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Implementation of Delirium Bundle on a Hospital Medical/ Surgical Unit to Help Decrease the Prevalence of Delirium

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Abstract

Description of the Problem: Delirium is defined as a constellation of symptoms that includes disturbance in attention or awareness, change in cognition, language and perceptual disturbances that develops over a short period of time. Delirium mostly affects adult patients with risk factors including history of dementia, early cognitive impairment, dehydration, and infections. This quality improvement project was implemented on one hospital unit at a large tertiary hospital in the Boston area. This unit has one highest rate of delirium in the entire hospital system. Delirium is associated with high rate of morbidity and mortality. Also, this syndrome leads to longer hospital stays and high cost to both national and local budget.

***Available Knowledge*:** A review of the literature revealed that a bundle of interventions including frequent re-orientation, adequate sleep, hydration, treating infections, and availability of sensory support were effective in decreasing the incidence and severity of delirium.

***Specific Aims*:** The overarching aim of this quality improvement (QI) project was to identify at least 90% of patients at risk of delirium, implement the delirium bundle in at least 90% of the patients identified to be at risk by the nursing staff, and decrease the rate of delirium by at least 10%.

Interventions: Patients over the age of 65 years were identified by the Confusion Assessment Method. For the patient who screened at risk, the delirium bundle was implemented. The delirium prevention bundle including early mobilization, frequent reorientation, adequate hydration, adequate sleep, appropriately managing infections, and pain management.

***Evaluation*:** The delirium bundle intervention was implemented comparing a 30 day pre-implementation to a 30 day post-implementation period. The first aim of 90% identification of delirium was not me. The nursing staff identified 69% of patients at risk of delirium. The second goal of 90% implementation of the delirium bundle was met, with more than 100% implementation of the delirium bundle. The last goal of 10% decrease in the rate of delirium was met, with 15% decrease in the rate of delirium.

Results: This QI project was able to accomplish two out of the three aims. The aim that 90% of the patients was not achieved with 69% of at-risk patients identified. The project successfully implemented the bundle in over 100% of the patients that were identified. Lastly, the goal of greater than 10% decrease in the rate of delirium was achieved, with 70% decrease.

Conclusion: This QI project overwhelmingly achieved its target aim of more than 10% decrease in the rate of delirium. Thus, the interventions contained in the delirium bundle have conclusively shown that if used appropriately, they have the potential to dramatically decrease this chronic syndrome. Long term, these strategies have the potential to penetrate not only the intervention unit, but also all the other units in the clinical macrosystems and across other health care systems in the state.

Description of the Problem

Delirium is defined as a constellation of symptoms that includes disturbance in attention or awareness, change in cognition, language and perceptual disturbances that develops over a short period of time (American Psychiatric Association (2013). The etiology of delirium is often multifactorial including frequent sleep interruption, unfamiliar environment, dehydration, pain, and infections. This syndrome tends to occur in adult geriatric patients who are 65 years or older, admitted to hospitals worldwide and carries significant morbidity and mortality (Smith et al, 2017). The primary reasons older adults become delirious while hospitalized are dehydration, pain, and infections such as urinary tract infections, pneumonias, and lack of sensory support.

In United States, delirium is associated with significant morbidity and mortality. According to the American Delirium society, approximately 7 million hospitalized older adults suffer from delirium every year. (American Delirium Society, 2021). Delirium is the primary cause of preventable injuries in hospitals and is associated with prolonged hospital stays compared to patients who do not develop iatrogenic delirium. This syndrome occurs in approximately 40-60 % of hospitalized adults (Martinez et al, 2012). Delirium adds approximately 10-30% to the mortality rate in hospitalized patients who become delirious while admitted to acute care hospitals and adds an estimated annual cost of 6 to 20 billion dollars to the national annual health budget (Smith et al, 2017). Additionally, the cost per patient to manage to manage patients, who become delirious, is about $16,000-60,000 per patient (Inouye et al., 1999).

Local Problem

Locally, the hospital where this QI intervention will be implemented is not immune to this syndrome and has been associated with increased rate of falls, prolonged hospitalization, and infections

including pneumonia and urinary tract infections. Patients who are admitted to the medical/surgical have multiple risk factors that predisposes them to hospital-acquired delirium, which consequently leads to an increased rate of delirium on the hospital unit. This issue, that is often referred to as “sun downing” is a nightly occurrence and evidence exists that it is preventable with the correct strategies. If implemented appropriately, these strategies will not only decrease the incidence of delirium but will also lead to shorter hospital stays leading to lower cost to the health care system.

Currently the clinical microsystem where this QI project will be implemented does not have an order set made specifically for delirium prevention. Most often these orders are inconsistent and varies from patient to patient. There is no standardized process of identifying patients at risk of developing delirium and providing the necessary intervention to combat this syndrome. The medical surgical unit serves as a teaching and training section of the hospital. Therefore, there are often new and inexperienced nurses getting trained and these nurses often lack the knowledge and experience necessary to identify a patient at risk of delirium and implement the appropriate strategies to prevent this syndrome. The combination of lack of a standardized delirium prevention template and the presence of newly licensed nurses tends to increase the likelihood of patients developing hospital-acquired delirium when they get admitted to the hospital unit.

A retrospective 30-day chart review from May and June 2021 on the medical surgical unit demonstrated an urgent need for evidenced-based interventions to help curb the occurrence of delirium. This medical surgical unit admits an array of patients from different demographics including ages from 21 years and older, race/ethnicity, and diagnoses. There was a pre-implementation retrospective 30 days chart review of patients 65 years or older with risk factors for delirium. This retrospective chart review showed 103 patients at risk of delirium with 48 who eventually became delirious via their CAM scores. These statistics showed that for that 30-day period, 46.6 % of patients with risk factors experienced delirium.

Available Knowledge

A review of literature was done using the databases CINAHL, PubMed and PsychInfo. Table 1 is Prisma table that shows the final studies that met the criteria to be included in the QI project. Multiple number of studies were eliminated due to the wrong setting, patients age younger than 65 years, type of interventions used and outdated studies. After eliminating non-eligible studies, a total of nine studies were left that demonstrated effective strategies to prevent delirium. All studies (n=9) used the delirium bundle as intervention to prevent delirium. Evidence from all nine studies showed that pain and infection control, sensory stimulation, early mobility, and sleep promotion are among the intervention that can be implemented to prevent the occurrence of delirium.

All the final nine studies had themes common to the hospital unit where the QI project will be implemented. The first common theme between the nine identified interventional studies and the project site was the setting where the research was done. The nine studies were done in hospital settings similar to the project site. They both had the same age ranges of patients greater than 65 years old. All nine studies have similar overarching aim of decreasing the rate of delirium by at least 10%. Additionally, all the studies were done using nurses to implement the intervention, like what this QI project will undertake. All nine interventional studies were implemented with the last fifteen years excerpt two, which was chosen because it meets all the criteria needed to be included excerpt the year it was implemented. Finally, all nine studies used the delirium bundle and where able to reduce that occurrence of delirium by at least 10%.

Rationale

Kurt Lewin's change theory will be used to guide the implementation and evaluation of this QI project. This theory is appropriate because it has the three components needed to help implement change. This theory proposes a driving and resistant force that comprises of three stages—unfreezing,

change, and refreezing stages. The driving forces in this change theory represents individual stake holders who are agents for change and constantly striving for ways to make things better. The refreezing change is when the changes are successfully implemented into practice. Resistant forces are stakeholders, who fear change and will fight to maintain the status quo. For this theory to be successful, driving forces must dominate the resistant forces (Langley et al. 2009).

