

**A Restraint Alternative Program on the Neurotrauma Intermediate Care Unit**

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### **Abstract**

**Problem & Purpose:** Restraint use has been associated with risks to patient safety, including physical injury, cognitive and functional impairment, agitation and delirium, increased psychological distress for patients and family, and even death. The Joint Commission, Centers for Medicare and Medicaid Services, and the American Nurses Association all support the reduction of restraint use in order to improve patient safety. On a Neurotrauma Intermediate Care (IMC) unit at an urban, academic medical center, the prevalence of restraint use is consistently higher than the National Database of Nursing Quality Indicators mean. The purpose of this quality improvement project is to implement an evidence-based restraint alternative program consisting of a Restraint Decision Wheel, improved restraint alternative supply, and charge nurse restraint rounding in order to reduce restraint prevalence on the Neurotrauma IMC Unit.

**Methods:** Improvements in restraint alternative supply, provision of the Restraint Decision Wheel, and charge nurse restraint rounds were implemented on the unit. Staff training was provided on restraint alternatives and use of the Restraint Decision Wheel. The project champion team met twice monthly to strategize improvements to project implementation. Data were collected to evaluate adherence to process changes through electronic health record audits, survey, and restraint rounding forms. Outcome and balancing measures tracked included restraint prevalence and unintentional device removal. Data were analyzed using run charts.

**Results:** Restraint prevalence was variable throughout the early weeks of the project, but a non-random pattern was demonstrated by project completion with a shift of 6 consecutive points below the median. The median Restraint Decision Wheel Utilization was 43% and charge nurses rounded a median 21% of shifts per week. 10 unintentional device removal occurrences were reported during the project.

**Conclusions:** Implementation of the restraint alternative program was associated with a significant decrease in restraint prevalence. Use of the Restraint Decision Wheel was incorporated into practice more frequently than charge nurse rounding. No significant safety events occurred from unintentional device removal. Overall, implementation of a restraint alternative program is a low-cost, safe, and effective intervention for reducing restraint prevalence.

## Introduction

Non-violent, mechanical restraints are often used in hospital settings to protect patients from removing life-saving, therapeutic devices or to prevent falls. However, they can also lead to patient harm through physical injury and damage, cognitive and functional impairment, agitation and delirium, increased psychological distress for patients and family, and even death. (Johnson et al, 2016). The Centers for Medicare and Medicaid Services (CMS) define restraints as “any manual method, physical or mechanical device, material, or equipment immobilizing or decreasing the ability of the patient to move arms, legs, body or head freely in all hospital settings” (Center for Medicare Medicaid Services, 2008). In 2007, The National Database of Nursing Quality Indicators (NDNQI) stated that restraint prevalence is considered a nurse sensitive quality indicator (NSQI), therefore encouraging nurses to reform their restraint practices (Montalvo, 2007).

The Joint Commission (TJC), CMS, and the American Nurses Association all support the reduction of restraint use in order to improve patient safety (American Nurses Association, 2012; Centers for Medicare Medicaid Services, 2008; The Joint Commission, 2009). They recommend discontinuation as soon as possible, the use of less restrictive, alternative devices, and addressing underlying causes of agitation and delirium (Center for Medicare Medicaid Services, 2008; The Joint Commission, 2009). This places a national impetus on healthcare workers to optimize restraint practices, avoid the complications of restraint use, and provide safe, high-quality patient care.

Between January 2018 to December 2019, a quarterly restraint audit performed on a neurotrauma intermediate care unit (IMC) unit at an academic medical center demonstrated that there was a high prevalence of nonviolent, mechanical restraint use among the patients, ranging

from 4.4% to 27.3%, which was well above the NDNQI mean of 1.2 % to 2.5%. Neurotrauma patients are particularly vulnerable for restraint use due to their predisposition for agitation and confusion. Through internal interviews at this facility, high restraint prevalence was identified as a barrier to discharge to rehabilitation centers, many of which accept patients with one restraint or less. Therefore, the effects of high restraint prevalence on both patient and organizational outcomes should drive innovation to reduce the overall use of physical restraints. The purpose of this Doctorate of Nursing Practice (DNP) project was to reduce restraint prevalence on the Neurotrauma IMC Unit by implementing a restraint alternative program consisting of a restraint decision-making tool known as the Restraint Decision Wheel, improved restraint alternative supply, and charge nurse rounding.

### **Literature Review**

This literature review will provide a synthesis of the evidence supporting a restraint alternative program. The review includes five studies supporting the use of the Restraint Decision Wheel, improving restraint alternative supply, rounding on restrained patients, and non-pharmacological management of agitation (see Appendix A). The quality of the evidence was determined using the Melnyk and Fineout-Overholt (2015) Ranking System of Hierarchy of Evidence and Newhouse's (2006) quality of evidence rating system (see Appendix B). The synthesis will begin broadly with studies that demonstrated a reduction in restraint prevalence across a variety of settings, and then focus on interventions specific to the neurotrauma population.

Three studies supported restraint alternatives with additional interventions to reduce restraint prevalence. Hevener, Rickabaugh, and Marsh (2016) found that after implementation of a Restraint Decision Wheel (RDW), online educational activity with one-on-one staff discussions

about proper restraint use, introduction of restraint alternatives, and using mitts as a restraint alternative, there was a statistically significant reduction of restraint use in the medical-surgical intensive care unit (ICU) by 32% ( $p=0.02$ ). No unplanned extubations or disruptions of therapeutic devices occurred. In a Trauma ICU, Johnson et. al. (2016), demonstrated a statistically significant reduction in restraint prevalence after the implementation of an educational intervention about non-pharmacological approaches and restraint alternatives ( $p=0.008$ ). Finally, a quality improvement project across four acute care hospitals in one healthcare system applied a variety of interventions, including multidisciplinary rounds on restrained patients, increased availability of restraint alternatives, development of unit-based restraint champions, and education of staff and healthcare providers about restraints. This led to a sustained reduction in quarterly restraint prevalence of less than 2.26% with the exception of one variant quarter (Cosper, Morelock, & Provine, 2015). In addition, the authors reported that there was no correlation between restraint use and fall rates or self-extubation.

A systematic review was conducted to develop evidenced-based guidelines in the management of agitation crisis in patient with TBI (Luaute, Plantier, Wiart, Tell, & the SOFMER group, 2016). According to this review, non-pharmacological interventions for agitation crisis should include discarding non-essential tubes, lines and constraints, maintaining a therapeutic and safe environment, family involvement, normalizing sleep-wake cycles, and psychiatry consultations. One particularly useful non-pharmacological restraint alternative may be music therapy according to a small randomized crossover trial, which found that TBI patients experienced a statistically significant reduction in agitation during preferred music exposure than in the classical relaxation music exposure ( $p=0.046$ ), as measured by the Agitated Behavior Scale (ABS) (Park, Williams, & Lee 2016).

