Hospital *for* *Special* Care

We Rebuild Lives.

Using Bernoulli *One*™, the Hospital for Special Care (HSC) has empowered their clinical staff with real-time surveillance capabilities for more than 100 patients on ventilation support and has reduced the total number of ventilator alarms by an estimated 80%. Going forward, HSC is considering additional deployment of the Bernoulli solution to connect more devices in other units, as well as provide medical device integration (MDI) for their upcoming EMR implementation and support clinical research.

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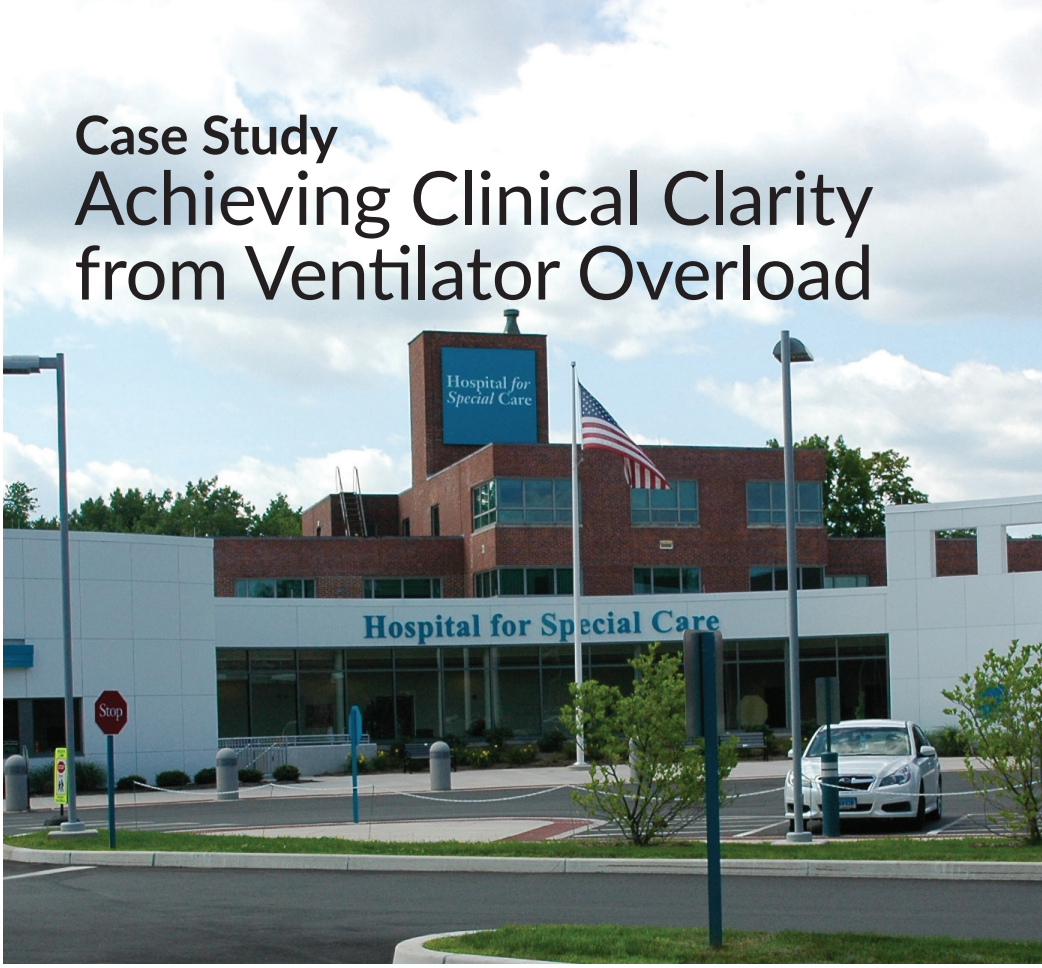
Case Study
Achieving Clinical Clarity from Ventilator Overload



With locations in New Britain and Hartford, Conn., the Hospital for Special Care (HSC) is the only long-term acute-care (LTAC) hospital of its kind in New England serving adults and children, and one of only a handful in the country.

HSC is nationally recognized for advanced care and rehabilitation in pulmonary care, acquired brain and spinal cord injury, medically-complex adults & pediatrics, neuromuscular disorders, and cardiac disease.

HSC selected Bernoulli to:

- **Collect and distribute real-time data from over 100 ventilators, as well as pulse oximeters, for enhanced, continuous patient surveillance;**
- **Reduce or eliminate non-actionable alarms while simultaneously providing triage and distribution of relevant alarms, allowing respiratory therapists (RTs) to focus on patients;**
- **Analyze objective, comprehensive clinical data after any patient incident to assess response processes and preventative measures.**

Case Study

Achieving Clinical Clarity from Ventilator Overload

"We were concerned that alarm fatigue could become a serious problem due to the number of nuisance alarms. The RTs have a lot of patient care responsibilities in addition to responding to ventilator alarms."

Connie Dills, MBA, RRT, RPFT Respiratory Practice Manager Hospital for Special Care

The Challenge

The Respiratory Therapy Department at HSC manages more than 100 ventilators — each with its own set of alarms—at patients' bedsides across the hospital, including:

- The Pediatric Unit, a 30-bed, four-team unit that offers rehabilitation therapies, as well as learning programs that focus on building patients' physical, cognitive and social abilities.
- The Respiratory Care and Respiratory Step-Down Units, 36- and 38-bed units, respectively, for patients requiring intensive nursing and respiratory care, including intravenous medication and non-invasive respiratory monitoring.
- The Close Observation Unit, a 12-bed, interdisciplinary team-based unit that focuses on weaning adult patients from mechanical ventilation.

