

Cost Effectiveness of Patient Surveillance Systems.

Morgan J.A., McGrath S.P., Blike G. *Proceeding from the International Anesthesia Research Society Annual Meeting*, 2010:S-249

Introduction

Unrecognized deterioration of unmonitored in-patients is a significant contributor to morbidity and mortality for in-hospital patients.¹ Patients show signs of deterioration in the 6-8 hours prior to a cardiac or respiratory arrest,²⁻⁴ however the current standard of care, which is intermittent vital sign sampling and physical examination, is not adequate for detecting deterioration. Recently, the use of continuous monitoring via a patient surveillance systems, Patient Safety Net (PSN) (Masimo Corporation) has demonstrated improvement in outcomes in early recognition of deterioration and intervention.⁵ However, the costs of implementing a patient surveillance system in a hospital setting can be quite significant. In this study, the cost-effectiveness of PSN was analyzed in a postoperative in-hospital patient population.

Methods

PSN was implemented in a 36-bed orthopedic unit with 10,938 patient days and 3,207 patient discharges per year. PSN includes wireless communications connecting bedside oximetry monitors to a server computer and a radio transmitter, which notifies nurses via pager when preset physiological limits are violated. ICU transfers, length of stay (LOS), mortality, and financial costs were available for 2007 as well as after installation of the system in 2008. Using this data, a decision tree model was applied to evaluate the cost-effectiveness of this system for the hospital.⁶

Results

Implementation of the PSN decreased average LOS from 3.6 to 3.4 days, decreased ICU transfers per 1,000 patient days from 5.2 to 2.7 ($p=0.02$), and decreased the average LOS of those who transferred to ICU from 7.67 to 5.87 days. Mortality risk decreased from 0.47 to 0.39% per patient (NS). Cost savings per patient were \$255 per patient for the implementation year and are projected to be \$404 for subsequent years. Annual cost savings were about \$817,000 in the first year and are projected to be \$1,295,000 thereafter. Sensitivity analysis showed that cost-effectiveness was driven by reduced ICU transfers.

Length of Stay and ICU Transfers before and after PSN Installation

	Pre-Installation of PSN	Post-Installation of PSN
Average Length of Stay (days)	3.6	3.4
ICU Transfers/1000 patient days	5.2	2.7
Average Length of Stay of ICU Transfers (days)	7.67	5.87
	1 st Year	Projected 2 nd Year
Cost Savings	\$817,000	\$1,295,000

Discussion

Current standard of care for hospital inpatients is the sampling of intermittent vital signs and clinical examinations with additional monitoring for patients considered to be at high

risk for adverse events. PSN can potentially improve outcomes and save costs. In this study, results suggest that PSN implementation is cost-effective in its initial year, with the cost savings driven largely by the reduction in ICU transfer rate. The cost-benefit increases significantly in subsequent years. These findings could aid hospital administrators and physician leadership in their decision to deploy patient surveillance systems.

References:

¹ Internal Medicine Journal, 31(6): 343-348, 2001.

² Medical Journal Australia, 171(1):8-9, 1999.

³ Critical Care Medicine, 22(2):189-91, 1994.

⁴ Resuscitation, 37: 133-137, 1998.

⁵ Taenzer, Andreas, et al. Impact of SpO₂ Surveillance on Rescue Alerts and ICU Transfers. A Before-and-After Concurrence Study. To be published.

⁶ A decision tree approach has been applied in similar analyses including Circulation, 94:957-965, 1996.