The level of evidence of these five studies ranged from level II to VI and were all given a low-quality rating for small sample populations or lack of control for confounding factors. Despite this, there are still important patterns in this literature synthesis that support a multifaceted approach to reducing restraint prevalence through improvement of non-pharmacological restraint alternative supply, the Restraint Decision Wheel, and multidisciplinary rounding. Although the studies are from a variety of settings and the neurotrauma population presents unique challenges in restraint use, the translation of these interventions to the patients on the neurotrauma IMC unit was determined to be a low-risk practice change with the potential for substantial benefit.

### **Theoretical Framework**

Kurt Lewin's Change Theory, a middle range theory, provides a way to understand and direct the evidence for practice change. In Lewin's Change Theory, organizational change is dependent on three, dynamic concepts: the driving forces that facilitate change, the restraining forces that oppose change, and the equilibrium of the two in which no change occurs. These forces act over three phases: unfreezing an organizational culture, changing behavior and attitudes, and refreezing new changes into a sustainable habit.

Lewin's Change Theory is an ideal middle range theory for this project, because implementing a restraint alternative program will engage staff to understand and challenge the restraining forces, behavior, and culture that maintain the status quo of restraint practice. By understanding those restraining forces, innovation can be targeted at reducing those restraining forces and enhancing driving forces. In the unfreezing phase, staff will be mobilized to critically think about their application of physical restraints and cultivate a culture that values appropriate restraint reduction. Leadership will increase the feasibility of a practice change by improving

restraint alternative availability, engaging with staff, and identifying change champions. In the changing phase, staff will actively alter their behavior and skills through process changes such as using the RDW, utilizing more restraint alternatives, and performing restraint rounds as charge nurses. In the refreezing phase, measures to ensure sustainability of the practice change will include eventual EHR incorporation, reference availability, continuing rounding, and education for new staff through online modules. These phases are dynamic and continually cycling through each other as new challenges to the practice change emerge.

### **Methods**

This quality improvement project took place on a 24-bed Neurotrauma Intermediate Care Unit at an urban, academic medical center. The intervention was targeted towards the unit's nursing staff, which included 38 registered nurses (RN) and 19 patient care technicians. The patient population consisted of adult patients with diagnoses including, but not limited to, traumatic brain injury (TBI), spinal cord injury, subarachnoid hemorrhage, etc. The unit was identified for having a high restraint prevalence above the NDNQI mean, and restraint use was often a discharge barrier to rehabilitation facilities for patients with and without TBI.

The implementation team consisted of one project lead, two change champions, the unit nurse manager, and the assistant nurse manager. There were several evidence-based interventions that were implemented: an improvement in restraint alternative supply, the Restraint Decision Wheel, and charge RN rounding. During the first two weeks of the implementation phase, staff were requested to attend a 30-minute training session over video conferencing to learn about these interventions. Improvements in restraint alternative supply included increasing visibility of current restraint alternatives with bright pink labels, as well as stocking new restraint alternatives, such as puzzles, coloring supplies, games, books Bluetooth

speakers, glasses, eye masks, ear plugs, and diversional activity boards. New restraint alternatives were placed in two supply carts on the unit (see Appendix C). The second intervention was the implementation of a Restraint Decision Wheel (RDW), which prompted nurses to assess patients on a behavior level, device level, and independence level, to help them determine if restraints, restraint alternatives, or no-restraints were appropriate (Appendix D). The RDW was supplied as a badge card to all nurses for quick reference. Finally, the third intervention was charge RN rounding for restrained patients during each shift to encourage utilization of the RDW (Appendix E).

The effectiveness of the interventions was evaluated using structure, process, and outcome measures. The structure measure of staff training was measured through attendance sheets and improvements in restraint alternative supplies were evaluated through observation. The process measures were RDW utilization and charge RN rounding. The process measure of RDW use was tracked using twice weekly staff surveys, administered electronically via QR code (see Appendix F) Charge RNs were provided a rounding form to complete for their restraint rounds, which also functioned as the data collection method for this process measure. The outcome measure of restraint prevalence was collected via EHR audits and calculated per National Database of Nursing Quality Indicators standards, which is restraint occurrences divided by number of adjusted patient days and multiplied by 100 for a restraint rate over 1000 adjusted patient days. Finally, to track if restraint alternative was associated with an increase in complications, unintentional removal of medical devices was measured via survey (see Appendix F). These measures were analyzed using run charts to describe the trends over time.

Several strategies were used to overcome implementation barriers and refine the project overtime. Staff were incentivized to attend training with gift cards towards a café. An online

module was created to reach remaining staff who were unable to attend. Twice monthly champion meetings developed strategies to overcome barriers throughout the project, such as improving staff communication, applying frequent reminders to enhance compliance, incentivizing with food, and re-educating staff.

This quality improvement project was determined to be Non-Human Subjects Research by the UMB Human Research Protections Office (HRPO). Measures were taken to protect the rights of the project participants and the patients through de-identification in data collection, storing of data on a password protected computer.

### **Results**

Baseline data collection began 5 weeks prior to project launch, and data collection continued throughout the 12-week implementation period. Of the full-time nursing staff, 72% of them received training in restraint alternatives and use of the RDW. For process measures, nurses reported utilization of the RDW a median of 43% of the time per shift on the surveys (see Figure 1). Run chart analysis demonstrated three surges of RDW utilization that occurred during increases in survey compliance. For charge RN rounding, charge RNs rounded a median 21% of shifts per week on restrained patients according to completed rounding forms (see Figure 2). Charge RN rounding remained low throughout the project with only 4 nonconsecutive weeks that were above the median.

Like the process measures, restraint prevalence was variable throughout the early weeks of the project, however, ultimately demonstrated a non-random pattern by project completion with a shift of 6 consecutive points below the median (Perla, Provost, & Murray, 2011). Specifically, median restraint prevalence throughout the implementation phase of the project was 16.9% and during the final 6 weeks of implementation the highest rate was 16.5% (see Figure 3).

Unintentional device removal was measured as a balancing measure, and according to survey data, a total of 10 unintentional device removal occurrences took place over the span of the project. The most frequent type of unintentional device removal reported during restraint liberation was removal of peripheral intravenous catheters.

During the project implementation phase, nurses verbally reported their experience in applying restraint alternatives. Many nurses described improvements in patient agitation through distraction, activities requiring concentration, and addressing sensory deficits. These improvements eventually led to nurses being able to remove restraints for hours or entire shifts. Overall, feedback from nursing conveyed a positive transformation in safety culture and a heightened awareness for opportunities for restraint removal.

### **Discussion**

Implementation of the restraint alternative program was associated with a significant decrease in restraint prevalence. There was greater incorporation of RDW utilization in practice than charge nurse rounding. Charge RNs reported increased workload burden and staffing shortages due to the COVID-19 pandemic as barriers to complying with restraint rounding. Despite low compliance to charge RN rounding, the unit still demonstrated a successful practice change and decrease in restraint prevalence. This may suggest that factors other than charge RN rounding played a greater role in the successful outcome of the project.

