

Reducing Use of Restraints in Intensive Care Units: A Quality Improvement Project

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BACKGROUND Use of physical restraints is scrutinized in intensive care units today. Usage rates for the 5 intensive care units in the Christiana Care Health Services, Newark, Delaware, were higher than the National Database of Nursing Quality Indicators mean rate of 9.61% to 15.43% for many months during fiscal years 2013 and 2014.

OBJECTIVE To reduce and sustain the restraint rates to less than the national database mean rates for all 5 intensive care units.

METHODS A quality improvement process was used that included forming a multiunit restraint collaborative; reviewing restraint data, including self-extubation rates; surveying staff nurses to examine alignment with evidence-based practice; and selecting a new restraint-alternative product.

RESULTS All 5 intensive care units were able to successfully decrease restraint rates to less than the national database mean for the majority of the months since the start of the restraint collaborative in September 2012.

CONCLUSION Use of a restraint collaborative with subsequent adoption of restraint alternatives led to a decrease in restraint rates for the 5 intensive care units to less than the national database mean, enabled sustained success, and helped align nurses' beliefs with evidence-based practice. (*Critical Care Nurse*. 2018;38[4]:e8-e16)

Use of physical restraints throughout health care institutions, particularly intensive care units (ICUs), has plagued health care providers who must balance the work of providing quality evidence-based care with keeping patients safe. In the 1990s, the use of physical restraints increased and became a standard in many ICUs as patients' severity of illness increased, leading to need for more intensive therapies.¹ Ultimately, the goal was to minimize the potentially harmful consequences of interference in therapies, such as removal of devices (eg, tracheal tubes, nasogastric tubes, chest tubes, ventriculostomy catheters, central venous access devices)¹⁻⁴ and falls.^{1,5,6} Despite the lack of evidence that they prevent harm,^{1,5-8} physical restraints are still often used in ICUs.^{3,6,9-13}

Once thought to be an unquestionable necessity for the safe care of ICU patients, physical restraints are now being scrutinized in the ICU as they have been in many other settings throughout health care systems.^{8,14} Consequences of physical restraint have been well documented and include increased agitation, increased risk for delirium,^{8,16} posttraumatic stress disorder,¹⁷ pressure injuries, increased length of stay,^{17,18} risk

for physical damage to limbs, emotional problems, and even death.^{5,17} For many ICU patients, risks for harm can increase because the patients are treated with mechanical ventilation and are receiving sedatives and analgesics, which can further alter mental states.¹⁷ Physical restraints may not only increase the risk for harm in patients but also increase moral distress in the nurses who care for the patients. The ethical balance in restraining patients relies on the principle of beneficence or being of benefit to the patient versus the principle of nonmaleficence or contributing to a patient's harm.¹⁸ The many studies of use of physical restraints in the ICU have ultimately yielded no absolutes for eliminating the use of such restraints but some solid recommendations for management while the restraints are in use and alternatives to help minimize their use.^{1,16}

Quality Outcomes

For more than 25 years, the National Database of Nursing Quality Indicators (NDNQI) has been the platform for measuring nursing quality in the United States.¹⁹ This national program measures many quality indicators (areas primarily affected by nursing care), including staffing ratios, falls, pressure injuries, and restraint use. With the NDNQI, participating health care organizations and specific health care units have access to a myriad of data that are benchmarked with similar organizations and units. The data and analysis provided by the NDNQI are nursing specific and thus empower nursing staff to engage in conversations and strategic plans to monitor performance and create interventions for improvement.

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Problem

Our health care system participates in and uses the NDNQI to benchmark use of physical restraints. The goal is to have a mean less than the benchmark NDNQI mean. Prevalence data are collected monthly on the nursing units and are posted within our system and submitted to NDNQI. Mean use of physical restraints in all 5 ICUs within our system during the 2012 calendar year was higher than the NDNQI mean, with a range of 4.17% to 45.83% for many of the months within the time span. In particular, the means of 2 of the largest ICUs were greater than the NDNQI mean 100% of the time, as noted in a 1-year retrospective review.

