

Table 1
Study Characteristics

Study	Hospital	Intensive Care Unit (ICU) Mortality Change	Average Length of Stay (LOS) Change
Rosenfeld et al. (2000) ^a	A 10-bed surgical ICU at Johns Hopkins Medicine	Severity-adjusted mortality rate in ICU decreased by 46%; in hospital, by 30%	ICU length of stay decreased by 30%
Breslow et al. (2004) ^b	Sentara Healthcare (Virginia)	26.4% reduction at the end of first year	Observed decrease in LOS from 5.6 to 4.8 days
Shaffer et al. (2005) ^c	Health First (integrated network on Florida's east coast)	Associated with significant decrease in mortality rate; odds ratio of pre- to postimplementation is 0.72	
Dickhaus (2006) ^d	Community hospital in Weston, Wisconsin, and a hospital in Jefferson City, Wisconsin	A decrease in mortality is observed	17% decrease in LOS resulted
Ikeda et al. (2006) ^e	Sutter Health (Sacramento, California)	Actual ICU mortality rate reduced from 40.07% to 18.86%; an estimated 56 lives were saved over a 30-month period	
Young (2006) ^f	Parkview Hospital (Fort Wayne, Indiana)	Cardiac arrest decline from nine months' prior average of 38% to 28%	
Gracias et al. (2007) ^g	Surgical intensive care units (SICU) at Pennsylvania Health System	Mortality rate decreased from 5.5% to 2.6%	
Howell et al. (2007) ^h	Saint Luke's Health System	Severity-adjusted ICU mortality went from 1.0 to 0.68; hospital mortality, from 0.95 to 0.77 days	ICU LOS decreased from 1.18 to 0.96; hospital LOS decreased from 1.09 to 0.84 days
Kohl et al. (2007) ⁱ	University of Pennsylvania Health System	Reduction in ICU mortality rate from 8.4% to 3.1% (63% decrease); hospital mortality rate reduced from 11.1% to 6% (46% decrease)	Decreased 3.7 to 4.4 days on average
Kohl et al. (2007) ^j	University of Pennsylvania Health System		10% reduction in LOS in ICU; 20% reduction in floor stay (cost savings of \$700,000 to \$2,850,000)
Mora et al. (2007) ^k	University of Texas Medical School at Houston	Majority of residents perceived that tele-ICU improves patient care (82.3%); 66.7% of residents expressed a desire to have remote telemonitoring involved in the care of their patients	
Rincon, Welcher,	Sutter Health (Bay Area and		Total estimated savings of

Srikanth, and Seiver (2007) ^l	Sacramento, California)		\$132,859 for 2007
Rincon, Bourke, and Ikeda (2007) ^m	Sutter Health (Sacramento, California)	Accurate sepsis identification can be achieved from tele-ICU; improved sepsis bundle compliance and reduced mortality observed after using tele-ICU	
Zawada and Herr (2007) ⁿ	Avera Health System (Sioux Falls, South Dakota)		Annual reduction of 4,146 ICU days and 572 hospital days
Coletti et al. (2008) ^o	Christiana Care Health System (Newark, Delaware)	77% of surveyed residents reported that tele-ICU was associated with improved patient safety	
Howell et al. (2008) ^p	University of Missouri, Kansas City	Both ICU and hospital mortality improved	Severity-adjusted ICU LOS improved from 0.84 to 0.03; severity-adjusted hospital LOS improved from 0.97 to 0.64
The New England Healthcare Institute (2008) ^q	University of Massachusetts Memorial Medical Center	209 lives were saved in 2007	Hospital length of stay reduced by 4 days on average; cost savings averaged \$5,000 per patient
Goran et al. (2008) ^r	Maine Medical Center	Estimate of 5% to 20% reduction in mortality rate; for an estimated 2,000 adult ICU admissions per year, 100 additional patients survive per year	
Zawada and Herr (2008) ^s	Rural center close to Avera Health System (Sioux Falls, South Dakota)		160 patients were prevented from transfer to a tertiary hospital for a savings of \$1,202,379
Thomas et al. (2009) ^t	Nonprofit health system of Gulf Coast region	Reduction in mortality by 1.4% to 2.1%	No significant differences in LOS pre- and postimplementation
Zawada et al. (2009) ^u	Avera Health System (one large tertiary hospital, three rural hospitals, two community hospitals, and nine critical care centers)	Reduction in adjusted mortality rate ranged from 0% to 29%	LOS reduction ranged from 45% to 22.5% (nine sites)
Morrison et al. (2010) ^v	Two community hospitals in the metropolitan Chicago area	No significant effect on ICU, non-ICU, or total mortality	No effect on LOS.
Lilly et al. (2011) ^w	University of Massachusetts	2.1% decrease	1.9-day decrease
Young et al. (2011) ^x	Review	Odds ratio for pooled data was 0.80, which shows reduction	1.26-day decrease
Willmitch et al. (2012) ^y	South Florida		0.55-day decrease