Biweekly project champion team meetings were crucial in strategizing innovations to overcome project barriers, engaging staff, and improving compliance to process measures. This was also reflected in the literature, which attributed consistent champion engagement for having the largest impact on restraint practice changes (Cosper et al, 2015). Nurses applied restraint alternatives and utilized the RDW as it was reinforced by their peers and became a prevalent

behavior on the unit. Although there were 10 unintentional device removal occurrences throughout the project, no significant safety events from unintentional device removal. These findings were similar to those in the literature, which also observed some unintentional device removal occurrences without adverse events while demonstrating significant decreases in restraint prevalence (Hevener et al, 2016). Strengths of the project include frequent engagement of the project champion team with bedside nurses and the support of unit leadership for the project. Continuing project champion engagement, maintaining restraint alternatives supplies, creating an online module for restraint alternative program training for onboarding nurses, and incorporating the RDW into the electronic health record will support the sustainability of the project.

Limitations to the project include its generalizability, as it was conducted in on a single unit with a specific neurotrauma patient population. The neurotrauma patient population is particularly prone to agitation and delirium, which may make attempting restraint alternatives difficult. Additionally, the reliance of self-reported surveys for data collection was limited by staff forgetfulness and reporting bias, and therefore may have underestimated results, as evidenced by low survey compliance throughout the project. Finally, the project was implemented during the 2020 COVID-19 pandemic, which diverted resources, attention, and staffing from quality improvement projects.

### **Conclusion**

On the Neurotrauma IMC unit, implementation of a restraint alternative program was a low-cost, safe, and effective intervention that significantly reduced restraint prevalence. By reducing restraint prevalence, nurses minimize opportunities for restraint-related harm and improve the quality and safety of patient care. Future projects that aim to implement a restraint

alternative program should consider implementation of restraint alternative training, the Restraint Decision Wheel, and restraint rounding in a stepwise method to optimize uptake of each component restraint alternative program before progressing onward. They should also consider engaging the multidisciplinary team in discussions of restraint alternatives and consider restraint alternatives supplies in unit budget planning. This project demonstrates that, with champion engagement with nursing staff, implementation of restraint alternative supplies, a Restraint Decision Wheel, charge RN rounding can be successful in reducing restraint use in a challenging patient population and inciting a transformation in nursing practice.

## References

- American Nurses Association. (2012). Reduction of Patient Restraint and Seclusion in Health Care Settings. *American Nurses Association*. <https://www.nursingworld.org/practice-policy/nursing-excellence/official-position-statements/id/reduction-of-patient-restraint-and-seclusion-in-health-care-settings/>
- Center for Medicare Medicaid Services. (2008). CMS Manual System Publication 100-07 State Operations. 13<sup>th</sup> ed. Baltimore, MD: Centers for Medicare and Medicaid Services.
- Cosper, P., Morelock, V., & Provine, B. (2015). Please Release Me: Restraint Reduction Initiative in a Health Care System. *Journal of Nursing Care Quality*, 30 (1). Doi: 10.1097/NCQ.0000000000000074.
- Hevener, S., Rickabaugh, B., & Marsh, T. (2016). Using a Decision Wheel to Reduce Use of Restraints In a Medical-Surgical Intensive Care Unit. *American Journal of Critical Care*, 25 (6). Doi: <http://dx.doi.org/10.4037/ajcc2016929>.
- Johnson, K., Curry, V., Steubing, A., Diana, S., McCray, A., McFarren, A., & Domb, A. (2016). A non-pharmacologic approach to decrease restraint use. *Intensive and Critical Care Nursing*, 34. Doi: <http://dx.doi.org/10.1016/j.iccn.2015.08.004>.
- Luante, J., Plantier, D., Wiart, L., Tell, L., & the SOFMER Group. (2016). Care management of the agitation or aggressiveness crisis in patients with TBI. Systematic review of the literature and practice recommendations. *Annals of Physical and Rehabilitation Medicine*, 59. Doi://dx.doi.org/10.1016/j.rehab.2015.11.001 1877-0657/.
- Melnyk, B.M. & Fineout-Overholt, E. (2015). *Evidence-based practice in nursing & healthcare: A guide to best practice (3rd ed.)* Philadelphia, PA: Wolters Kluwer Health.

Montalvo, I. (2007). The National Database of Nursing Quality Indicators (NDNQI). *The Online Journal of Issues in Nursing*, 12(3). Doi: 10.3912/OJIN.Vol12No03Man02

Newhouse, R. (2006). Examining the source for evidence-based nursing practice. *The Journal of Nursing Administration*. Volume 36, Number 7/8, pp 337-340

Park, S., Williams, R., & Lee, D., (2016). Effect of Preferred Music on Agitation After Traumatic Brain Injury. *Western Journal of Nursing Research*, 38 (4). Doi: 10.1177/0193945915593180.

Perla, R., Provost, L., & Murray, S. (2011). The run chart: a simple analytical tool for learning from variation in healthcare processes. *British Medical Journal Quality & Safety*, 20. Doi: 10.1136/bmjqs.2009.037895.

The Joint Commission. (2009) Online standards and FAQ Retrieved from:

[http://www.jointcommission.org/standards\\_information/jcfaqdetails.aspx?StandardsFaqId=260&ProgramId=47](http://www.jointcommission.org/standards_information/jcfaqdetails.aspx?StandardsFaqId=260&ProgramId=47). Published October 6, 2009.

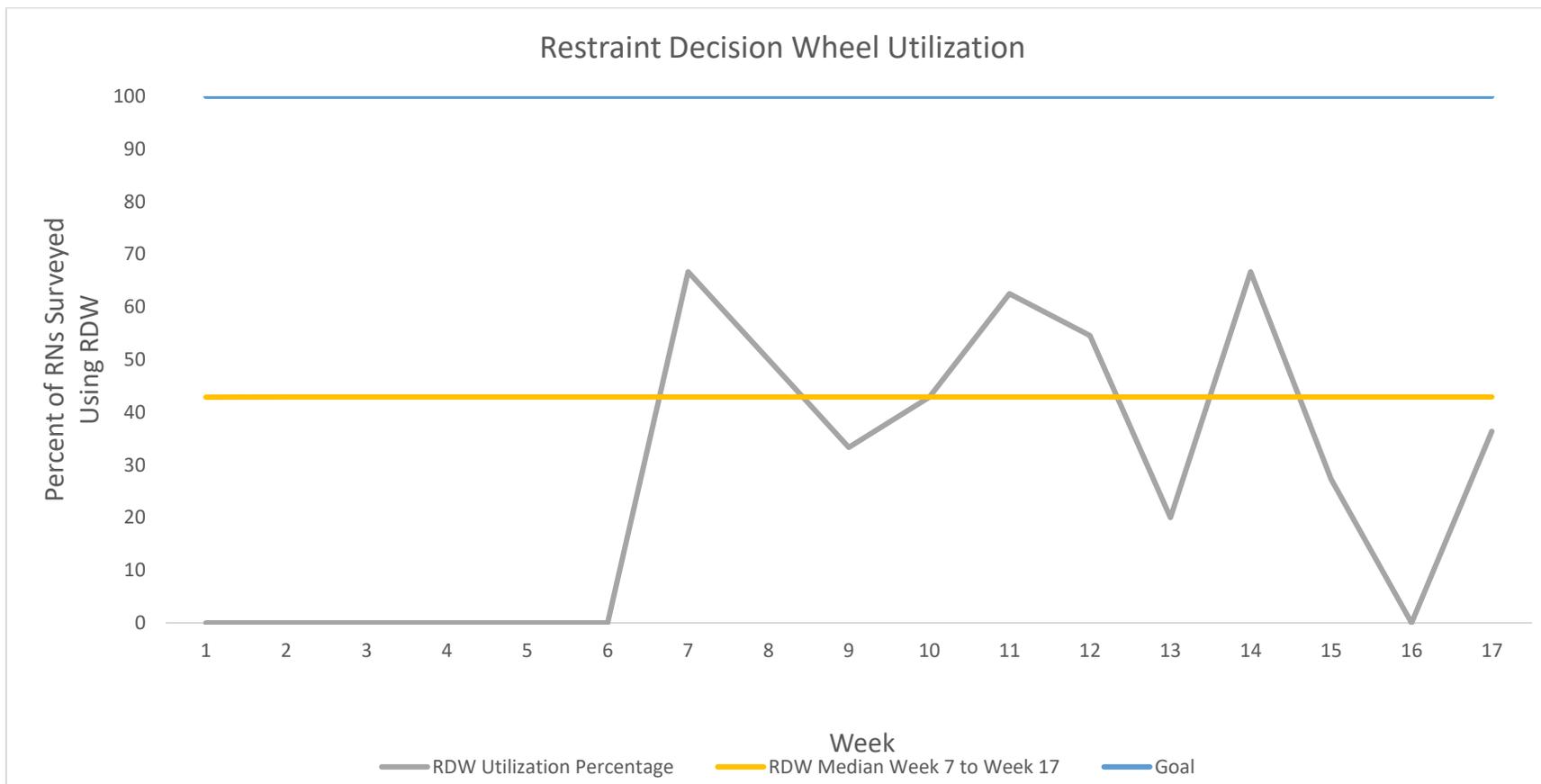
The Joint Commission. (2019). Patient Safety Systems. *Comprehensive Accreditation Manual*