The general perception of our colleagues in critical care during discussions at critical care meetings and in unit-based interdisciplinary meetings and huddles was that restraints prevented self-extubation. We recognized that the rates of restraint use were high because perception of the need for the physical restraints was high. Like staff members at other institutions, our staff thought the restraints would help prevent adverse events and the consequences associated with the events. Additionally, our system had an inadequate number of alternative devices for nurses to use in place of physical restraints, a situation that further enhanced the use of restraints.

Over time, this lack of alternatives coupled with increasing evidence of the consequences of the use of physical restraints in the ICU became the impetus for the ICUs to join together, learn and share ICU-specific strategies, and create a plan to decrease use of physical restraints.

Survey results revealed that nurses believed that restraints prevented self-extubations.

We have 5 critical care units in our Magnet-designated 2-hospital system: 4 on the main campus (suburban) and 1 on a smaller campus (urban). The larger of the ICUs, the medical ICU (MICU) has 22 beds, provides care for patients with complex medical conditions, and is located on the main campus. The surgical critical care complex (SCCC) is a 20-bed unit also located on the main campus; its patient population consists of critically ill surgical patients and trauma patients. The 18-bed neuro critical care unit (NCCU) is the newest of the ICUs within the system; patients in this unit have primary neurological conditions. The cardiovascular critical care complex (CVCCC) is a multilevel unit with a cardiac

surgery ICU, a cardiac medical ICU, and cardiac step-down units. This multilevel unit has 30 beds; 16 are designated as ICU beds. The medical-surgical ICU (WICU) with 9 beds is the smallest in the system. The WICU is located on the smaller campus and provides care for medically and surgically critically ill patients, excluding severe trauma, cardiac surgery, and neurosurgery patients. All 5 ICUs have received Beacon awards from the American Association of Critical-Care Nurses; the MICU and the CVCCC received this honor multiple times.

Historically, these units had little interaction with each other, because each unit was specialized or separated by physical barriers. Additionally, with a shared decision-making structure, units are highly encouraged to evaluate opportunities for improvement in all areas of their work and ultimately create plans to streamline processes, improve patient care, and improve unit morale. Ultimately, initiatives could prove successful for 1 unit before members of other teams with similar concerns become aware of the initiatives, thus having multiple teams working on similar projects simultaneously, but

Involvement of clinical nurses in the collaborative helped to drive down restraint use.

separately. For example, the CVCCC worked on a strategy to decrease use of physical restraints on their patients in the immediate postoperative period after open heart surgery. The CVCCC staff successfully decreased the use to 0%, in addition to fewer days of mechanical ventilation, decreased number of patient self-extubations, and decreased use of sedatives.

Working independently of each other resulted in a specific unit's success with reduction in use of restraint not being shared; thus, other units struggled. This lack of communication between the units was a detriment to the overall restraint rate of the system, particularly all the ICUs; because solutions already in use were not shared, rates remained high. The mean rate of use of restraints had been greater than the NDNQI benchmark mean 100% of the time for the MICU and the SCCC and 50% of the time for the WICU from January 2010 through March 2012. The CVCCC was not reporting data to NDNQI during 2010 through 2012, and the NCCU had not opened yet.

Process

The systemwide and unit-based quality and safety teams, in addition to the restraint committee (nursing administrators, nurse managers, educators, bedside nurses, clinical nurse specialists) have monitored and compared restraint use for many years as part of NDNQI. Monthly prevalence is determined on all units by bedside nurses. If a patient has restraints in place, the patient's chart is reviewed for orders and proper documentation, and education is provided to staff if needed. Although the focus of this project was to minimize use of physical restraints (particularly soft limb restraints), activity focused on the care of patients in restraints is ongoing: how to determine who needs restraints, how to order restraints and how often to reassess their necessity, how often to assess patients, how to document use of restraints, and when to remove the restraints.

To determine why rates of use of physical restraints were greater than the NDNQI benchmark for most of the patient care units and to mitigate the reluctance to share information and resources with other units and departments (silo mentality), the systemwide restraint committee formed a restraint collaborative in September 2012. The collaborative consisted of bedside nurses, nurse educators, clinical nurse specialists, and nurse managers from units with high rates of restraint use, including the 5 previously noted ICUs, and from both facilities. The goal of the collaborative was to improve communication between the units, discuss barriers, review evidence-based practices, share unit best practices, and collectively engage in solving problems to provide safe patient care while working toward a restraint-free environment. The collaborative met 4 times between September 2012 and November 2012. In this time, they were able to look more closely at data for individual units, provide evidence-based education to support changes, and provide some coordination of these efforts between unit teams, as well as evaluate alternatives to physical restraints. The members of the collaborative team created flyers, posters, and educational presentations that were disseminated throughout the units.

