

The Rhode Island ICU Collaborative: The First Statewide Collaborative Four Years Later

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Four years ago, we wrote in this journal about the development of the first statewide Critical Care collaborative in the nation, the Rhode Island Intensive Care Unit (RI ICU) Collaborative.¹ This article outlines the last four years of the RI ICU Collaborative and its accomplishments.

Key local health care leaders and the state's three quality organizations (the RI Quality Institute [RIQI], Quality Partners of RI [QPRI], and the Hospital Association of RI [HARI]) recognized an opportunity for continuing to improve the care provided in RI hospitals. Research shows that bundled interventions and efforts to improve the culture of safety in ICUs can reduce ICU complications.² Median rates of deadly and costly complications such as central line-associated blood stream infections can be reduced to '0'.³ In early 2005, after surveying the hospitals for willingness to participate, the three quality organizations outlined the proposal, described in the 2005 article, to develop the RI ICU Collaborative to work collectively to foster a culture of safety and to implement bundled care strategies to improve ICU outcomes.¹ Funding to support the project management, speakers, and conferences was obtained from the Blue Cross Blue Shield of RI and UnitedHealthcare of New England, based on their market share. To date, their financial support has totaled over \$2.4 million.

All of RI's eleven acute care hospitals, having one or more adult acute or intermediate-care ICUs, agreed to partici-

pate, representing 23 adult ICUs with the total capacity of 263 beds. The overarching aim of the Collaborative is to reduce ICU-related complications, such as ventilator-associated pneumonia (VAP) and central line-associated blood stream infection (CLABSI). In Phase II, the management of septic patients was added, with the aim of reducing mortality.

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COLLABORATIVE DESIGN

The RI ICU Collaborative's leadership team included representatives from each of the quality organizations and a Critical Care physician consultant. The leadership team managed the funds, organized conferences, coaching calls, managed the contracts of consulting physicians and database vendors, and provided the oversight and strategy for accomplishing the goals. The use of this statewide leadership approach reduces the costs to each hospital for activities associated with the work, thus allowing for availability of these resources to all hospitals throughout the state. The RIQI remains the principal investigator in this project and is responsible for financial management, fundraising and other leadership responsibilities. HARI provides on-going support for hospital leadership. QPRI pro-

vided the bulk of the project management and real-time support for teams. The project manager met frequently with each team, to provide individualized assistance, training, and support.

In the first phase, the Collaborative partnered with the Quality and Safety Research Group at Johns Hopkins University under the leadership of Dr. Peter Pronovost to introduce and implement the Comprehensive Unit-Based Safety Program (CUSP) and VAP and CLABSI bundles. In Phase II, the faculty relied on local experts in Critical Care, including Dr. Mitchell Levy, currently the President of the Society for Critical Care Medicine and a world leader in the Surviving Sepsis Campaign (SSC). We embarked on the SSC in the spring of 2008. Engagement of all participants of the RI ICU Collaborative (senior executives, ICU directors, nurse managers, frontline physicians and nurses, pharmacists, respiratory therapists, infection control specialists, and quality improvement and support staff) have led to the success of the RI ICU Collaborative.

The application of the rapid-cycle improvement model, using the Plan-Do-Study-Act cycle, was instrumental in helping teams change processes in their units.⁴ Training in the science of safety and improvement techniques helped teams integrate practical, low-technology tools into their daily practice. The Collaborative fostered a culture of shared

Table 1: Aggregated Statewide Results of RI ICU Collaborative.

Outcome	2005	2006	2007	2008	% Improvement	Goal
SAQ Safety Climate Score (mean)	43.8	44.3	44.7	47	+ 7%	60%
SAQ Team Work Score (mean)	46.3	45.5	47.8	50	+ 8%	60%
CLABSI/1000 catheter days (mean)	-	3.12	1.80	1.71	- 45%	< 1.0
VAP Bundle Compliance %	-	62%	69%	80%	+ 30%	> 90%
VAP/1000 ventilator days (mean)	-	4.03	3.38	3.28	- 18%	< 1.0
Sepsis Mortality %*	-	-	-	25.1%	n/a	National Standard 28.4%

VAP- Ventilator Associated Pneumonia; CLABSI Central Line-Associated Blood Stream Infection; SAQ- Safety Attitudes Questionnaire.

*April to December data available only

Table 2: Statewide Lives Saved, Reduction in ICU Days, and Cost Savings Associated with RI ICU Collaborative Compared to 2006.