The first stage of this theory is the "unfreeze stage" and this involves preparing the organization to break away from existing culture and implement new ways of doing things better than before. The next stage of this conceptual theory is the "change phase". This is the stage where the actual implementation will be undertaken. It is critical here to present this QI project in a way staff will see the benefit of implementation of this QI project. The last stage is the "refreeze phase". This is the stage where change starts to take shape and the organizations is beginning to accept this change (Langley et al, 2009).

Specific Aims

The overarching aim of this quality improvement project was to implement a delirium prevention bundle in a Boston-area hospital medical/surgical unit to decrease the number of hospital-acquired delirium in adult patients 65 years and older.

The specific aims of this quality improvement project were to:

- The registered nurses will identify at least 90% of patients admitted to the medical surgical unit over a 4-week period, who are at risk of developing delirium as defined by being 65 years or older, has a past medical history of dementia or early/mild cognitive impairment, pain, dehydration, infections such as urinary tract infections or pneumonia and signs and symptoms of dehydration such as dry mucous membranes and elevated creatinine above baseline.

- At least 90% of the patients identified by the nursing staff to be at risk for delirium will have the delirium bundle implemented within 12 hours of admission to the hospital unit.
- The identified medical/surgical unit will experience a 10% decrease in hospital-acquired delirium when comparing a 30 day pre-implementation to a 30 day post implementation period.

Methods

Context

This proposed project will take place on one medical/surgical unit in a large tertiary hospital in a metropolitan area teaching hospital in the northeastern part of the United States. This is a fast-paced unit that admits and manages medical and surgical patients. Most admissions are via the emergency room, some are surgical patients from the operating rooms and a small percentage are directly admitted from home or residential facilities. Patients admitted to the unit have multiple co-morbidities that could be potential risk factors for delirium. Multiple medical consults are available to meet the patients specific needs to prevent and treat delirium including the pain management service, geriatrics service, physical therapy, pharmacist, and laboratory services are available 24 hours each day. This full array of services provides the necessary resources to implement a delirium prevention bundle that addresses the patient, provider and the environmental factors associated with hospital-acquired delirium.

There are multiple contextual elements that are specific to the medical/surgical unit that could enhance or hinder the implementation of the QI project. Figure 3 is an illustration of a force field analysis diagram of current and potential restraining forces. Also shown on the force field analysis diagram are potential and current driving factors that could help with the QI implementation. Important forces that could drive the implementation of the project includes the desire to lower annual health care budget that occurs with the cost of managing delirium. Additionally, lowering patient's hospital stays, state /federal mandates to keep patients safe, lack of reimbursement for falls, desire to improve patient

satisfaction, and improved nurse sensitive data are driving forces that could expedite the implementation of the project.

Conversely, there are both potential and current restraining forces that could prevent or delay the implementation of this project. Current restraining factors includes increased nursing staff workload, fear of change, competition for other areas of need in the institution, and the need to prioritize resources due the emergence of the novel CV-19 pandemic. Potential restraining forces includes difficulty getting hospital leadership approval, staff availability to attend training sessions, staff attitude towards change, and patient getting transferred or discharged home before post implementation data could be analyzed. Implementation of the project will leverage the driving forces and will attempt to mitigate the restraining forces.

Interventions

The QI project implemented a delirium prevention pathway, as illustrated figure 1**,** to help decrease the incidence of delirium on the project unit. This is macrosystem map that shows the pathway that traces a patient from admission to discharge or transfer. The delirium pathway is started as soon as the patient arrives on the unit via the emergency room, operating room or direct admit from their place of residence. The nurse assessed the patients with the delirium assessment tool, the Confusion Assessment Method (CAM), at least four hours from the time they were admitted.

If the patients exhibit any factors that predisposes them to delirium, then the RN will add the delirium bundle into the patient's plan of care in the EPIC electronic health record. The nursing staff will continue to monitor the CAM score every shift or every eight hours to assess for any sign or symptoms of delirium. If the patient is over the age of 65 but does not have any delirium risk factors, then the nurse will continue to check their CAM scores every eight hours until discharge or transfer from the unit.

If at any point the patients develop any of the associated delirium risk factors, as illustrated in figure 1, the registered nurse will access the patient's chart and add the delirium bundle into their plan of care.

During the intervention period, all patients over the age of 65 year were assessed for the risk of developing hospital-acquired delirium. The RN assessed the patient's presenting symptom and past medical history to determine if they had any history of delirium and early cognitive impairment. Additional criteria that were assessed included dehydration, pain, any symptoms of infection such as urinary tract infection or pneumonia. The delirium bundle included the strategies identified during the systematic literature review that have been shown to help manage with delirium. As part of the initial delirium risk assessment, the RN next assessed the presence of delirium with the Confusion Assessment Method (CAM). This tool was chosen because it is a valid and reliable tool for assessing delirium (Brooks et al, 2012). A 2008 systematic review of literature by Ba et al, showed that the CAM tool has a sensitivity of 94-100% and specificity of 90-95%.

The Confusion Assessment Method (CAM) is a tool used to assess delirium in hospitalized adult patients. This tool gives healthcare personnel the ability to assess fluctuating mental status, any evidence of disorganized thinking, level of consciousness and finally if the patient is delirious. (Brooks et al, 2012) This tool uses a scoring system to determine the presence of delirium. The number 1 indicates any acute change of fluctuating mental status., 2 indicates presence of inattention, 3 shows disorganized thinking, and 4 assess the level of consciousness. A positive CAM must include presence of levels 1 and 2 and either 3 or 4. If the patient is 65 years or older but does not have any of the delirium risk factors, then they will not initially be placed on the delirium prevention pathway. Instead, the nursing staff will continue to assess the patient every 8 hours using the CAM. If at any point a patient has a positive risk screening, then the delirium prevention bundle will be implemented.

The delirium bundle identified during the systematic literature review included pain management, hydration, managing infections, avoiding sleep interruption, and frequent re-orientation. The core risk factors identified in the systematic literature review for delirium includes any patient with a past medical history of dementia, early cognitive impairment, dehydration, pain, any symptoms of infection such as urinary tract infection or pneumonia. The delirium includes instructions to nurses and nurse's aides to offer oral hydration to patients and if the patient is unable to drink then intravenous fluids will be initiated. Nursing staff were also directed to assess and adequately manage the patient's pain.

The hospital environment is a very important part of the delirium prevention bundle. Loud noises, frequently waking up patients for non-urgent medical procedures have been shown to increase the risk of the patient developing delirium. Additionally, changes to patient's environment, such as moving from one room to another, can adversely affect personal and space-time orientation of patients and thus increased their likelihood of patient developing delirium. (Martinez et al. 2012). This etiology of delirium due to loud noises and interruption of sleep can be curbed with the implementation of the strategies identified during the systematic review of literature. This intervention was achieved with the registered nurses ensuring that patients get adequate and uninterrupted sleep. The nurses directed the nurse's aides to toilet the patient before sleep and avoid waking the patient overnight for vital signs. Invasive phlebotomy blood checks and other procedures can be moved to waking hours when the patient is awake. `

Early mobility is one of the core components of the delirium bundle. All the nine studies identified from the systematic search, identified early mobility as a clinically significant method in preventing or managing delirium. Early and frequent patient mobilization helps with both physical and mental health of patients and can lead to early discharge out of the hospital unit, leading to less likelihood of the patient developing delirium. This intervention was achieved by the nursing staff

ensuring patients get adequate uninterrupted sleep. The nurses directed the nurse's aides to toilet the patients

One of the major physiological variables that has been shown to increase the likelihood of delirium is the presence of infections such as pneumonias, urinary tract infections and other soft tissue infections such as cellulitis. It is therefore very important adult patients at risk for delirium, who present with such infections, are identified in a timely manner and treated to decrease their likelihood of getting delirious. This intervention was achieved by nurses monitoring for any evidence of infection such as increased white blood cells in the patient's laboratory data or fevers, and chills. And then making sure the appropriate therapy is in place to treat the infection.