The systemwide collaborative showed noted improvements in restraint reduction overall, a result that continued to put the spotlight on the areas with consistently high restraint rates: the ICUs. In 2013, as formal restraint collaborative work was continuing, the team recognized

that a greater effort was necessary to explore the restraint practices in the ICUs. Thus, members (led primarily by the clinical nurse specialists) from all ICUs, continued in the collaborative, focusing specifically on ICU reduction in use of physical restraints. The purpose of this quality improvement project was to reduce the mean rate of use of physical restraints to less than the NDNQI mean for all 5 ICUs in the health care system.

Staff Concerns

The initial information gathered from this smaller collaborative revealed a lack of baseline data on the current practice of using physical restraints and the attitudes of the nurses placing the restraints. An online nonvalidated survey tool, consisting of 6 questions was developed by the collaborative team and administered to all of the nurses to gain insight into the nurses' restraint practices. A total of 119 ICU nurses participated in the survey.

In addition to the survey, members of the collaborative team reported themes from conversations that had taken place at ICU unit-based meetings where outcomes and unit data are discussed. Consistent with information in current publications,⁶ nurses thought that restraints minimized self-extubation by patients. With continued discussions of restraint reduction initiatives, concern for an increase in the number of patients' self-extubations increased. Several additional barriers were identified by the collaborative team, including the lack of knowledge of NDNQI data and current evidence on use of restraints. A literature review on use of restraints and patient self-extubation was conducted and shared by the members of the collaborative team. The health care system's NDNQI expert also educated the team about the database: how the information is collected monthly, how it is interpreted, and a review of how to obtain and share each unit's data.

The lack of alternatives was identified as another barrier to removal of physical restraints. Nurses were reluctant to use the mitt product available at the time because the product was a poor fit for most patients and it limited access to hands for pulse oximetry and finger sticks and the ability to be tied. Like physical restraints, the current mitt product was confining and uncomfortable for the patients. Product research based on published findings, what other institutions were using, and questions discussed via email distribution

services (listserves), was done by members of the collaborative team, and a new mitt product was chosen for trial. All ICUs had an opportunity to evaluate the new product during a month-long period. A product survey created by members of the collaborative team comparing the new product with the mitt currently in use was completed by the bedside nurses who used the new product. A summary of the product evaluations was presented to the purchasing committee of our system, and the new mitt product was selected.

Throughout this process, members of the collaborative team reported directly to their unit teams. The unit teams were charged with integrating a reduction in the use of restraints locally. Bedside nurses are the key stakeholders and play a major role in providing education on reduction in the use of physical restraints, acting as mentors, and gathering feedback on their individual units. Information sharing was accomplished with a series of posters, emails, and newsletter updates. Monitoring use of restraints increased in some units to more often than the usual monthly monitoring.

Results

Restraint Rates

All 5 ICUs have been successful in lowering their unit's mean restraint rate since the start of the restraint collaborative in September 2012 and the more focused ICU efforts in 2013. Compliance (\leq NDNQI mean) has been at the target value for the MICU since February 2013 (Figure 1), the WICU since June 2013 (Figure 2), and the NCCC since January 2014 (Figure 3). The CVCCC mean has been less than or the same as the NDNQI mean with 1 exception (September 2015) since March 2013 (Figure 4). The SCCC mean has been less than or at the NDNQI mean for 26 of 32 months since November 2012 (Figure 5).

Self-Extubation Rates

Self-extubation rates for fiscal years 2013 and 2014 were collected by the respiratory department from electronic documentation. Each patient's chart was reviewed for verification of unit location at time of self-extubation, the presence of restraints, and whether or not the patient

The lack of alternatives was identified as a barrier for removal of physical restraints.