Year	Lives Saved	Days in ICU Reduced	Cost Savings
2007	19	958	\$2,833,622
2008	26	1118	\$3,086,589
Cumulative Savings	45	2076	\$5,920,211

learning and mutual support. Team Leaders met bimonthly to share strategies, lessons learned, frustrations, and best practices in a safe, supportive environment. Face-to-face meetings, twice yearly, let teams showcase results and deepen their knowledge in Critical Care Medicine and Quality Methods.

RESULTS

Culture Change

The implementation of the CUSP program early in the Collaborative helped integrate key principles important to bring about change. The CUSP program included: conducting a culture survey (the **Safety Attitudes Questionnaire (SAQ)**), educating staff on the science of safety, identifying staff concerns, establishing executive walkrounds, documenting results, and resurveying the culture. Following each SAQ survey, the teams are encouraged to develop and implement SAQ action plans.⁵ After four annual SAQ surveys, the results are mixed. (Table 1) Several units demonstrated significant improvements, but overall these have been countered by units that have remained stagnant or worsened. We noted significant shifts in SAQ results with nursing or physician leadership changes. Units that developed a robust SAQ action plan demonstrated the greatest gains.

Reduction in ICU Infections (VAP and CLABSI)

Reduction in ICU-acquired infections was the focus of the first phase of the ICU Collaborative. The CLABSI bundle includes a catheter insertion checklist, which should be performed with every central line placement. The bundle included using a line cart, using chlorhexidine skin preparation, using full-barrier precautions, removing unnecessary lines, and using the subclavian site as the preferred site. The statewide rate of CLABSI has been reduced by 45% and continues to decline in the

state.⁶ (Table 1)

The VAP bundle implemented after the CLABSI bundle includes elements thought to contribute to optimal ventilator management. The bundle consisted of elevation of the head of the bed, establishing sedation and weaning protocols with daily assessment of ability to wean, providing peptic ulcer and deep vein thrombosis prophylaxes, and controlling glucose levels. Communication of the daily care goals for a ventilated patient can improve the efficiency of weaning and result in earlier extubation with a reduction in ventilator days. Three years later, VAP rates declined 18%.⁶ (Table 1)

Over 2 years, we estimate 45 lives were saved.

Improving Sepsis Care – The Surviving Sepsis Campaign in RI

In Phase II, the Collaborative collaborated with Drs. Mitchell Levy and Sean Townsend of the Surviving Sepsis Campaign to improve sepsis identification and management, with the goal of reducing the sepsis mortality rate. Early identification of sepsis in the emergency room or on the medical floors with prompt and aggressive fluid resuscitation requires partnership of Emergency Department and Medicine colleagues. The teams are currently in the process of improving their compliance with the 10 sepsis processes of care which comprise the bundles.⁷ The resuscitation bundle includes the measurement of serum lactate, blood cultures prior to antibiotic use, broad spectrum antibiotics, fluid resuscitation (and vasopressor use) using adequate central venous pressure (>8) and central venous oxygen saturation (>70%) as resuscitation targets, all within the first 6 hours. The maintenance bundle includes administering steroids or

activated protein C according to unit protocol, controlling the glucose level, and avoiding excessive plateau pressures in mechanically ventilated patients, all within 24 hours.⁷ Education began in the spring of 2008 and baseline data been collected since July 2008. RI's baseline mortality is lower than the national average but our compliance rate with process measures is slightly worse. (Table 1) Our goal is to reduce mortality by 25% by December 2009.

Cost Saving Estimates for Rhode Island

Using an opportunity calculator provided by the Johns Hopkins group, which incorporates cost and length of stay assumptions based on literature and national data, researchers can estimate the number of lives saved and the reduction of ICU days.⁸ For 2007, a conservative estimate calculates that 19 lives were saved from VAP, BSI, and deep vein thrombosis complications. Over 2 years, we estimate 45 lives were saved, ICU days were reduced by more than 2000 days, and healthcare costs were reduced by almost \$6,000,000 statewide.

CONCLUSION

Opportunities for improvement persist everywhere in healthcare, perhaps more so in the ICU where the stakes are higher. While hospitals in Rhode Island had already taken steps to improve care in the ICU setting, participation in the RI ICU Collaborative has enabled hospitals to learn from each other and other states that have demonstrated dramatic improvement in ICU care. It has allowed ICUs within the state to share best practices and lessons learned, and improve the quality of ICU care provided to Rhode Islanders.

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