



The Jewish Hospital Demonstrates Over 2-Day Reduction in ICU Length of Stay with GE Ventilation

The Situation

The Jewish Hospital – Mercy Health, is committed to making quality healthcare easy in helping their patients and community be well in body, mind and spirit. As a teaching hospital, their graduate medical education (GME) program has been shaping the next generation of physicians for more than 120 years. And The Jewish Hospital and the entire Mercy Health system has a history of partnering with technology companies to support improved patient outcomes.

So when considering a purchase of new ventilators for critical care, The Jewish Hospital saw the opportunity for improving the health of critically ill patients through a measured approach to nutrition. GE Healthcare presented their solution, which included use of the ventilator and respiratory gas module, for precise, real-time measurements of the critically ill patient's caloric requirements. They also presented the potential to significantly reduce length of stay with the implementation of the GE technology, which would result in significant cost savings in addition to potentially improving their patient's health. The Jewish Hospital challenged the GE team to prove that the length of stay savings were real.

The Challenge

Working closely with Joseph Robertson, the Respiratory Care Manager for The Jewish Hospital, GE placed 19 ventilators with the GE Respiratory Gas Module, for a 90-day trial. A commitment to reduce ICU length of stay for critically ill, ventilated patients by 0.5 days was the requirement for purchase of the products. As a baseline for the 90-day study, the prior 9-months of patient data for all ventilated patients was used, which included ventilator days, as well as, ICU length of stay.

This case study is based on data and information from The Jewish Hospital – Mercy Health located in the United States and solely represents their experience. The results from this case study are specific to Jewish Hospital – Mercy Health only; any costs or potential cost savings at other facilities might differ significantly from this study, particularly for facilities outside of the U.S. GE Healthcare makes no promise or guarantee about actual cost savings as clinical practice and costs vary by individual facility and by region.



Overview

With the GE Respiratory Gas Module integrated with the GE CARESCAPE™ R860 Ventilator, clinicians can:

- Easily assess the caloric requirements of the critically ill ventilated patient
- Optimize a nutritional plan that integrates the entire care team
- Use Spontaneous Breathing Trials to easily liberate the patient from the ventilator
- Help reduce the ICU length of stay for critically ill ventilated patients, potentially improving patient outcomes while saving significant costs for the hospital

About The Jewish Hospital

The Jewish Hospital has been offering the most innovative treatments and services for 165 years. U.S. News and World Report has named The Jewish Hospital among the best hospital in Ohio for the fourth year running.

They offer unique and specialized services that no one else in Cincinnati has:

- Adult Blood Cancer Center
- Makoplasty® robotic arm for total hip replacements and partial knee replacements
- Gamma Knife® that offers precision brain surgery with no incisions
- Advanced heart care with the newest and lowest dose radiation equipment

The Solution

Both The Jewish Hospital and GE understood that technology was only one part of the equation needed to deliver a length of stay reduction. People and process were also critical to the 90-day evaluation. Training the multi-disciplinary care team comprised of respiratory therapists, physicians, nurses and dietitians was required to create a sustainable impact. A consistent process needed to be developed for the measurement of indirect calorimetry.



Joseph Robertson
Manager of Respiratory Care

“GE supported the project by providing on-site respiratory therapists and a registered dietician to train our team. The support was broad and inclusive and allowed my team to both learn the product and implement the study,” states Joseph Robertson, director of Respiratory Care. “We had used metabolic carts in the past and understood the measurements, but due to the complexity and

time required to get an accurate measurement, we were very limited in the number of patients where metabolic measurements were made. In fact, our cart had broken and the cost of replacement was significant, so it had not been replaced when this opportunity presented. Having the measurements available in real-time, using the technology integrated in the ventilator, was a huge time saver and leveraged the same resources.”

The respiratory therapist captured the steady state caloric requirements of the patient and provided the data to the dietitian, who then consulted with the physician/nursing when modifications to the patient’s nutritional plan were required. They also worked closely with nursing to understand the number of calories that the patient received in IV’s and sedation such as Propofol (Diprivan). Ignoring these extra calories often leads to overfeeding and delays in ventilator liberation.

The Results

As a result of implementing a data-driven nutritional assessment for ventilator patients, The Jewish Hospital realized a 0.59 reduction in average ventilator days and

even more significant was the 2.98 reduction in ICU length of stay from the pre-evaluation average. “Metabolic measurements is only one of the tools that we have access to with the GE Ventilator,” states Dr. Erich Walder. “Our ability to implement lung protection strategies using FRC measurements, with the same respiratory gas module, will prove valuable for the management of our critically ill ventilated patients.”



