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ICUTracker™ Impact Study

February 1, 2017

Evaluating clinical performance in the ICU is the primary purpose served by an aggregated patient data base such as found in ICUTracker. This was the intent of the original developer of the ICUTracker schema, Dr. Jamie Krinsley. In 2005 Dr. Krinsley was running a 12 bed ICU at Stamford Hospital in Stamford CT. He was intrigued by data and had been compiling extensive patient data into his own Access database since 2000. Using this database, he ran retrospective analyses of glycemic management protocols in use within his ICU and the result of his work was published in Mayo Proceedings in 2004. The title of that paper, "The Effect of an Intensive Glucose Management Protocol on the Mortality of Critically Ill Patients" has been cited over 1300 times.

Dr. Krinsley was instrumental in our understanding of clinical data measures and metrics and over time the ICUTracker platform was modified and enhanced to adjust for severity of illness when measuring length stay and hospital mortality. As our customer base grew we heard from more of our users about measures important to them, we upgraded our data collection and aggregation skills to meet this ever-increasing request for additional clinical insight. This additional work focused on getting a better grip on ventilator days, ICU readmissions and the calculations of standardized mortality ratios based on the latest and most accurate set of severity scoring equations, Acuity 2016.

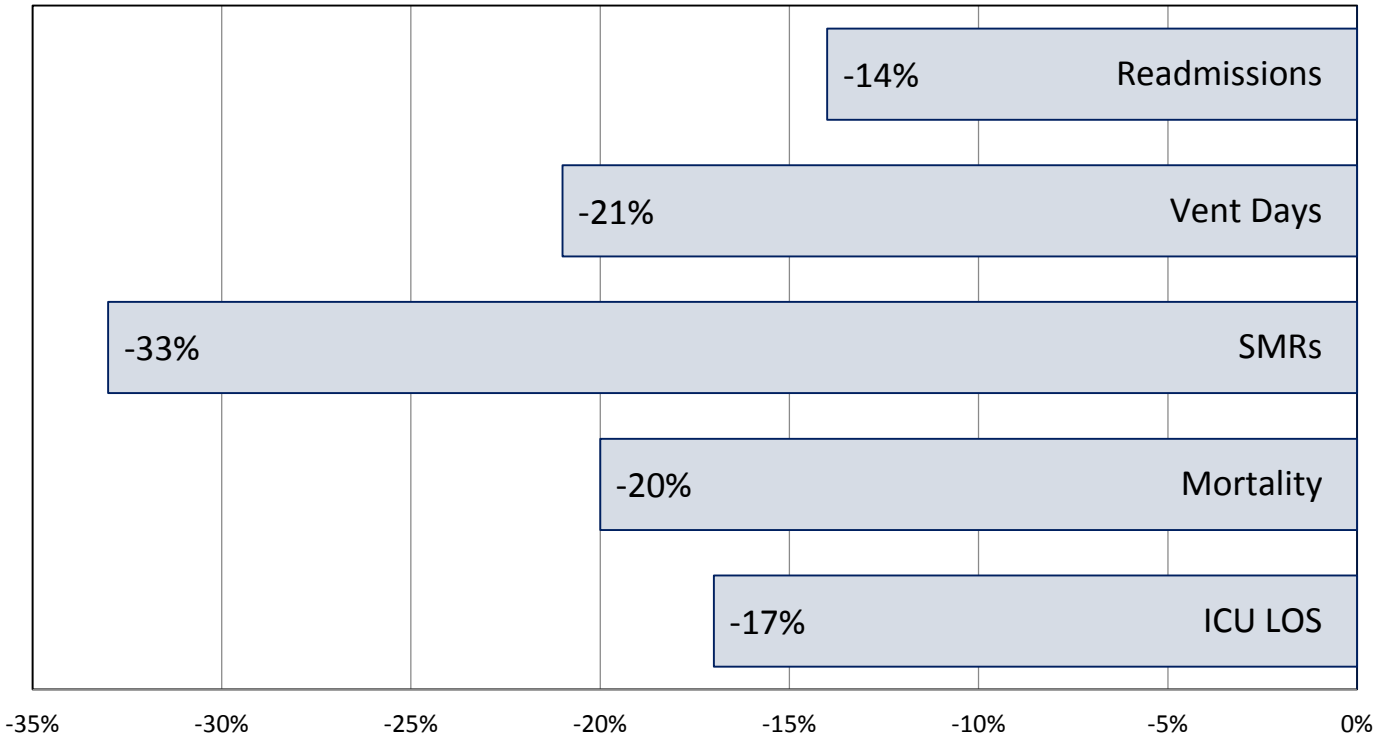
After ten years of supporting the clinical need for data and the ability to access and evaluate that data, we decided to take a look at our client's data (all properly secured and deidentified) to see if there was any difference in ICU performance after ICUTracker was in place and fully integrated into the clinical culture.

Here is the process we followed:

1. **Source:** We pulled the data from our hospital systems that had complete patient records for at least 8 quarters (omitted partial quarters (first and last quarters) and spurious/omitted data. The data is compiled of data from 7 hospital systems with a database from 8-40 months and a total of 227,073 admissions.
2. **Outcomes Measure:** The outcome measures reviewed included: # of Admissions, ICU LOS, Hospital Mortality, # of ventilated patients, Ventilator Duration, Readmissions to the ICU, and APACHE severity score and Standardized Mortality Ratio (O/E mortality rate).
3. **Analysis:** Once we had built our data set we started looking at the trends in the outcomes comparing the first 4 quarters to the final 4 quarters (to alleviate seasonal changes) and evaluated the overall change from the first 4Qs to the final 4Qs.

Results: The results of our analysis is in the chart and graph shown below:

Overall	Initial	Final	Difference	Change Overall
LOS	3.95	3.28	0.7	17%
Mort	14.61	11.73	2.9	20%
Vent Days	5.16	4.07	1.1	21%
Readmissions	2.65	2.28	0.4	14%
Severity score	58.67	58.79	0.1	0%
SMR	0.91	0.6	0.3	33%
Admissions	838.57	1398.43	559.9	67%



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Summary:

- Analysis of our client data which was generated by reviewing over 200,000 patient records show that every clinical measure we tested showed improvement.
- Unit mortality and the standardized mortality ratios decreased significantly despite the relatively consistent severity scoring indicating that the population remained as critically ill but their outcomes were much improved.
- Admission into the units showed a drastic increase. This may account, to some extent, the 17% decrease in length of stay and thus increased throughput. However, the facilities also tended to add additional beds/units during the timeframe and we were unable to determine the number of beds added and when these additions occurred.

Conclusion:

- Providing actionable data (database and external comparative data) directly to clinicians who drive performance improvement, appears to result in significantly better clinical and financial outcomes.
- Coupling objective outcomes data with external benchmarking allows the clinician to clearly identify opportunities for improvement and focus performance improvement initiatives.

More Information:

For more on ICUTracker, as well as other tools for critical care available from MDN, click on one the links below:

- www.mdnllc.net/
- www.icutracker.net/ - ICU database software that collects data from any electronic feed and provides immediate access to actionable information with no coding or programming
- www.mdnllc.net/PHOENIX.htm - Critical care database software that provides clear insights into the performance of your critical care units
- www.glucostabilizer.net/ - Trusted, safe, effective glycemic management and insulin dosing software

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