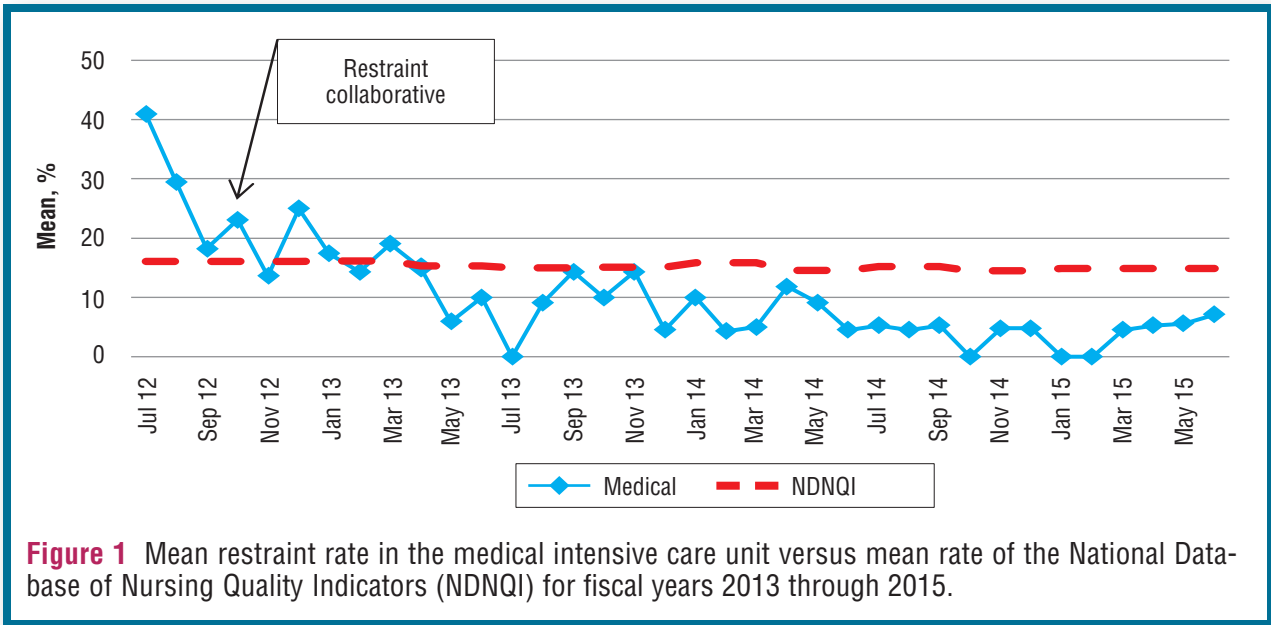


Figure 1 Mean restraint rate in the medical intensive care unit versus mean rate of the National Database of Nursing Quality Indicators (NDNQI) for fiscal years 2013 through 2015.