*for Hospitals*. Retrieved from: [https://www.jointcommission.org/-/media/tjc/documents/standards/ps-chapters/20190701\\_2\\_camh\\_04a\\_ps.pdf](https://www.jointcommission.org/-/media/tjc/documents/standards/ps-chapters/20190701_2_camh_04a_ps.pdf)

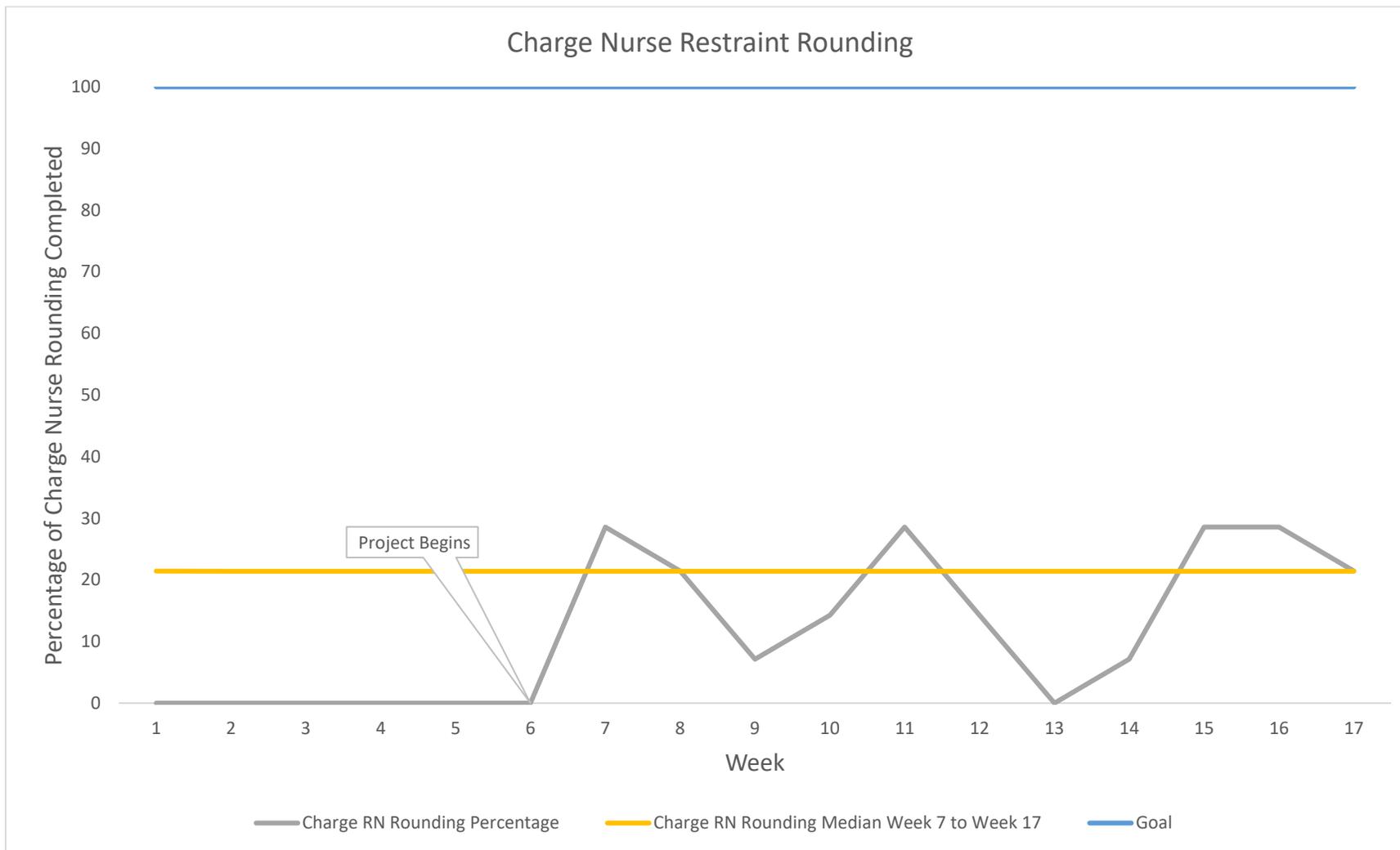
The Joint Commission. (2020). Sentinel Events. *2020 Comprehensive Accreditation Manual for*

*Hospitals*. Retrieved from: [https://www.jointcommission.org/-/media/tjc/documents/resources/patient-safety-topics/sentinel-event/20200101\\_2\\_camh\\_24\\_se.pdf](https://www.jointcommission.org/-/media/tjc/documents/resources/patient-safety-topics/sentinel-event/20200101_2_camh_24_se.pdf)