Pain is another important physiologic factor that can increase not only the development of delirium but its severity. Also, important in managing pain is pain communication. In some instances, these patients are not only not able to verbalize the presence of pain, but its severity. The nursing staff will be a very important part of identifying pain and offering the necessary tools and medications to help alleviate it. Both pharmacological and non-pharmacological pain control were offered to patients on the medical/surgical unit to help decrease the likelihood of delirium**.**

Another core intervention that has proven to decrease the rate of delirium is the provision of sensory support to patients (Inouye et al. 1999). Interaction between patients and the hospital environment is an important component of treatment. Provision of sensory support such as audiovisual equipment including glasses and hearing aids will improve the patient's ability to interact with their environment, thereby leading to less likelihood of delirium. This intervention can be accomplished by asking family members to provide this audiovisual support equipment to hospital staff. This audiovisual equipment ensured better communication between patients and staff leading to less likelihood of the patient developing delirium.

Implementation of the Project

Figure 2 is an illustration of a logic model that shows processes that were undertaken before the delirium pathway was implemented. The goal for implementing this QI project is to reduce the rate of delirium which in turn will lower patient hospital days, rates of falls, and the cost to our health care budget. Available resources that helped in the implementation of the project includes assessment tools such as Confusion Assessment Method, nursing/hospital leadership, quality improvement department and EPIC electronic health records. Activities, as shown in figure 2, that were undertaken included forming a coalition of stake holders, developing a curriculum to train staff.

Expected output after the activities have been undertaken included assessing and identifying patient over the age of 65 for risk factors for delirium, implementing the delirium bundle, and assessing patients every 8 hours for delirium. After all these processes have been undertaken, the expected short-term outcomes include increased staff utilization of the delirium identification tools, increased staff confidence in implementation of the delirium bundle. Expected intermediate term outcomes includes numeric decrease in the rate of delirium, staff will verbalize their satisfaction with the QI project, and incorporation of the delirium pathway into the unit workflow.

Implementation of the project was undertaken in two phases, first the pre-implementation planning and secondly when the project went live**.** Figure 2 shows available resources, activities to be undertaken, and the expected output. After all these processes the short, intermediate, and long-term outcome of the QI project will be evidenced. The resources were bundled together with the listed activities with the goal for short, intermediate, and long-term outputs. The final overarching goal was to accomplish the initial aim of this QI implementation. Once the delirium bundle went live on the unit, the project leader maintained a presence to help the staff as they implemented this change with the goal of reducing the incidence of delirium.

The project leader did a 30-day power point presentation of the delirium bundle to the nursing staff. Out of a total number of 58 registered nurses, 43 were able to attend the training session. The project leader was only able to capture 75% of the nurses during the teaching sessions. Additionally, many new nurses were hired to replace those that left, but they could not attend the training session because they were getting onboarded on a different unit. Many travel nurses were hired but their work schedule was inconsistent, and they most were floated to other unit to work. All these factors led to a low turnout by the nursing staff to the training sessions.

Measures and Analysis

Aim 1: Delirium risk was assessed by the nursing staff. Evidence of risk is assessed by reviewing the patient's presenting symptoms and past medical history. A patient is at risk of delirium if they are over the age of 65 years and has any past medical history of dementia and early or mild cognitive impairment. Additionally, patients over the age of 65 years are at risk of hospital-acquired delirium with any of the following physiological symptoms including pain, dehydration, and infections. If risk factors were present the nurse recorded these risk factors in the nurse's notes. Identification of patients at risk for delirium was confirmed by chart review by the project leader. The project leader reviewed the charts of all patients admitted to the unit during the implementation period for the presence of risk factors. The percent of patients at risk of delirium was calculated by comparing the number identified by the nursing staff divided by the number identified by chart review by the project leader.

Aim 2: 90% of patients identified by the nursing staff to be at risk of delirium will have the delirium bundle implemented. This aim was operationalized by confirming that the delirium bundle was implemented for any patient at risk of delirium. The percent of patients with the bundle implemented was divided by the number identified as at risk by the nursing staff.

AIM 3: The medical/surgical unit will experience a 10% decrease in hospital-acquired delirium. This aim was operationalized by comparing the baseline incidence of delirium during the 30 days prior to implementing the interventions with the incidence of delirium during the implementation. Finally, a change score was calculated to assess for any change in the rate of delirium.

Ethical Considerations

The university of Massachusetts Boston Clinical checklist has been reviewed and demonstrates that the project meets the criteria for clinical quality improvement and is not human subject research (Appendix D). The project or innovation proposed is a quality improvement and does not meet the definition of human subject research because it is not designed to generate generalized findings but rather to provide immediate and continuous feedback in the local setting in which the project is carried out. The University of Massachusetts Boston IRB has determined that quality improvements projects do not need to be reviewed by the IRB.

This quality improvement project has been reviewed with nursing leadership and the quality improvement department at the project site. Additionally, the hospital quality improvement checklist has been filled by the project leader and it has been determined that this project meets the criteria for quality improvement. This QI project primary goal is not to generate new knowledge but seeks to use existing scientific knowledge to improve nursing practice. Thus, no IRB consent is needed, and QI project leader has been granted permission by nursing leadership to implement the project

Results

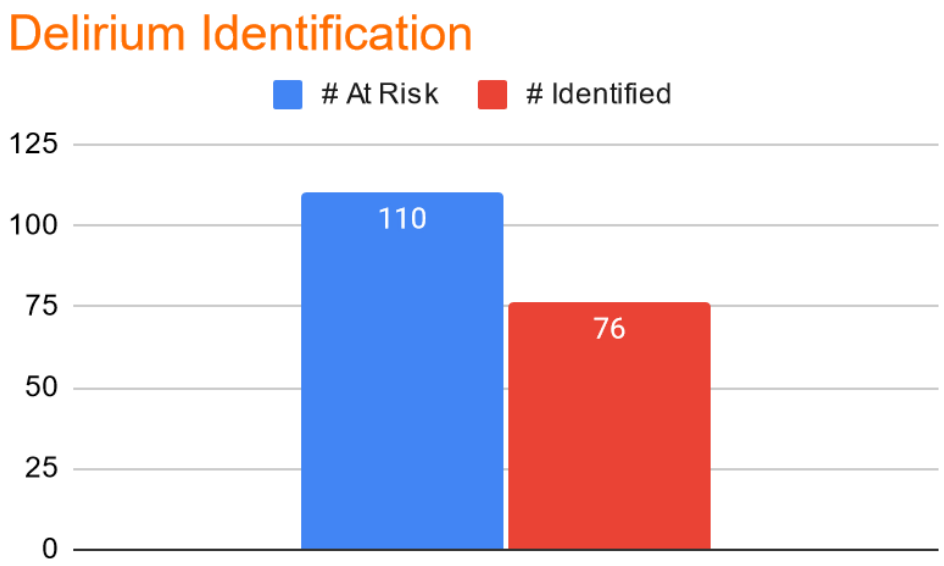
Table 3: Demographics Table

	Pre n=103	Post n=110
Race/Ethnicity		
African Americans n (%)	25 (24%)	34 (31%)
Caucasians n (%)	56 (54%)	47 (43%)
Hispanics n (%)	22 (21%)	29 (26%)
Gender		
Male n (%)	56 (54%)	48 (44%)
Female n (%)	47 (46%)	62 (56%)
Average Age		
	74 years	79 years

Table 3 represents a demographic table of the participants of the QI project. The sample population was similar to that of the demographic makeup of the community served by the medical institution. The pre-implementation sample had a greater makeup of younger Caucasian males. The post implementation group was older and more diverse. Specifically, there were 7% more Hispanics, 11% less Caucasians, and 10% more females.

