 (66.7%)	5 (27.8%)	1 (5.6%)

Table 2. Medications Used to Treat Delirium Based on Providers' Years in Practice

Medications used to treat delirium in practice	< 10 Years Practice	> 11 Years Practice	Total	*p* value
Benzodiazepines	2 (18.2%)	2 (25.0%)	4 (21.1%)	.574
Narcotics (opiates)	1 (9.1%)	0 (0.0%)	1 (5.3%)	.579
Atypical antipsychotics	6 (54.5%)	8 (100.0%)	14 (73.7%)	**.040**
Haloperidol	10 (90.9%)	8 (100.0%)	18 (94.7%)	.579

Table 3. Descriptive Statistics of Providers' Perception of Change in Their Attitudes and

Practices

Question	Strongly Agree to Agree	Neutral	Disagree to Strongly Disagree
Since the delirium education was disseminated, I have noticed a change in my practices regarding delirium	6 (30%)	9 (45%)	5 (25%)
Since the delirium education was disseminated, I have noticed a change in my attitudes regarding delirium	8 (40%)	8 (40%)	4 (20%)
I found the delirium education useful	14 (70%)	4 (20%)	2 (10%)
I am more confident in treating delirium since the educational podcast	12 (60%)	5 (25%)	3 (15%)