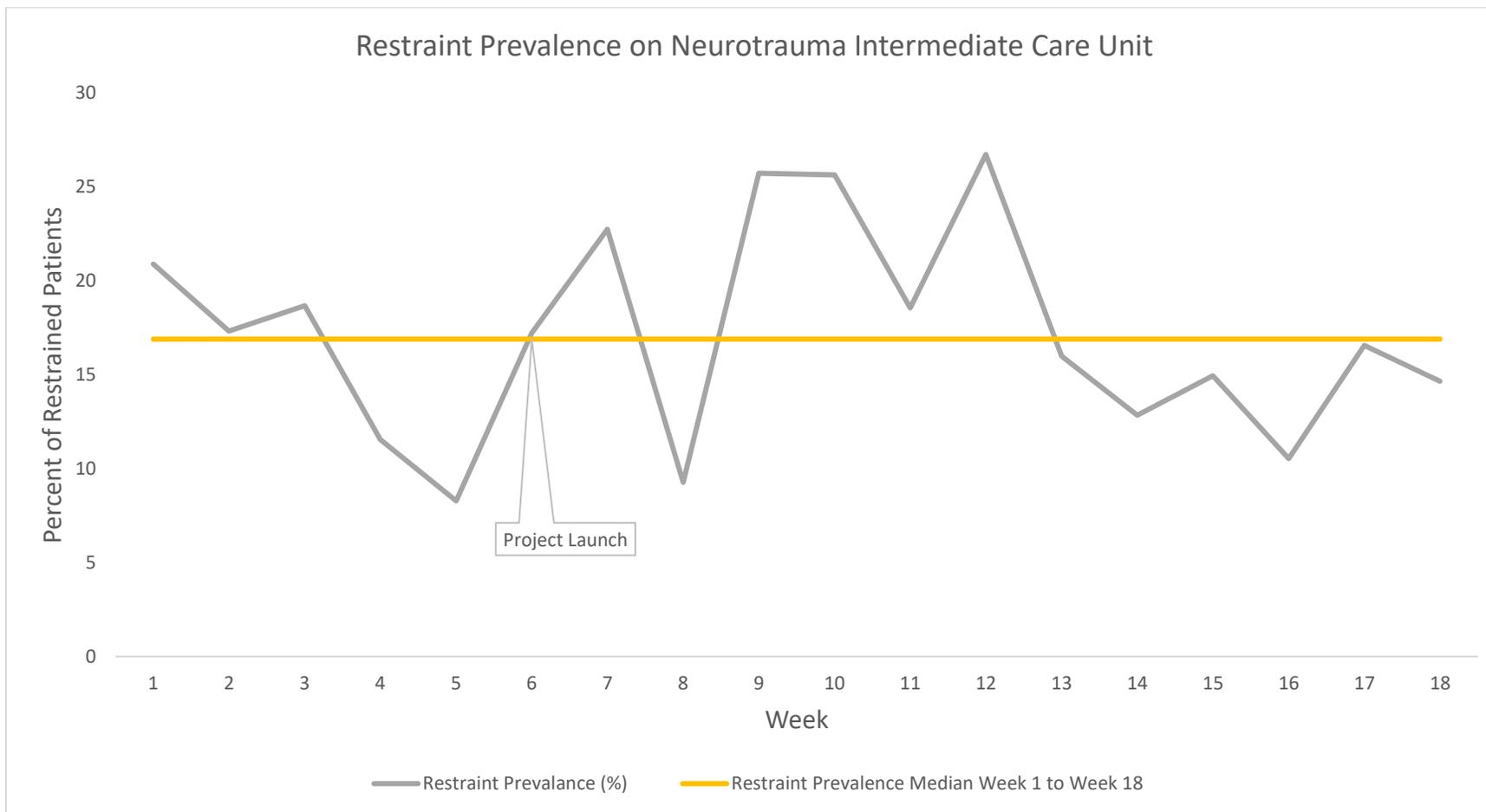
**Figure 1**  
Restraint Decision Wheel Utilization Run Chart



**Figure 2**  
Charge Nurse Restraint Rounding Run Chart



**Figure 3**  
Restraint Prevalence Run Chart



**Appendix A**  
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Evidence Review Table

Citation: Hevener, S., Rickabaugh, B., & Marsh, T. (2016). Using a Decision Wheel to Reduce Use of Restraints In a Medical-Surgical Intensive Care Unit. <i>American Journal of Critical Care</i> , 25 (6). Doi: <a href="http://dx.doi.org/10.4037/ajcc2016929">http://dx.doi.org/10.4037/ajcc2016929</a> .					Level III
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
“To decrease use of restraints in a medical-surgical intensive care unit and to determine if the Restraint Decision Wheel is useful in helping bedside nurses determine whether or not to restrain a patient”	Pre- and post-test quasi-experimental design	<b>Sampling Technique:</b> Non-randomized <b># Eligible:</b> 32 nurses <b># Accepted:</b> 32 nurses <b># Control:</b> 32 nurses <b># Intervention:</b> 32 nurses <b>Power analysis:</b> N/A <b>Group Homogeneity:</b> “The ages of the 32 participants ranged from 21 to 60 years; 85% were women. Education levels were bachelor of science in nursing (61%), associate degree in nursing (18%), and master of science in nursing (18%). Most nurses (77%) worked 31 hours or more per week, and 60% had 10 years or more of critical care experience. “	<b>Control:</b> Pre-intervention, baseline data from one month prior <b>Intervention:</b> A Restraint Decision Wheel (RDW).  <b>Intervention fidelity:</b> Month One intervention consisted education of the RDW via online learning modules. Month Two was incorporation of RDW into practice. Month Two to Four was data collection and post study survey.	<b>DV:</b> Restraint use, incidence of device dislodgement  <b>Measurement tool (reliability), time, procedure:</b> A Device Dislodgement Reporting Form was developed to measure device dislodgement, (unvalidated tool). Restraint incidence was collected via electronic health record, with quarterly and monthly aggregate data, as well as for day shift and night shift.	<b>Statistical Procedures: Results:</b> There was a statistically significant difference in restraint incidences before and after the use of the RDW by 32% (p=0.02), and there were no adverse events reported such as dislodgement of endotracheal tubes, chest tubes, gastrointestinal tubes, or ventriculostomy.
Citation: Cosper, P., Morelock, V., & Provine, B. (2015). Please Release Me: Restraint Reduction Initiative in a Health Care System. <i>Journal of Nursing Care Quality</i> , 30 (1). DOI: <a href="https://doi.org/10.1097/NCQ.0000000000000074">10.1097/NCQ.0000000000000074</a>					Level VI
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
“The purpose of this article is to describe a 2-year journey to reduce restraint	Quality Improvement Study	<b>Sampling Technique:</b> non-randomized, convenience sample <b># Eligible:</b> 4 acute care hospitals with over 1000 patient beds <b># Accepted:</b> 4 acute care hospitals with over 1000 patient beds	<b>Control:</b> 4 acute care hospitals pre-intervention <b>Intervention:</b> Multidisciplinary rounds on restrained patients, increased availability of	<b>DV:</b> Prevalence of restraint use  <b>Measurement tool (reliability), time, procedure:</b>	<b>Statistical Procedures(s) and Results:</b> Restraint prevalence rate decreased from 5.87% to