The impact of this quality improvement project was evaluated on measures based on the aims of the project. The measures chosen aligned with the project proposal and aims. The first aim of the project was to correctly identify at least 90% of patient 65 years or older admitted to the medical unit with risk factors for delirium was not met. Data analyses were performed to assess whether the target for the first aim was achieved. Chart reviews were conducted to determine whether a patient was at risk for delirium, and this was compared to the nursing staff's determination of risk.

Figure 5: Delirium Identification Graph



The project leader identified 110 patients with delirium risk factors. As shown in figure 5, the nursing staff identified 76 out of the total 110 patients that were identified by the project leader. From the data, the registered nurses failed to identify 34 patients at risk of delirium. This translates into the registered nurses identifying only 69% of patients at risk of delirium. Therefore, the target 90 % delirium identification was not achieved.

The second aim of this QI project was that the nursing staff will successfully implement the delirium prevention bundle on the medical/surgical unit was met. The outcome of this second aim is that greater than 90% of the patients identified by the nursing staff, will have the delirium bundle implemented into their plan of care.

Figure 6: Delirium Implementation Graph

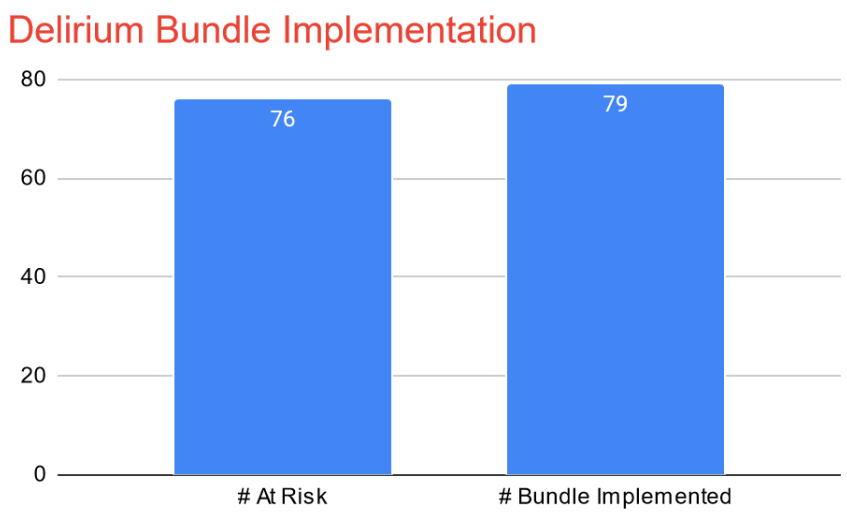


Figure 6 shows a graphical representation of this aim. The nursing staff overwhelmingly achieved the target of greater than 90% implementation of the delirium bundle. This aim was operationalized by the number of patients identified to be at risk in aim number 1 (76 patients) and the number of patients that had the delirium bundle implemented in the second aim (79 patients). The nurses identified 76 (see figure 5), patients at risk of delirium and implemented the delirium bundle into 79 patients plan of care. This indicated over 100% implementation of the delirium bundle by the nursing staff.

The third aim of this QI project that the identified medical surgical unit will experience a 10% decrease in hospital-acquired delirium when comparing a 30-day pre-implementation period to a 4 - week implementation period was met. This aim was accomplished by initially performing a retrospective 30-day chart review to identify the number of patients who developed hospital acquired delirium, evidenced by a positive Confusion Assessment Method (CAM) score in the EPIC electronic health record. Next, a 30-day implementation period was undertaken, and the delirium bundle was successfully implemented by the nursing staff. The pre-implementation data was then compared to the post-implementation phase of the QI project to assess for any significant decrease in the number of patients with hospital-acquired delirium.

Figure 7: Delirium Occurrence Rate

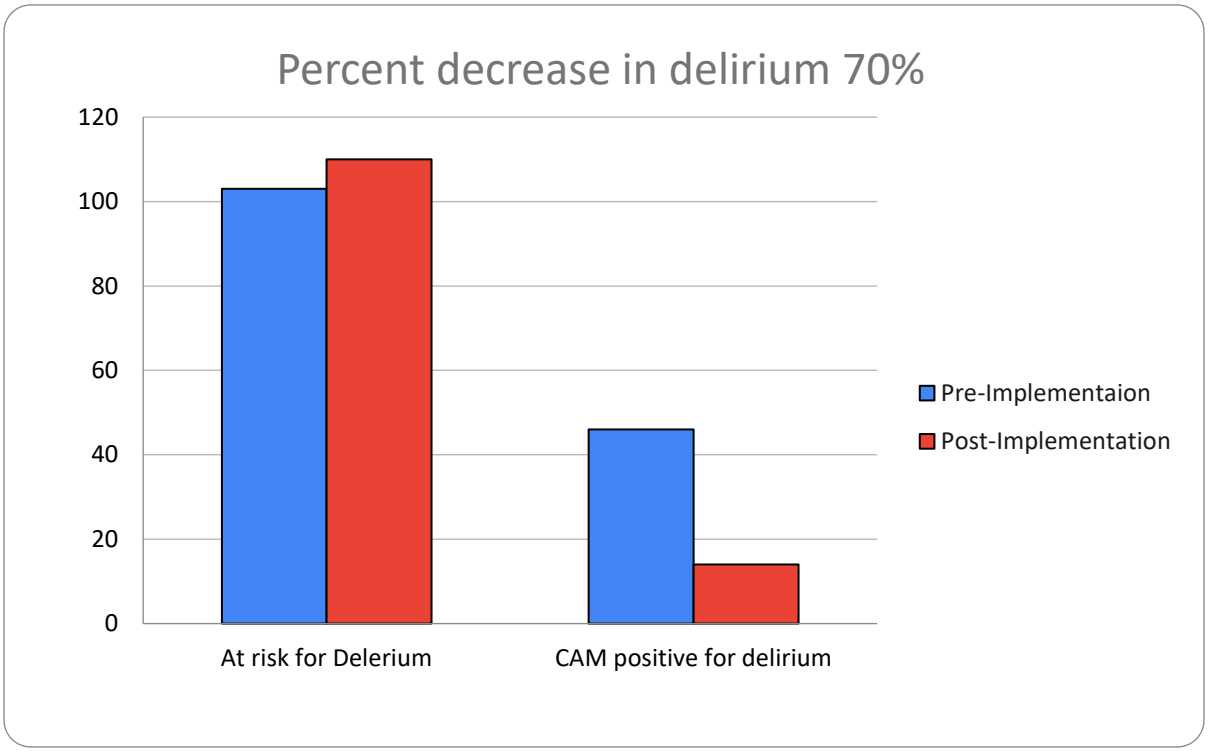


Figure 7 shows the pre and post-implementation rate of delirium and the changes that occurred after the intervention bundle was implemented. After implementing this QI project, data analysis was preformed to assess if the third aim has been accomplished. Pre-implementation analysis showed a total number of 103 patient who met the criteria being at risk of delirium. With a total number of 46 patient who developed delirium during their hospital stay. In total the pre-implementation rate of delirium ended up at 45%. The next step was finding out the post implementation rate of hospital acquired delirium. A total of 110 patient screened where deemed at risk for developing delirium, but only 14 patients developed the syndrome. This equates to a delirium percentage of 13%. There was a 70% decrease in the number of patients with delirium post implementation, which exceeds the third aim's target goal of 10% decrease.