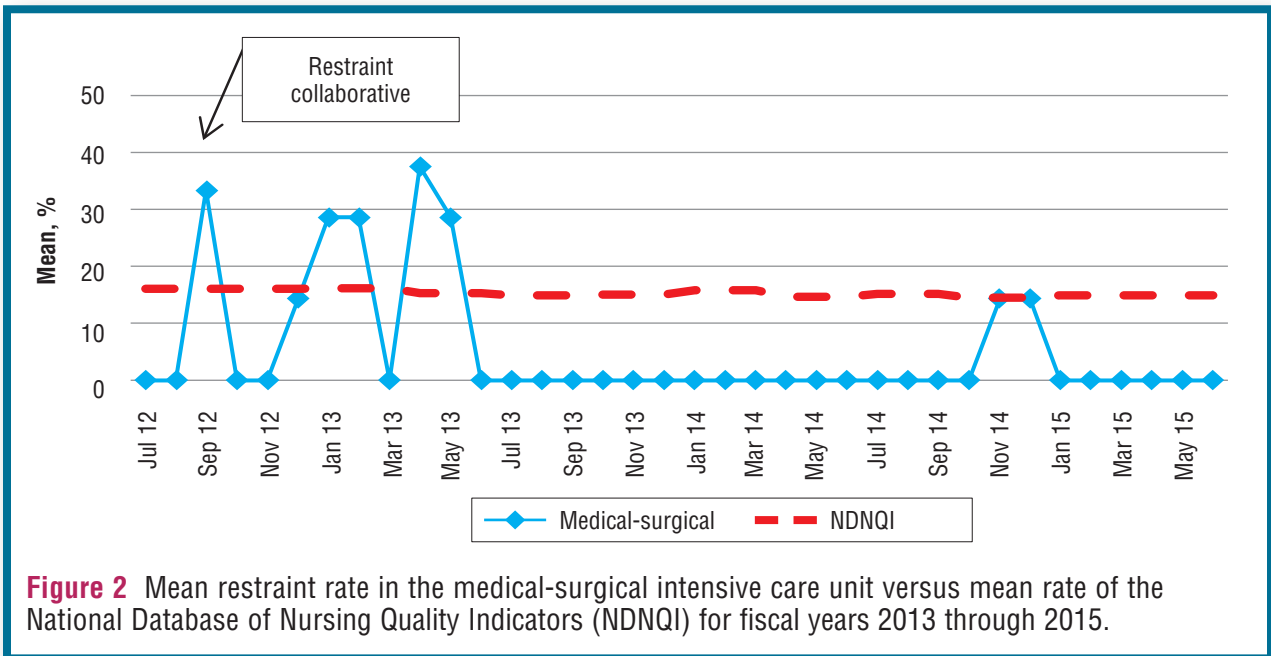


Figure 2 Mean restraint rate in the medical-surgical intensive care unit versus mean rate of the National Database of Nursing Quality Indicators (NDNQI) for fiscal years 2013 through 2015.

required reintubation within 6 hours (Table 1), The number of patients with self-extubation increased from 82 in 2013 to 101 in 2014. Although the number of patients who had self-extubation increased, the number of ICU beds also increased (by 18 beds) with the opening of a new NCCU in July 2013. Along with an accompanying decrease in the use of restraints in general, the use of restraints at the time of self-extubation decreased significantly from 50 patients (61%) in 2013 to 31 (31%) in 2014 ($P < .001$). Concurrently, the total number of ICU patients

who had reintubation within 6 hours of self-extubation, although not significant ($P = .07$), also decreased, from 33 patients (40%) in 2013 to 22 patients (22%) in 2014. The self-extubation rate per 100 ventilator days increased from 0.73 to 0.77.

Nursing Practice Survey

Survey results from November 2012 (101 responders) at the start of the restraint collaborative and after implementation of the alternative mitt in July 2013 (91

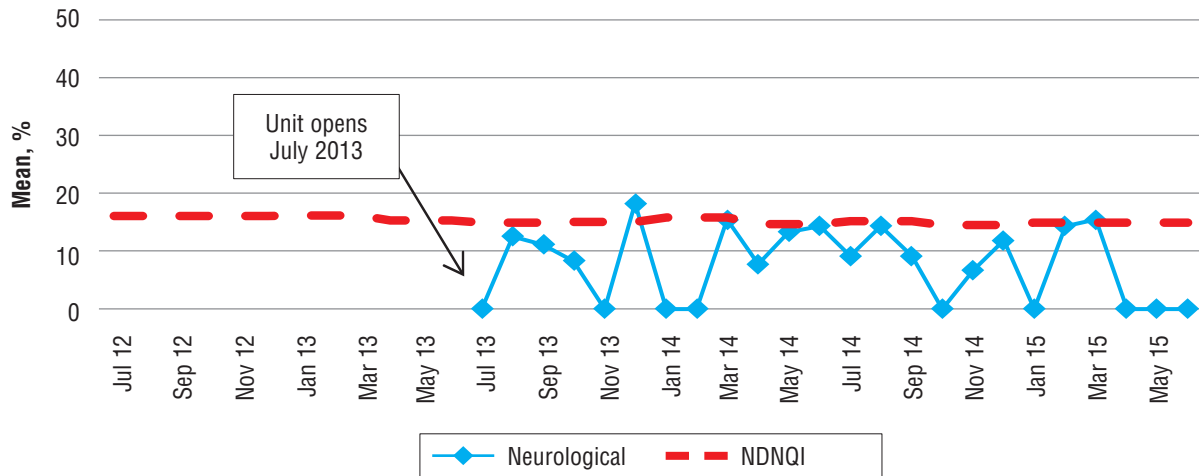


Figure 3 Mean restraint rate in the neurological critical care unit versus mean rate of the National Database of Nursing Quality Indicators (NDNQI) for fiscal years 2013 through 2015.