<p>prevalence in an academic health care system consisting of 4 hospitals and more than 1000 licensed beds that cares for adult patients.”</p>		<p><b># Control:</b> 4 acute care hospitals with over 1000 patient beds  <b># Intervention:</b> 4 acute care hospitals with over 1000 patient beds  <b>Power Analysis:</b> N/A  <b>Group Homogeneity:</b> N/A</p>	<p>restraint alternatives, development of unit-based restraint champions, and education on both staff and healthcare providers about restraints  <b>Intervention fidelity:</b> A interdisciplinary system-level restraint steering committee was formed, followed by the development of hospital champions. Restraint education, which included restraints, guidelines, legal and ethical issues, types of restraints and application, assessment and maintenance, alternative measures, and documentations via online course was given to nursing staff, respiratory therapists, and providers.</p>	<p>NDNQI Restraint Quarterly Prevalence Tool, measured weekly, and then monthly.</p>	<p>1.73%. Restraint prevalence sustained below 2.26% over two years with the exception of one variant quarter. There was no association between fall rates and restraint usage (<math>r^2=0.054</math>) or self-extubation (<math>r=0.001</math>). There was a correlation between decreased restraint utilization and decreased sitter utilization (<math>r^2=0.604</math>).</p>
<p>Citation: Luante, J., Plantier, D., Wiart, L., Tell, L., &amp; the SOFMER Group. (2016). Care management of the agitation or aggressiveness crisis in patients with TBI. Systematic review of the literature and practice recommendations. <i>Annals of Physical and Rehabilitation Medicine</i>, 59. <a href="https://doi.org/10.1016/j.rehab.2015.11.001">https://doi.org/10.1016/j.rehab.2015.11.001</a></p>					<p>Level V</p>
Purpose/ Hypothesis	Design	Sample	Intervention	Outcomes	Results
<p>“To conduct a critical review of the literature, confronted to experts’ opinion, in order to propose evidence-</p>	<p>Systematic review without meta-analysis, conducted by a group of researched and reviewed by an interdisciplin</p>	<p><b>Search Strategy:</b>                  “A literature review was conducted on Medline in French and English from January 1990 to March 2012. Search terms used included a combination of the following keywords: “Brain Injuries, craniocerebral Trauma, Brain trauma*, Head injur*, Head trauma*, Crisis, , Brain Injuries/drug therapy...”. (see article for complete search</p>	<p><b>Interventions:</b>                  Interventions that were identified by the systematic review were categorized into non-pharmacological and pharmacological management of agitation crisis in TBI patients.</p>	<p><b>Dependent Variable:</b>                  Agitation and aggressive crisis in TBI patients.</p>	<p>When an agitation crisis occurs, clinicians should work to find an underlying cause such as pain or medications (expert opinion). Non-pharmacological interventions include discarding non-essential tubes, lines and</p>

<p>based practice guidelines regarding the treatment of agitation and aggressiveness.”</p>	<p>ary group of professionals.</p>	<p>terms) An additional research was performed up to June 2015 without the help of the French Health Authority. Finally, researches were conducted on books and articles not referenced in this database.” Articles that did not target traumatic brain injury patients, evaluate specific interventions, or evaluation agitation or aggressive disorders were excluded. The articles were systematically analyzed and used alongside the expert opinion interdisciplinary group to develop practice recommendations.”  <b># Eligible:</b> 194 Articles. Randomized control trials, open studies without a control group, case series and clinical cases were included.  <b># Excluded:</b> 164 articles were excluded if they did not include TBI patients, no specific intervention was evaluation, or there was no specific evaluation of aggressive disorders or agitation.  <b># Accepted:</b> 30 Articles, 376 patients  <b>PRISMA:</b> Included detailed decision making criteria for excluding and including studies is present in this systematic review.</p>			<p>constraints, maintaining a therapeutic and safe environment, family involvement, normalizing sleep-wake cycles, and psychiatry consultations (expert opinion).                  Pharmacological management can include neuroleptic agents (expert opinion) beta blockers (grade B) and antiepileptics with mood regulation effects (grade C). Antidepressants, neuroleptics, benzodiazepines, and buspirone are considered second line agents (expert opinion)</p>
<p>Citation: Park, S., Williams, R., &amp; Lee, D., (2016). Effect of Preferred Music on Agitation After Traumatic Brain Injury. <i>Western Journal of Nursing Research</i>, 38 (4). DOI: <a href="https://doi.org/10.1177/0193945915593180">10.1177/0193945915593180</a></p>					
<p>Purpose/ Hypothesis</p>	<p>Design</p>	<p>Sample</p>	<p>Intervention</p>	<p>Outcomes</p>	<p>Results</p>

<p>“The purpose of the study were to evaluate the effects of preferred music compared to classical relaxation music on the reduction of agitation levels of patients with TBI.</p>	<p>Randomized cross-over trial.</p>	<p><b>Sampling Technique:</b> Computer generated randomization  <b># Eligible:</b> N/A  <b># Accepted:</b> 14  <b># Control:</b> 14  <b># Intervention:</b> 14  <b>Power Analysis:</b> 0.8 (p&lt;0.05)  <b>Group Homogeneity:</b>                  “11 male, 3 female patients. The average age was 34.64 years (SD = 13.66 years, range = 19-61 years:). The majority were Caucasian and suffered TBI from a motor vehicle accident. The average time from the date of accident to the time of data collection was 40 days (SD = 23.15 days, range = 15-105 days). The average GCS score at admission was 5.16 (SD = 1.34). The majority of patients (n = 12) exhibited severe cognitive impairment on the BNCE. The average ABS score before data collection was 28.57 (SD = 7.93, range = 21-46), indicating that all patients were agitated (greater than 21).”</p>	<p><b>Control:</b> Patients served as their own controls with one intervention followed by a “washout period” before the next interventions.                  Intervention:                  Classical “relaxation” music compared to preferred music   <b>Intervention fidelity:</b>                  “Patients in Group A received classical “relaxation” music on Day 1. On Day 2, patients went through the wash-out period to reduce the possible cumulative effects of the music intervention. Post wash-out period, on Day 3, patients received preferred music. Group B patients received this intervention in reverse order.</p>	<p><b>DV:</b>                  Agitation   <b>Measurement tool (reliability), time, procedure:</b>                   Measured by the Agitation Brain Score (ABS). The ABS has a high inter-rater reliability (r = .92) and high internal consistency (Cronbach’s <math>\alpha</math> = .92) in the neuro-rehabilitation population.</p>	<p><b>Statistical Procedures(s) and Results:</b>                  There was a statistically significant reduction in agitation during the preferred music exposure than in the classical relaxation music (p=0.046) using ABS scores (r=0.92, Cronbach’s alpha= 0.92), while there was no statistical significance in reduction of agitation with the classical relaxation music intervention (p= 0.76).</p>
<p>Citation: Johnson, K., Curry, V., Steubing, A., Diana, S., McCray, A., McFarren, A., &amp; Domb, A. (2016). A non-pharmacologic approach to decrease restraint use. <i>Intensive and Critical Care Nursing</i>, 34. Doi: <a href="http://dx.doi.org/10.1016/j.iccn.2015.08.004">http://dx.doi.org/10.1016/j.iccn.2015.08.004</a>.</p>					<p>Level III</p>
<p>Purpose/ Hypothesis</p>	<p>Design</p>	<p>Sample</p>	<p>Intervention</p>	<p>Outcomes</p>	<p>Results</p>
<p>“The aims of this study were to evaluate an education intervention used to decrease restraint use in patients in a</p>	<p>Pre-and post test quasi-experimental study</p>	<p><b>Sampling Technique:</b> Non-randomized convenience sample from one TICU  <b># Eligible:</b> 77 nurses  <b># Accepted:</b>56 nurses  <b># Control:</b>56 nurses  <b># Intervention:</b> 56 nurses  <b>Power Analysis:</b> N/A  <b>Group Homogeneity:</b></p>	<p><b>Control:</b>                  56 nurses served as their own control as a pre-intervention group.  <b>Intervention:</b>                  Powerpoint review of non-pharmacological interventions and alternative devices with</p>	<p><b>DV:</b>                  Restraint use and nurses’ perception of restraints.   <b>Measurement tool (reliability), time, procedure:</b></p>	<p><b>Statistical Procedures(s) and Results:</b>                  There was a statistically significant reduction in restraint use (p= 0.008) after implementation of the educational intervention of non-</p>