Discussion

Interpretation

One of the aims was that the nursing staff will identify at 90 % of patients admitted to the unit with risk factors of delirium. This aim was not achieved, and the nursing staff were only able to identify 69% of patients at risk of delirium. The reasons for the failure to achieve this aim could be due to multiple factors. One glaring factors could be the timing of the interventions. Many experienced nurses left the profession due to exhaustion from managing this novel pandemic infection. This led to the influx of newly licensed nurses, whose primary focus was learning to be safe practitioners.

Another important reason for the failure to achieve the first aim could be the nurse's turnout and lack of adequate training to the nursing staff during the PowerPoint presentation of the delirium bundle to the nursing staff. As mentioned during the implementation phase of the QI project, only 43 of the total 58 registered nurses were able to attend the training session. 25% or a quarter of the nursing staff failed to attend the PowerPoint presentations. This number is significant because this indicated that some nurses did not get a chance to get adequate training and most of the information, they obtained was from secondary sources like their nursing colleagues. The fact that only 75% of the nursing staff attended the sessions could be an important factor to explain why they nurses where not able to identify at least 90% of patients at risk.

Another reason for the failure to achieve the 90% threshold could be due to lack of adequate time to teach and explain the bundle to the nursing staff. No time was allocated by the nurse manager for the nurses to attend the training sessions. Most nurses attended the training during their breaks or at the end of their working shift. A few nurses had to leave halfway through the training session because they had an urgent need to attend to. Even though, some nurses were present at the teaching presentation, their focus was not entirely on the presentation. Therefore, they had some issues

remembering the risk factors that predisposes a patient to delirium. Lack of time adequate time could be a major reason for the failure to achieve this threshold of 90%.

Aim 2 was that the nursing staff will implement the delirium bundle on at least 90% of patients identified to be at risk of this syndrome. This aim was overwhelmingly achieved, and the nursing staff implemented the delirium bundle into over 100% of patients that were identified. 76 patients were identified to be at risk, but 79 patients had the delirium bundle implemented. The possible explanation for this achievement was that the nursing staff did not accurately document the CAM results in the patient's chart but uploaded the bundle into the patients plan of care.

The third aim was a 10% decrease in the occurrence of delirium when comparing a pre and post intervention. This aim was also achieved, and the nursing staff lowered the occurrence of delirium by 70% on the intervention unit. Despite all the missed assessment, the delirium bundle was successfully reduced by the targeted aim of greater than 10%. There are multiple reasons why this aim was overwhelmingly achieved and one the primary ones is the motivation and drive of the project leader, the nursing staff and nursing leadership. Delirium comes with significant mortality and morbidity.

The project leader drive and tenacity were one of several reasons for the decrease in the rate of delirium. For 30 days the project leader was on the intervention unit during nursing rounds to encourage the nurses to assess for delirium and implement the bundle. The project leader was a constant presence to help answer any questions or help with any concerns. Several hospital and nursing leaders were united in their support of the QI project and expressed their appreciation for the intervention bundle because it had the capability of significantly decreasing the costs of our health care system. The nursing staff were also motivated to implement the intervention bundle because it increased patient safety by decreasing the rate of falls. These factors together were likely the most important variables that led to such a significant decrease in the rate of delirium.

This QI project successfully decreased the rate of delirium on one medical surgical unit by 70%. The impact of this decrease has significant effect on our national and local state health systems, hospital staff, patients, and their families. For the national and state healthcare system, this ability to decrease the rate of delirium means less cost dedicated to managing and treating this syndrome. If a patient avoids developing this syndrome, this in turn leads to increased likelihood of discharge home. Less hospital days often leads to less cost to our health care system. In summary, the decreased rate of delirium leads to less hospital admission stay leading to decrease cost to our state and national budget.

The impact of this QI project on the hospital staff, specifically the nurses, is the increasing capability to keep patients safe. When a patient develops delirium, they have no sense of safety awareness leading to increased falls, which could cause significant injuries. The delirium bundle therefore was one of the tools that the nursing staff could implement to help keep patients safe while admitted to the hospital. Patients who are delirium-free get discharged on time. Timely discharge means less cost incurred by the patients and their families.

The delirium bundle had very minimal financial cost to the intervention unit. The cost that was incurred was mostly human capital which was the time and energy invested by the nursing staff into assessing for any delirium risk factors and then implementing the intervention bundle. Additional cost included printing signs and symbols to put in front of at-risk patients to alert the nurse's aides not to wake the patients for overnight vital signs. Compared to the positive gains made by implementing the bundle, this cost is worth the investment. The potential long-term gains of decreasing the rate of delirium can be immeasurable across the whole macrosystem.

Comparing the results to other past QI studies shows similarities in decreasing the rate of delirium but at a widely different percentage rate. The decrease in the rate of delirium varied widely from what was found in the articles identified during the systematic review of literature. The decrease

rate of delirium varied from a low of 12% to a high of 66%. Martinez et al (2011) in their QI project were able to decrease the rate of delirium by 7.7%. Hosie et al in 2020 had a 12% decrease in the rate of delirium from 32% to 20%. The highest and closest decrease in the rate of was to that of a QI project by Andro and his team. Andro et al in 2011 during their implementation of the intervention bundle were able to decrease the rate of delirium by 66%, close to the 67 % achieved by this QI project.

Limitation

This QI project had major accomplishment of decreasing the rate of delirium by greater than 10% and greater than 90% implementation of the bundle, but conversely it also had many limitations. One of the major limitations was the failure to accomplish the aim of 90% identification of patients at risk of delirium. This limitation was most likely due to the inability of the nursing staff to allocate time to attend the training sessions. The CV-19 pandemic was another major variable that could account for the QI project's inability to accomplish this goal. Hospital and nursing leadership shifted resources to manage the pandemic, and QI project did not garner the attention it otherwise would have been given. The lack of adequate resources and leadership focus could be a strong reason for the failure to accomplish the first aim.

Another limitation of this QI project was that it was implemented just one unit a very large health care system. The health care system has several locations with multiple units and different specialties. It is very difficult to ascertain if the results of the QI intervention could have similar impact on other units or locations in the whole health care macrosystem system. It therefore remain to be seen if the intervention project could be able to penetrate and have the same effect that it did on the intervention floor.

The inability to electronically perform a retroactive chart review is limitation of this project. A manual 30-day patients chart review was performed and compared to an electronic mode. The EPIC electronic health record did not have the capability to retroactively save delirium data. Therefore, a manual chart review was the primary method used to extract data. Compared to other nurse sensitive such as falls, pressure ulcers, catheter-associated infections, the electronic health record did not offer that ability to do a retroactive electronic chart review. Therefore, a manual chart review was the only reasonable alternative option.

Another major limitation of this project was the inability to account for confounders. It is very likely that the 15% decrease in the rate of delirium could be attributed to confounders such as timing of the intervention, nursing staff experience, motivation of nursing leadership, availability of resources and patient characteristics such as age, sex, and race/ethnicity. Future studies can be a barometer that could tell us about the role confounders play in the results.

This QI study did not assess for any racial or ethnic inequities in the rate and occurrence of delirium. It is well known that there exist major racial and ethnic disparities not only in access to health but also the quality. Minority populations such as Black and Hispanics disproportionally suffer from chronic diseases such as hypertension and diabetes. This QI project could have shown if there exist any differences in racial and ethnic disparities in the risk of hospital acquired delirium.