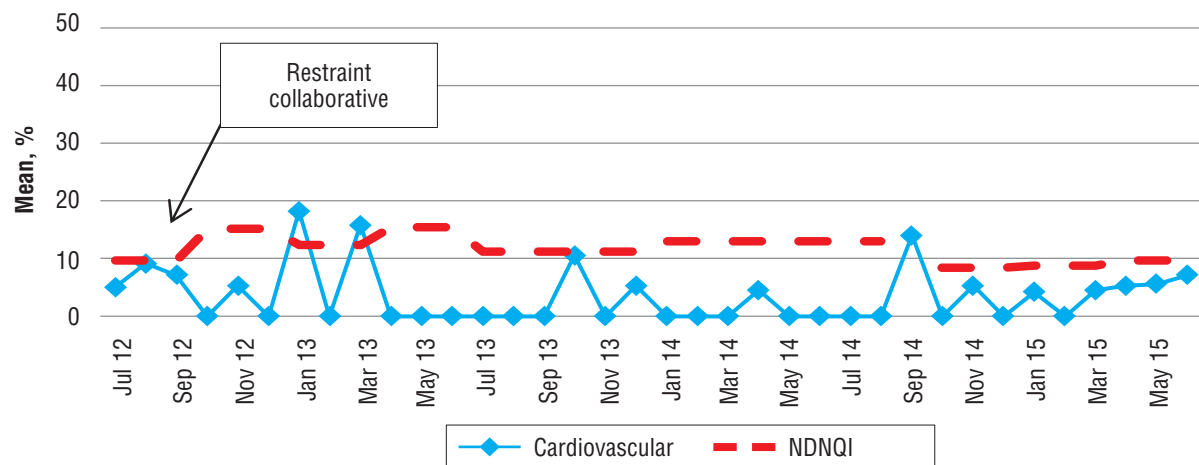


Figure 4 Mean restraint rate in the cardiovascular critical care complex versus mean rate of the National Database of Nursing Quality Indicators (NDNQI) for fiscal years 2013 through 2015.

responders) showed improvement in all but 1 question (Table 2). The results indicated a statistically significant improvement in use of alternatives ($P < .001$) and discussion in daily rounds ($P < .01$). Reporting use of restraints for self-extubation ($P < .01$) decreased, along with monitoring intracranial pressure ($P < .02$), preventing patient wandering ($P = .41$), risk for airway compromise ($P < .01$), and acute delirium ($P < .01$). In addition we observed improved change in belief aligning with the literature that not using restraints put patients at risk for self-extubation ($P < .005$) and loss of critical devices ($P < .003$).

Discussion

In this quality improvement project, we saw an improvement in compliance with staying at less than the NDNQI benchmarks for restraint use in all 5 ICUs (Figures 1-5). Several factors appear to be pivotal to the initial project and to maintaining the improvement.

Direct involvement of staff members in all aspects of the project was facilitated by the clinical nurse specialist team. Bedside nurses were engaged in evidence-based practice using the latest evidence that they now willingly shared with their colleagues. These nurses led their individual unit teams in collecting data and in communicating