<p>Trauma Intensive Care Unit (TICU) and, to evaluate nurses' perceptions regarding restraints."</p>		<p>Of the 56 participants, 55% had their Bachelor degree, 33% had their Associates Degree, and 6% had their Masters in Science of Nursing or Diploma degree. Most nurses were female and had 1-5 years of experience.</p>	<p>hands on demonstration with the devices were provided in the TICU on both day and evening shift.</p> <p><b>Intervention fidelity:</b> To maintain fidelity and compliance, therapeutic alternative devices for agitation and delirium management was a standing agenda item at monthly staff meetings and shared government reviews for review and clarification. Charge nurses also included the intervention during their walking rounds.</p>	<p>Restraint use was measured by prevalence surveillance that was monitored daily and recorded monthly. A modified Perceptions of Restraint Use Questionnaire (PRUQ) was used prior to the intervention and after the intervention.</p>	<p>pharmacological approach and restraint alternatives.</p>
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**Appendix B**  
University of Maryland School of Nursing  
Synthesis Table

<b>Evidence Based Practice Question (PICO):</b> <i>In traumatic brain injury (TBI) patients in the neurotrauma IMC unit (P), does a multicomponent approach to restraint alternatives (I), as compared to standard practice (C), decrease overall restraint use (O)?</i>			
<b>Level of Evidence</b>	<b># of Studies</b>	<b>Summary of Findings</b>	<b>Overall Quality</b>
<b>II</b>	<b>1</b>	According to Park, Williams, and Lee (2016), TBI patients experienced a statistically significant reduction in agitation during preferred music exposure than in the classical relaxation music exposure (p=0.046), as measured by Agitated Behavior Scale (ABS) scores (r=0.92, Cronbach’s alpha= 0.92), while there was no statistical significance in reduction of agitation with the classical relaxation music intervention (p= 0.76).	(C). Low Quality: There was use of the ABS which is a valid and reliable tool, use of power analysis and effect size, use of blinding and inter-rater reliability, some measures used for control by using washout period, and fairly definitive conclusions. However, the sample size is small in this single center study, and it took place in the rehabilitation setting which therefore may limit generalizability.
<b>III</b>	<b>2</b>	<p>Hevener, Rickabaugh, and Marsh (2016) found that after implementation of a restraint decision wheel (RDW), online educational activity with one-on-one discussion about proper restraint use, restraint alternatives alternatives, and use of the RDW, and encouragement of using mitts as a restraint alternative, there was a statistically significant reduction of restraint use in the medical-surgical intensive care unit (ICU) by 32% (p=0.02). No unplanned extubated or disruptions of therapeutic devices occurred.</p> <p>In a Trauma ICU, Johnson et. al. (2016), had a statistically significant reduction in the prevalence of restraint use after the implementation of an educational intervention on non-pharmacological approaches and restraint alternatives (preintervention 314.5 days (SD=35.4) per 1000 patient days, postintervention 237.8 days (SD=56.4) per 1000 patient days, p= 0.008). The most common reason for using restraints was for preventing falls from the bed or chair. Post-intervention, the most commonly used alternatives included therapeutic and distraction devices, such as activity blankets, music, and distraction devices.</p>	<p>(C). Low Quality: Sample size is small, and multiple interventions were applied simultaneously. There are inconclusive results due to confounding factors and lack of control. For example, they introduced this RDW at the same time introducing a new product of mitts as a restraint alternative, which may have inflated results. Additionally, the setting was a single unit, and the medical-surgical ICU population may have key differences to TBI patient which may lack generalizability.</p> <p>(C). Low Quality: This study has a small sample size in a single unit. There is some control and consistency. There is use of validated tools to measure perceptions of restraint use with the PRUQ. Data is comprehensive and the literature review is recent and thorough. The study identified a period of time where there were higher admissions of adult patients in motor vehicle accidents and head injuries, and that non-pharmacological approaches were less effective with this age group (20 to 40 years) and diagnosis. This limits generalizability to patients of various diagnoses, including those of interest to this PICO.</p>