Conclusions

This quality improvement project has the potential to serve as a useful template for future quality improvement projects that seeks to prevent or reduce the rate of delirium in hospitalized adult patients over the age of 65 years. It sets an example for future quality improvement projects to help successfully extract pre and post implementation data, how to analyze data and implement delirium

preventative measures. Even though, this QI study failed to achieve the first aim, the suggestions will help future QI projects to better achieve their aims.

The inability of the nursing staff to identify 31 patients, could most likely be due the prevalence of CV-19 pandemic. This pandemic did put significant stress on nursing staff that led to many nurses moving to different units and new careers. This led to the influx of many newly trained nurses working on the unit. These new nurses not only lack the skills but the time to train on identifying patients at risk of delirium. It is possible that if more time is devoted to teaching, more patients will be identified and have the intervention bundle implemented into their plan of care.

This project has the capability to penetrate not only the hospital unit where the implementation took place, but other units in the hospital macrosystem. This is possible because there is little to no cost involved in applying the intervention bundle. All the resources needed are already available on the hospital unit, what is needed in the nursing staff to be afforded time to assess for risk and upload the delirium bundle into the patients plan of care. The fact that there was a significant decrease in the rate of delirium suggests that this QI project become assimilated into nursing practice and become part of unit culture and eventually be incorporated into the whole hospital macrosystem.

Conclusion

This QI project accomplished two out of three of its overarching aim. Delirium has existed for many centuries and has caused immeasurable mortality and morbidity. Nursing literature focuses on patients over the age of 65 years old, but what about those patients who are not yet 65 years old. Should we then screen all our patients for risk of delirium. These questions can be better answered by further QI studies into how to better protect our vulnerable patients.

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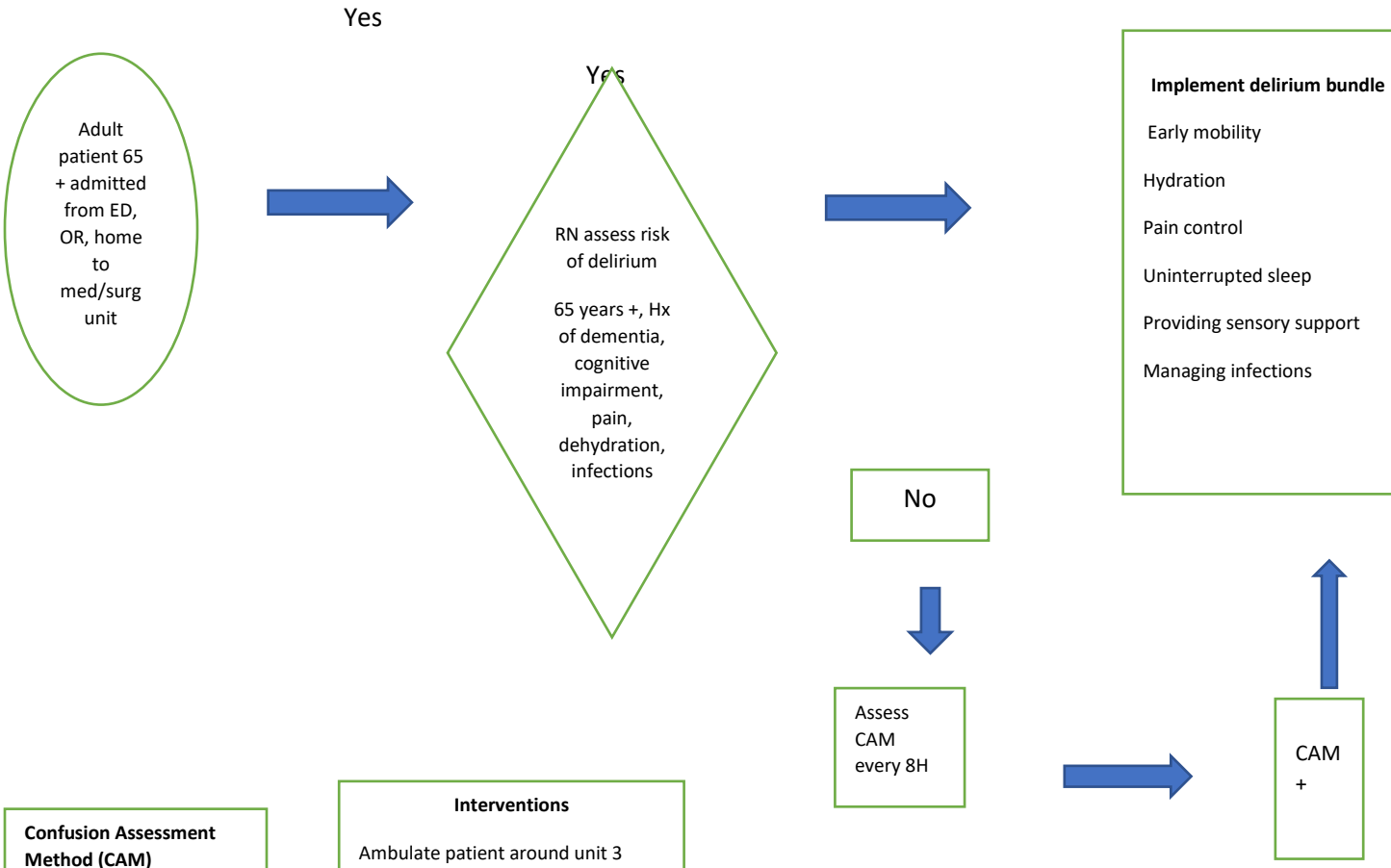
Table 1 : *Synthesis/Evidence Table*

Delirium Intervention	Number of studies	Significant Findings	Quality/Strength/Sample
Non-Pharmacologic Delirium Bundle **A. Hydration/Nutrition** **B. Sleep Promotion** **C. Pain management** **D. Early Mobility** **E. Provision of sensory support** **F. Frequent Re-orientation** **G. Presence of familiar objects**	**SMITH (2017):** Used delirium –pain control, sensory stimulation, early mobility, and sleep promotion-as interventions to manage delirium. **Martinez (2011)** Use delirium bundle—sensory support, Presence of familiar objects, Frequent Reorientation. **MARIO (2009)** Used the intervention bundle consisting of hydration/nutrition, sleep promotion **Andro (2011):** Used intervention bundle – hydration, nutrition, early mobilization, sensory support, and pain control-to delirium prevention. **Hosie (2020**): Intervention bundle used sleep promotion, sensory support, hydration, early mobility, and familiar objects—as interventions for delirium prevention **Inouye: (1999)** Delirium bundle used for intervention—hydration, sleep promotion, early mobility, sensory support **Vidan (2009)**: Delirium bundle used --- hydration, sleep promotion, early mobility, sensory support **Avedanos-Cespedes** (2016): Multi-component nurse intervention to reduce	**Smith:** 78% less incidence of delirium in the intervention than the control group **Martinez:** Delirium developed in 5.6% in the intervention group compared to 13.3 in the control group **Mario:** Medical floors where delirium. Delirium occurred in 8 of 121 patients admitted to intervention unit (6.6%) and in 20 of 131 patients admitted to control unit (15.2%). **Andro:** Implementing the delirium bundle of hydration, nutrition, early mobilization, pain management and sensory support decreased the incidence of delirium by approximately 66% **Hosie:** Non-pharmacological strategies including sleep, vision and hearing support, hydration and exercise/early mobility help decrease the incidence of delirium in the intervention group. 20% of patients in the intervention group became delirious compared 32% in the control group (p=0.5 **Inouye:** Rate and incident of delirium was significantly lower in the intervention group than the control group (9.9%) intervention group to (15%) in the control group 95% confidence **Vidan:** The rate of new episodes of delirium during hospitalization was significantly lower in the intervention group than in the UC group (11.7% vs 18.5%, P5.04, a 37% lower relative risk). One case of	**Smith:** 1, A N=149 Age average = 67 Women=75 (.62) Race White=76 (52.8) African American=42 (29.2) Hispanic=21 (14.6) **Martinez**: 1, A N=287 Intervention group=144 Control group=143 Age=78.2 Male=84 **Mario:** 1, A: N=121 252 patients (mean age 82.4 ± 4.1 year Gender 53% women **Andro:** 1, A N=372, Age=84.9 years, Men=44% **Hosie**: 1, A, N=56, Age=76, Male=41,Race=N/A **Inouye:** 1,A N=426, Age=79.6, Men=316 **Vidan**: 1, A , N=170, Age: 85.9 years, Female=106