Dr. Erich Walder
Pulmonologist



Pat Davis-Hagens
Central Market CEO

“Supporting our expert caregivers with state-of-the-art technology that delivers real value for our patient’s and community is my goal,” states Pat Davis-Hagens, The Jewish Hospital President and Mercy Health Central Market CEO. “Our partnership with GE has delivered improved patient outcomes that also result in a significant financial savings for the hospital.”

As a result of this 90-day risk-sharing evaluation, The Jewish Hospital purchased the 19 GE Ventilators with Respiratory Gas Modules.

Pre-evaluation LOS Data

Month	Average Vent LOS	Average ICU LOS	Average ICU Cost per Patient
JAN	4.94	12.49	\$38,241.81
FEB	4.71	9.36	\$34,952.61
MAR	4.24	10.62	\$33,788.70
APR	3.61	8.99	\$31,918.46
MAY	4.41	9.93	\$32,953.34
JUN	3.46	8.83	\$33,339.08
JUL	3.12	8.99	\$30,372.73
AUG	2.89	8.67	\$29,256.73
SEP	3.26	9.74	\$33,873.27
Avg Jan-Sept (Pre-eval)	3.69	9.81	\$32,441.29

Total Number of Ventilated Patients: 565
Total Cost: \$18,329,328.85

90 Day LOS Study Data

Eval Month	Average Vent LOS	Average ICU LOS	Average ICU Cost per Patient
OCT	2.69	6.31	\$21,315.90
NOV	2.89	6.85	\$24,589.00
DEC	3.73	7.32	\$24,434.00
Total LOS for Eval	3.10	6.83	\$23,446.30

Total Number of Ventilated Patients: 112
Savings: \$1,007,438.88 (estimated)

Estimated Full Year Savings: \$6,089,608.23

Note: The 90-day study was conducted from October 2014-December 2014 using the Engström Ventilator and E-COVX modules. Data was compiled by The Jewish Hospital Respiratory Care Team.

Why Nutrition Matters

Appropriate nutrition plays an important role in our everyday lives – keeping us healthy and helping us recover from illness and injury. When a person becomes critically ill, nutrition plays an even more crucial role in the recovery process. Today, approximately 40-50% of ICU patients are malnourished.¹ Malnutrition is associated with:

- Deterioration of lean body mass
- Poor wound healing
- Increased risk of pressure ulcer development as the deterioration of lean body mass, nature of bed rest, and increased infection rates with decreased immunity lead to this issue²⁻³
- Weakened respiratory muscles which impacts ventilator liberation
- Impaired immunity
- Organ dysfunction
- Increased morbidity and mortality⁴⁻⁹

Evidence-based nutrition assessment has been shown to potentially reduce LOS in the ICU as much as 2.9 days¹⁰

About Nutrition Assessment

In most hospitals, clinicians use predictive equations when assessing the nutritional status of their patients. There is no consensus on how to select from the hundreds of equations available and equations tend to be a one-size fits all approach to patient care. Many research studies have shown that these predictive equations are only accurate ~30% of the time.^{11, 12, 13} The metabolic status of the mechanically ventilated patient is in a constant state of flux as their bodies respond to stress and illness.

An accurate assessment of patient's nutritional status can be conducted using a metabolic cart. While using the metabolic cart to measure indirect calorimetry is possible, clinicians often encounter a number of issues:

- Specially trained staff is required, which may be costly
- Cart has a large footprint and may require frequent calibrations
- Connection to the ventilator circuit requires opening the circuit and may result in leaks that impact the measurements



GE CARESCAPE R860 Ventilator with Respiratory Gas Module

- Assessment may be time consuming since steady state is required for the measurement to be valid. This is often difficult to achieve during the more active daytime hours, when staff is available to make the measurement

With the GE Respiratory Gas Module integrated into the ventilator, clinicians realize a number of key benefits:

- Accurate and precise measurements of Energy Expenditure in kilocalorie and Respiratory Quotient
- Availability to 100% of your ventilated adult and pediatric patients
- Part of the normal respiratory therapy staff workflow
- Data is available on demand; simply review trends for steady state and record the data



GE CARESCAPE R860 Metabolic Application Screen

- Modular solution allows the clinician to add Respiratory Gas Monitoring where and when it is needed, allowing cost-effective implementation
- Same module provides Functional Residual Capacity (FRC) measurements to aid clinicians in lung protection strategies



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Imagination at work

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