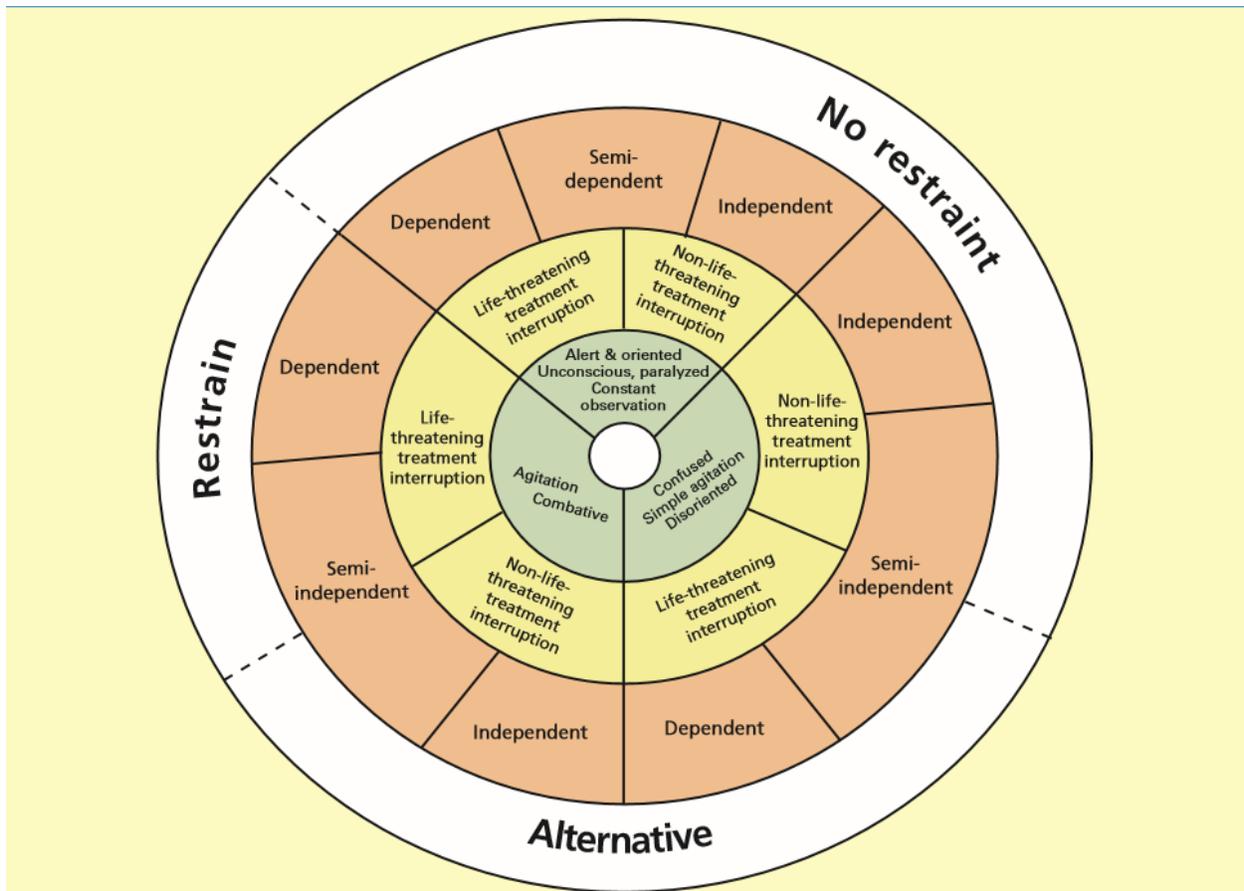
V	1	<p>Luaute, Plantier, Wiart, Tell, &amp; the SOFMER group (2016) completed a systematic review of the current literature in the management of agitation or aggressiveness crisis in TBI patient to propose some evidenced-based guidelines to treat the agitation crisis. According to them, when an agitation crisis occurs, clinicians should work to find an underlying cause such as pain or medications (expert opinion). Non-pharmacological interventions include discarding non-essential tubes, lines and constraints, maintaining a therapeutic and safe environment, family involvement, normalizing sleep-wake cycles, and psychiatry consultations (expert opinion). Pharmacological management can include neuroleptic agents in an acute situation where the patient poses harm to themselves or others (expert opinion), beta blockers of antiepileptics with mood regulation effects (grade B for beta blocker and C for antiepileptics). Antidepressants, neuroleptics, benzodiazepines, and buspirone are considered second line agents (expert opinion).</p>	<p>(C). Low Quality: Search strategies are limited to one database. The researched use is low quality, and much of the published data is greater than 10 years old. There were randomized control trials, non-randomized control trials, case series, and clinical cases used to support the pharmacological recommendations. There were no experimental studies used to support the non-pharmacological recommendations, only two synthetic literature reviews and the opinion of the experts of this working group. Overall, this systematic review is limited by its use of a single database, use of older evidence, and heavy influence of expert opinion which make it a high risk for bias and difficult to draw confident conclusions.</p>
VI	1	<p>In a quality improvement project by Cosper, Morelock, and Provine (2015), a variety of interventions was applied across four acute care hospitals in across one health system, including multidisciplinary rounds on restraint patients, increased availability of restraint alternatives, development of unit-based restraint champions, education of staff and health providers about restraints led to a sustained reduction in quarterly restraint prevalence of less than 2.26% with the exception of one variant quarter. There was no association between fall rates and restraint usage (<math>r^2= 0.054</math>) or self-extubation (<math>r= 0.001</math>). There was a correlation between decreased restraint utilization and decreased sitter utilization (<math>r^2= 0.604</math>).</p>	<p>(C). Low Quality: a variety of initiatives and interventions were applied that were not fully or specifically elucidated, therefore difficult to draw conclusions or generalize.</p>

## Appendix C

### Restraint Alternative Cart



### Appendix D Restraint Decision Wheel



Step 1	Step 2	Step 3
Behavior Level	Device Level	Independence Level
Level 1: AxOx3, unconscious, paralyzed, or constant observation  Level 2: Confused, Disoriented, Simple Agitation  Level 3: Agitated, Combative	<b>Non-Essential Treatment Interrupting:</b> PIVs, feeding, simple dressings and drains, monitoring devices, urinary catheters, rectal tubes. (Consider removal, securement, or concealment).  <b>Essential Treatment Interrupting:</b> Above may be considered essential depending on patient’s plan of care. Also, intracranial monitors, secured airways, chest tubes, and suprapubic catheters are considered essential.	<b>Independent:</b> Can sit in chair, bear weight, walk steadily  <b>Semi-Independent:</b> Slides in chair, bears some weight, unsteady gait, bradycardic/lightheaded/orthostatic with ambulation  <b>Dependent:</b> Unable to bear weight, unstable fracture, neuromuscular weakness, hemodynamically unstable

Hevener, S., Rickabaugh, B., & Marsh, T. (2016). Using a Decision Wheel to Reduce Use of Restraints In a Medical-Surgical Intensive Care Unit. *American Journal of Critical Care*, 25 (6). Doi: <http://dx.doi.org/10.4037/ajcc2016929>.

**Appendix E**  
 Charge Nurse Rounding Sheet  
**Reframe How You Restrain**  
**Charge Nurse Rounding Sheet**

We appreciate you completing this form once a shift as part Reframe How You Restrain Program on your unit to reduce restraint use.

Date: \_\_\_\_\_

Shift (circle one): AM    PM

If yes, please check:

Room	Restrained?	Alternatives Actively Attempted?	Restraint Decision Wheel Encouraged?
1			
2			
3			
4			
5			
6			
7			
8			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			

Total number of restrained patients on unit: \_\_\_\_\_

Comments:

Thank you! Please place in the “Completed” section of the binder for collection later this week.

## Appendix F Survey Questions

1. Which shift have you just worked?
  - a. Tuesday 7AM- 7PM
  - b. Tuesday 7PM- 7AM
  - c. Friday 7AM-7PM
  - d. Friday 7PM -7AM
2. Did you utilize the Restraint Decision Wheel during your shift today?
  - a. Yes
  - b. No
3. If yes, you did use the Restraint Decision Wheel, did you use it for (Select All that Apply)
  - a. A patient that might need restraints, but wasn't in them yet
  - b. A patient already restrained
  - c. A patient that had restraints removed, and wanted to keep them out of them with restraint alternatives
  - d. Other scenario
  - e. N/A. Did not use Restraint Decision Wheel
4. Which restraint alternatives did you apply today? (Select All That Apply)
  - a. Therapeutic Environment (sleep/wake cycles, noise, familiar objects, etc)
  - b. Safety
  - c. Sensory (pain management, visual aids, preferred music, hearing aids, encouraging oral care/diet, etc)
  - d. Cognitive ( activity board, distraction, puzzles, reading, etc)
  - e. Emotional (family presence/Zoom, etc) or Spiritual
  - f. Mobility
  - g. Device Securement (statlock, bridles, etc)
  - h. Device Concealment (skin sleeves, repositioning lines and tubes, etc)
5. Did your patient pull out or dislodge any devices by accident while you were attempting restraint alternatives? (IVs, NGTs, Foleys, Surgical tubes, etc?)
  - a. Yes
  - b. No