	the incidence and severity of delirium in hospitalized older adults **Pitkala**: (2006) Multicomponent randomized control trial interventions for elderly inpatients with delirium	delirium was prevented for every 15 patients in the intervention group. **Avedanos-Cespedes:** Delirium prevalence decreased in the intervention group compared to the control group from (33.3% vs 48.3%) **Pitkala**: Cognition improved significantly in the intervention group compared to the control group (18.4 % vs 15.8%)	**Avedanos-Cespedes: 1, A,** N=50**,** Age=86.5**,** Gender=48% women **Pitkala**: 1, A, N=174, Age=83.8, Gender= Female75.9%

Figure 1: Macrosystem Flow Map



Confusion Assessment Method (CAM)

1. Acute or fluctuating mental status
2. Inattention
3. Disorganized thinking
4. Altered mental status

Scoring

Presence of # I and 2 with either 3 or 4

Interventions

Ambulate patient around unit 3 times daily

Standing and PRN pain control

Encourage oral fluid hydration and intravenous fluid administration

Avoid waking patient for vitals signs, lab draws while they are asleep

Correctly diagnose infections and providing treatment

Availability of audiovisual support to patients

Figure 2: Logic Model Preventing Delirium in Older Hospitalized Adults a Medical/Surgical Unit

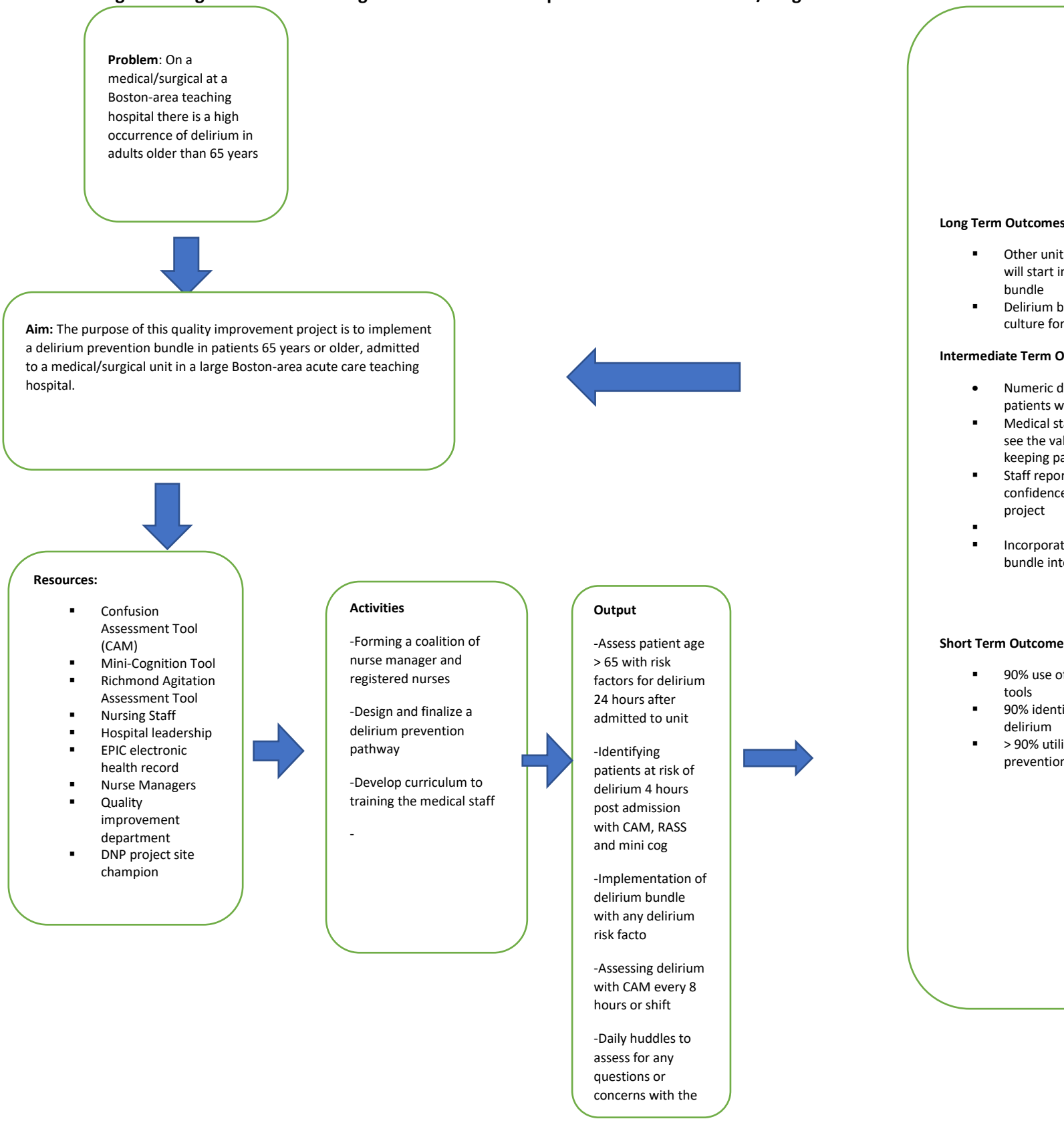


Figure 3: Fishbone Diagram

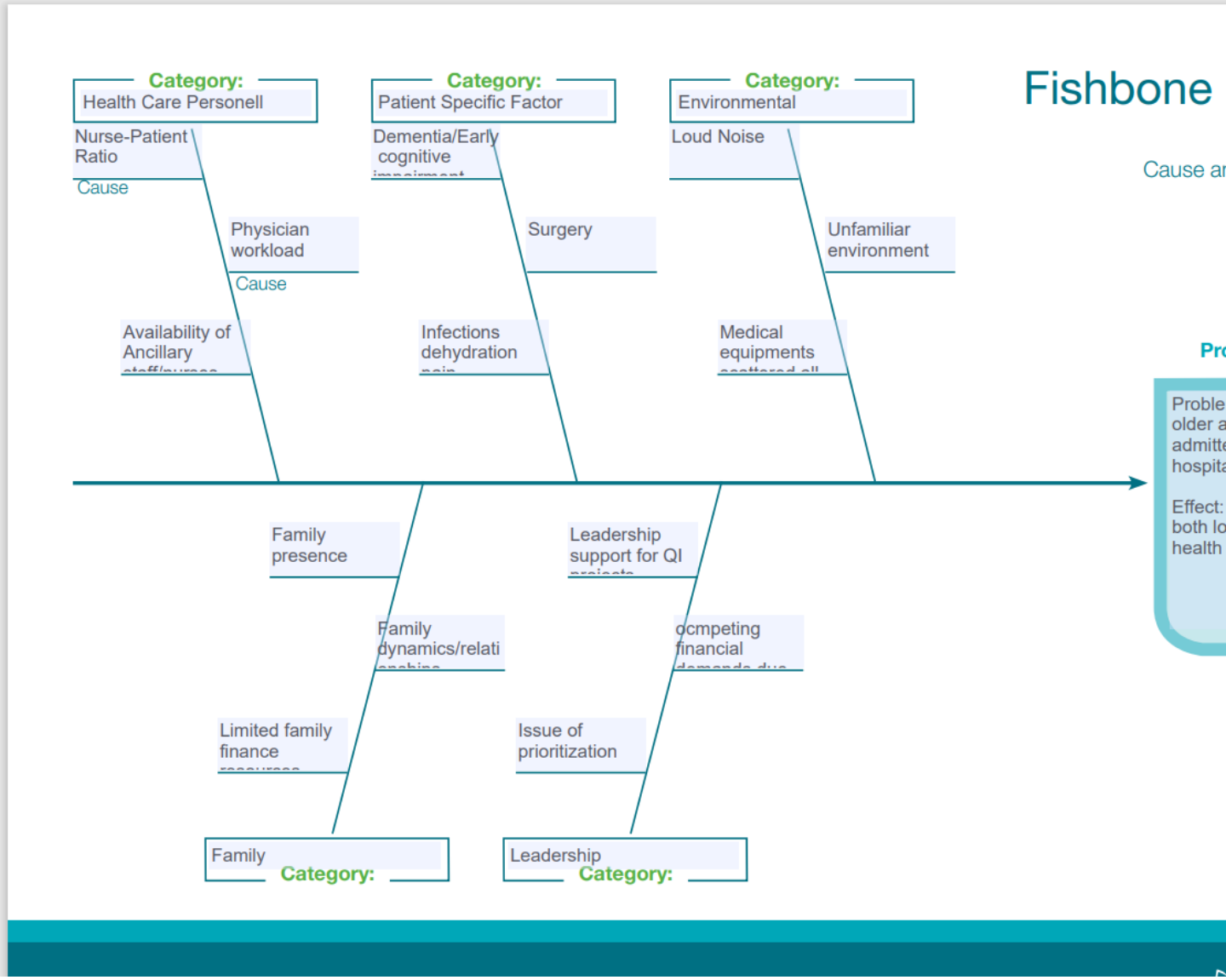


Figure 4: *Force Field Analysis*

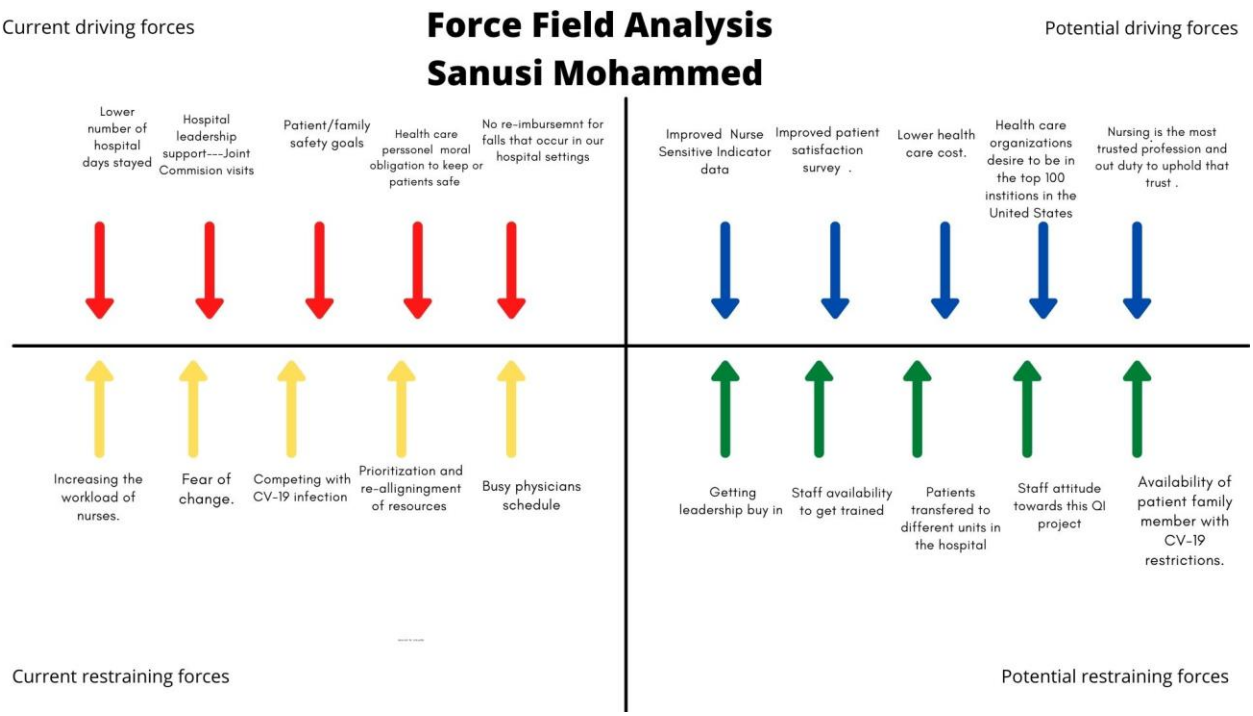


Table 2: ***Clinical Quality Improvement Checklist***

CLINICAL QUALITY IMPROVEMENT CHECKLIST		
Date:	**Project Leader: Sanusi Mohammed**	
Project Title: Strategies to Manage Delirium in Acute Care Hospital Settings		
Institution where the project will be conducted: Brigham and Women's Hospital		
Instructions: Answer YES or NO to each of the following statements about QI projects.	**YES**	**NO**
The specific aim is to improve the process or deliver of care with established/ accepted practice standards, or to implement change according to mandates of the health facilities' Quality Improvement programs. There is no intention of using the data for research purposes.	**X**	