According to Connie Dills, MBA, RRT, RPFT, Respiratory Practice Manager at HSC, for many years the number of ventilators and the complicated lay out of the units forced the hospital's RTs to spend much of their shift racing from room to room responding to hundreds of non-actionable alarms.

"In most cases, the alarms were going off because a patient coughed or was talking —events that didn't require an intervention," said Ms. Dills. As a long- term care and rehabilitation facility, many patients at HSC are active, which is typically good for their recovery process; however, the number of false alarms blaring daily was distracting to clinical staff and disruptive to patients.

"We were concerned that alarm fatigue could become a serious problem due to the number of nuisance alarms," Ms. Dills stated. "The RTs have a lot of patient care responsibilities in addition to responding to ventilator alarms."

The critical nature of ventilators as life-support devices and the volume of alarms they produced were major drivers in HSC selecting Bernoulli as their partner to implement a solution that would enable HSC's team of RTs to provide continuous surveillance monitoring of patients, while reducing non-actionable alarms and enhancing patient safety.

The Solution

Continuous Surveillance and Alarm Monitoring. The Bernoulli system was first implemented in the Pediatric Unit. Of the care units with ventilated patients at HSC, the Pediatric Unit has the most complex layout, making it difficult for clinical staff to move quickly from patient to patient. The unit utilizes three different types of ventilators from different manufacturers, so a vendor-neutral approach was critical.

Networked laptop and desktop computers, as well as scrolling message bars running the Bernoulli application, were deployed at key locations throughout the Pediatric Unit, providing RTs with access to data and alarms from all ventilated patients. In addition, ventilator alarms were routed through pagers to the specific RT assigned to each patient.

Improved Patient Care. With real-time access to patient data and alarms, the respiratory therapy team at HSC was able to see the condition of any patient in the unit and respond appropriately. Data from the Bernoulli system enabled them to start identifying non-actionable alarms that could be adjusted or eliminated entirely.

"Using Bernoulli, I would estimate that we have reduced ventilator alarms by 80%," said Ms. Dills.

"If you go on the units today, it's very quiet relative to the number of ventilators in use. Much quieter than it was before we started using Bernoulli."

Quality and Reporting Data. Prior to implementing the Bernoulli platform, HSC was dependent on individual recollections from the clinical responders after an alarm incident. Today, HSC has a clearer picture of every event.

"A lot of times we didn't have objective data to assess what happened with a patient," said Ms. Dills. "Now we can use the data provided by Bernoulli to sort out the story, increasing our accuracy on occurrence reporting and resolution."

Ventilator-Check Automation. Bernoulli *One*™ also removed the manual processes associated with ventilator checks. Bernoulli captures all the measured parameters (peak airway pressures, volumes, etc.) and settings, eliminating the risk of transcription errors. The automated process also means that RTs spend less time performing menial documentation tasks and more time assessing, treating and engaging with patients.

"Bernoulli drastically improves an RT's efficiency as a patient care coordinator, and improves their responsiveness to specific patient-related issues," Ms. Dills stated.

Joint Commission National Patient Safety Goal (NPSG) Compliance. Missed alarms and alarm fatigue have been identified as a major patient safety risk. By leveraging Bernoulli *One*™, HSC has already achieved compliance with both phase I and II, as well as the four associated Elements of Performance (EPs).

"Alarm management is already a fundamental part of what we do," Ms. Dills said. "It's made a big difference in our staff's efficiency and effectiveness, and reduced stress for our patients and their families."

Results

- Bernoulli *One*™ at HSC enabled real-time surveillance of more than 100 ventilated patients.
- Using Bernoulli's alarm management capabilities, HSC has reduced the number of ventilator alarms by an estimated 80%.
- HSC is able to leverage the system to produce detailed reports after any alarm incident, as well as support research and benchmarking studies going forward.
- Bernoulli allows HSC staff to automate manual processes, reducing the risk of transcription errors and giving clinicians more time for direct patient care.
- HSC has achieved full compliance with the Joint Commission NPSG on alarm management, using Bernoulli *One*™.

Next Steps

After successful implementation in the Pediatric Unit, Bernoulli *One*™ was expanded to the Respiratory Care and Respiratory Step-Down units as well. HSC is currently evaluating expansion of Bernoulli *One*™ to more devices in other units, including the Close Observation Unit. HSC is also looking to distribute device data collected through Bernoulli to its new electronic medical record, and leverage Bernoulli to extract de-identified data for research and benchmarking of best practices.

Summary

The Bernoulli *One*™ enabled HSC to achieve real-time surveillance of more than 100 patients on ventilation support and reduce the number of ventilator alarms by an estimated 80%, helping achieve compliance with The Joint Commission NPSG on alarm management. Bernoulli's intuitive, intelligent software allows HSC's team of RTs to provide continuous monitoring of vital patient information and intervene before a situation becomes critical, enhancing patient safety. The data collected is leveraged by Respiratory Care Services in reporting to the Performance Management Audit Committee, which monitors ventilator management performance, and also helps identify potential areas of need. The system also automates processes that were previously done manually, such as manual ventilator checks, which frees up the RT to focus more on the patient rather than the ventilator.

About Bernoulli

Founded in 1989 with headquarters in Milford, CT, Bernoulli is a leader in real-time connected healthcare, with more than 1,200 installed, operational systems. Bernoulli *One*™, the company's flagship platform, combines comprehensive and vendor-agnostic medical device integration with powerful middleware, clinical surveillance, telemedicine/virtual ICU, advanced alarm management, predictive analytics and robust distribution capabilities into ONE solution that empowers clinicians to drive better outcomes, improve the patient experience, and enhance provider workflow. For more information please visit www.BernoulliHealth.com.