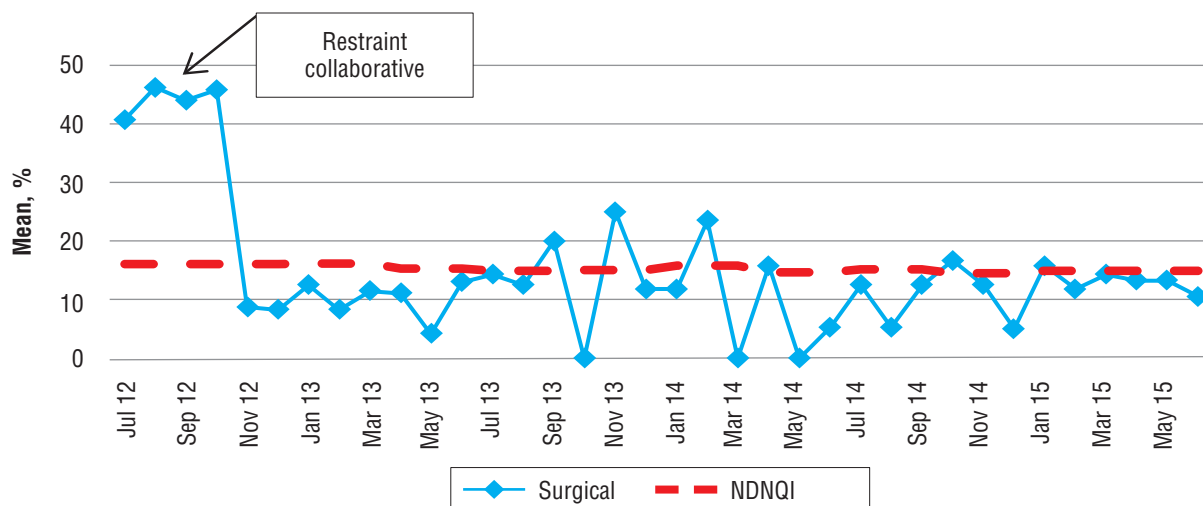


Figure 5 Mean restraint rate in the surgical critical care complex versus mean rate of the National Database of Nursing Quality Indicators (NDNQI) for fiscal years 2013 through 2015.

Table 1 Self-extubation rates in the critical care units

Variable	FY2013	FY2014
No. of ICU beds	69	87
No. of ventilator days	12 797	13 937
No. of self-extubations		
CVCCC	20	20
MICU	35	38
NCCU ^a	NA	8
SCCC	13	15
WICU	14	20
Total ICU	82	101
Patients with restraints at self-extubation, No. (%)		
CVCCC	8 (40)	7 (35)
MICU	24 (69)	12 (32)
NCCU ^a	NA	4 (50)
SCCC	11 (85)	6 (40)
WICU	7 (50)	2 (10)
Total ICU	50 (61)	31 (31)
Patients with reintubation within 6 hours, No. (%)		
CVCCC	3 (15)	5 (25)
MICU	22 (63)	12 (32)
NCCU ^a	NA	0
SCCC	5 (38)	2 (13)
WICU	3 (21)	3 (15)
Total ICU	33 (40)	22 (22)
Self-extubation rate per 100 ventilator days		
CVCCC	1.3	0.96
MICU	0.88	0.85
NCCU ^a	NA	0.47
SCCC	0.32	0.43
WICU	1.33	1.79
Total ICU	0.73	0.77

Abbreviations: CVCC, cardiovascular critical care complex; FY, fiscal year; MICU, medical intensive care unit; NA, not applicable; NCCU, neuro critical care unit; SCCC, surgical critical care complex; WICU, medical-surgical intensive care unit.

^a The NCCU opened in July 2013 with 18 beds.

their successes. Flyers and emails that provided catchy phrases to remind staff to use restraint alternatives were produced at the unit level and shared between units. Nurses had direct involvement in suggesting and choosing a new alternative mitt product that worked better for their patients.

As the staff embraced the successes, the culture shift from restraining most patients to minimal use of restraints spread from nurses to the entire interdisciplinary team. The use of restraints was added to the daily-goals checklist, a change that prompted discussions of the necessity of physical restraints during daily interprofessional rounds. Education was provided whenever a need for it occurred, and providers received information on successful compliance with national benchmarks such as NDNQI and learned that safe outcomes could be achieved without restraining patients.

Staff members had feared that patient self-extubation would increase if patients were left unrestrained. Although no benchmark exists for self-extubation or unplanned extubation, an incidence of 0.3% to 4.2% per 100 ventilator days has been reported.^{2,20,21} The incidence in this performance improvement project was much lower, at 0.32 to 1.79 self-extubations per 100 ventilator days. We were able to highlight to the staff and team that our incidence of self-extubation remained low in comparison with published data.