The project is **NOT** designed to answer a research question or test a hypothesis and is **NOT** intended to develop or contribute to generalizable knowledge.	**X**	
The project does **NOT** follow a research design (e.g. hypothesis testing or group comparison [randomization, control groups, prospective comparison groups, cross-sectional, case control]). The project does **NOT** follow a protocol that over-rides clinical decision-making.	**X**	
The project involves implementation of established and tested practice standards (evidence based practice) and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **NOT** develop paradigms or untested methods or new untested standards.	**X**	
The project involves implementation or care practices and interventions that are consensus-based or evidence-based. The project does **NOT** seek to test an intervention that is beyond current science and experience.	**X**	
The project has been discussed with the QA/QI department where the project will be conducted and involves staff who are working at, or patients/clients/individuals who are seen at the facility where the project will be carried out.	**X**	
The project has **NO** funding from federal agencies or research-focused organizations, and is not receiving funding for implementation research**.**	**X**	
The clinical practice unit (hospital, clinic, division, or care group) agrees that this is a QI project that will be implemented to improve the process or delivery of care.	**X**	
The project leader/DNP student has discussed and reviewed the checklist with the project Course Faculty. The project leader/DNP student will **NOT** refer to the project as research in any written or oral presentations or publications.	**X**	
ANSWER KEY: If the answer to **ALL** of these questions is **YES**, the activity can be considered a Clinical Quality Improvement activity that does not meet the definition of human research. **UMB IRB review is not required**. **Keep a dated copy of the checklist in your files.** If the answer to ANY of these questions is NO, the project must be submitted to the IRB for review.		