During the course of this project, multiple concurrent projects may have had a synergistic effect on staff members' acceptance of decreasing restraint use, including

Table 2 Survey results about restraint practice^a

	2012 Mean (N=117)	2013 Mean (N=91)	% change
Positive number denotes improvement			
1. Alternatives to restraints are used before restraining a patient	3.17	3.53	11.36
2. There is nurse/physican collaboration before applying restraints	2.86	3.10	8.39
3. The use of restraints is discussed during daily rounds	3.24	3.58	10.49
Negative number denotes improvement			
4. In what instances do you feel restraints are warranted?			
a. To prevent self-extubation	3.58	3.24	-9.50
b. For a patient with intracranial pressure monitoring	3.24	2.75	-15.12
c. To prevent removal of invasive catheters	3.28	3.08	-6.10
d. To prevent removal or dislodgement of drains/tubes	3.19	3.03	-5.02
e. To prevent a patient from falling	2.16	1.90	-12.04
f. For a patient with combative, aggressive behavior	3.03	3.09	1.98
g. To prevent a patient from wandering	1.75	1.62	-7.43
h. For a patient at risk for airway compromise, ie, difficult airway, facial trauma	3.12	2.93	-6.09
i. For a patient with acute delirium	2.45	2.19	-10.61
5. Based on your practice, rate your agreement or disagreement with the following statements regarding NOT restraining a patient:			
a. It puts the patient at risk for aspiration	2.10	3.24	54.29
b. It puts the patient at risk for self-extubation/loss of airway	3.24	2.75	-15.12
c. It puts the patient at risk for loss of critical therapeutic devices	3.10	3.08	-0.65
d. It puts the patient at risk for harming staff	2.54	3.03	19.29
e. It puts the patient at risk for harming themselves	2.79	1.90	-31.90
f. It puts me at risk for negative repercussions should there be an event, ie, self-extubation	2.62	3.09	17.94
g. It puts me at risk for emotional distress should there be an event, ie, self-extubation	2.53	1.62	-35.97
6. Based on your practice, rate your agreement or disagreement with the following statements regarding NOT restraining a patient:			
a. It puts the patient at risk for aspiration	2.10	1.90	-9.52
b. It puts the patient at risk for self-extubation/loss of airway	3.24	2.88	-11.11
c. It puts the patient at risk for loss of critical therapeutic devices	3.10	2.81	-9.35
d. It puts the patient at risk for harming staff	2.54	2.50	-1.57
e. It puts the patient at risk for harming themselves	2.79	2.62	-6.09
f. It puts me at risk for negative repercussions should there be an event, ie, self-extubation	2.62	2.26	-13.74
g. It puts me at risk for emotional distress should there be an event, ie, self-extubation	2.53	2.30	-9.09

^a Responses ranked by using a Likert scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = always.

phased implementation of many of the components of the ABCDEF bundle,¹⁵ delirium assessment and prevention, a mobilization program, generalized decreased use of continuous sedation, and coordination of spontaneous awakening trials with spontaneous breathing trials. Use of the ABCDEF bundle can help prevent delirium, improve management of delirium, and avoid use of restraints.^{15,17,22} Each unit's daily goals checklist reviewed at daily inter-professional rounds also included the routine discussion of delirium prevention and further supported minimalizing use of restraints.

The nursing practice survey indicated improvement in all areas except one. The only item that did not improve concerned the fear of negative repercussions for patient self-extubation events. Debriefing for patient events

occurs at interprofessional meetings designed to be fact finding and nonpunitive. The health care system has continually improved the methods for debriefing at the system

and the unit level. **Physical restraints may increase moral distress for nurses who care for these patients.**

Future work may include revisiting this survey to assess the current state and also to explore the ethical concerns of staff members.

Conclusion

Use of a restraint collaborative involving multiple nursing units and a critical care clinical nurse specialist team and early and direct involvement of the bedside

nursing staff can safely reduce the use of restraints in critical care units with divergent populations of patients. This improvement can be sustained, with continued measures and a change in culture led by nurses and spread to other members of the interprofessional team. **CCN**

Acknowledgment

The authors acknowledge the work and dedication of each intensive care unit's value improvement team and nursing staff.

Financial Disclosures

None reported.

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See also

To learn more about use of restraints in the intensive care unit, read "Determinants of Nurses' Use of Physical Restraints in Surgical Intensive Care Unit Patients" by Dolan and Looby in the *American Journal of Critical Care*, September 2017;26:373-379. Available at www.ajconline.org.

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