- ^a Rosenfeld, B. A., T. Dorman, M. J. Breslow, P. Pronovost, M. Jenckes, N. Zhang, et al. "Intensive Care Unit Telemedicine: Alternate Paradigm for Providing Continuous Intensivist Care." *Critical Care Medicine* 28, no. 12 (2000): 3925–31.
- ^b Breslow, M. J., B. A. Rosenfeld, M. Doerfler, G. Burke, G. Yates, D. J. Stone, P. Tomaszewicz, R. Hochman, and D. W. Plocher. "Effect of a Multiple-Site Intensive Care Unit Telemedicine Program on Clinical and Economic Outcomes: An Alternative Paradigm for Intensivist Staffing." *Critical Care Medicine* 32, no. 1 (2004): 31–38.
- ^c Shaffer, J. P., J. W. Johnson, F. Kaszuba, and M. J. Breslow. "Remote ICU Management Improves Outcomes in Patients with Cardiopulmonary Arrest." *Critical Care Medicine* 33, no. 12 (2005): A5.
- ^d Dickhaus, D. "Delivering Intensivist Services to Patients in Multiple States Using Telemedicine." *Critical Care Medicine* 34, no. 12 (2006): A24.
- ^e Ikeda, D., S. Hayatdavoudi, J. Winchell, T. Rincon, and A. Yee. "The Impact of Using a Standard Protocol for the Surviving Sepsis 6 and 24 Hr Bundles in Septic Patients on Total ICU Risk Adjusted Mortality." *Critical Care Medicine* 34, no. 12 (2006): A108.
- ^f Young, B. "ICU Process Improvement: Using Telemedicine to Enhance Compliance and Documentation for the Ventilator Bundle." *Chest* 130 (2006): 226s.
- ^g Gracias, V., et al. "Outcomes of SICU Patients after Implementation of an Electronic ICU ('eICU') System and Off-Site Intensivist." Presented at the IATSIC-AAST Conference, Montreal, Quebec, Canada, August 2007.
- ^h Howell, G. H., V. M. Lem, and J. M. Ball. "Remote ICU Care Correlates with Reduced Health System Mortality and Length of Stay Outcomes." *Chest* 132, no. 4 (2007): 443b–444.
- ⁱ Kohl, B., J. T. Gutsche, P. Kim, F. D. Sites, and E. A. Ochroch. "Effect of Telemedicine on Mortality and Length of Stay in a University ICU." *Critical Care Medicine* 35, no. 12 (2007): A22.
- ^j Kohl, B., F. D. Sites, J. T. Gutsche, and P. Kim. "Economic Impact of eICU Implementation in an Academic Surgical ICU." *Critical Care Medicine* 35, no. 12 (2007): A26.
- ^k Mora, A., S. Faiz, and T. Kelly. "Resident Perception of the Educational and Patient Care Value from Remote Telemonitoring in a Medical Intensive Care Unit." *Chest* 132, no. 4 (2007): 443a.
- ^l Rincon, T., B. Welcher, D. Srikanth, and A. Seiver. "Economic Implications of Data Collection from a Remote Center Utilizing Technological Tools." *Critical Care Medicine* 35, no. 12 (2007): A161.
- ^m Rincon, T., G. Bourke, and D. Ikeda. "Screening for Severe Sepsis: An Incidence Analysis." *Critical Care Medicine* 35, no. 12 (2007): A257.
- ⁿ Zawada, E., and P. Herr. "The Economic and Clinical Value of a Remote Intensive Care Unit." *Critical Care Medicine* 35, no. 12 (2007): A20.
- ^o Coletti, C., D. Elliott, and M. Zubrow. "Resident Perceptions of an Integrated Remote ICU Monitoring System." *Critical Care Medicine* 36, no. 12 (2008): A71.
- ^p Howell, G., T. Ardilles, and A. Bonham. "Implementation of a Remote Intensive Care Unit Monitoring System Correlates with Improvements in Patient Outcomes." *Chest* 134 (2008): s58003.
- ^q eICU Program. *Clinical and Financial Evidence for Improving Quality and Efficiency in the ICU*. Baltimore, MD: Philips VISICU, Inc., January 2009.
- ^r Goran, S. F., and T. Van der Kloot. "Savings in RN Staffing Costs Pre and Post eICU Implementation." In *eICU Program Success Stories*. Baltimore, MD: Philips-VISICU, 2008, 34-38.
- ^s Zawada, E., and P. Herr. "ICU Telemedicine Improves Care to Rural Hospitals Reducing Costly Transports." *Critical Care Medicine* 36, no. 12 (2008): A172.
- ^t Thomas, E. J., J. F. Lucke, L. Wueste, L. Weavind, and B. Patel. "Association of Telemedicine for Remote Monitoring of Intensive Care Patients with Mortality, Complications, and Length of Stay." *JAMA* 302, no. 24 (2009): 2671–78.
- ^u Zawada, E. T., Jr., and P. Herr. "Impact of an Intensive Care Unit Telemedicine Program on a Rural Health Care System." *Postgraduate Medical Journal* 121, no. 3 (2009): 160–70.
- ^v Morrison, J. L., Q. Cai, N. Davis, Y. Yan, M. L. Berbaum, M. Ries, and G. Solomon. "Clinical and Economic Outcomes of the Electronic Intensive Care Unit: Results from Two Community Hospitals." *Critical Care Medicine* 38, no. 1 (2010): 2–8.
- ^w Lilly, C. M., S. Cody, H. Zhao, K. Landry, S. P. Baker, J. McIlwaine, M. W. Chandler, R. S. Irwin, and University of Massachusetts Memorial Critical Care Operations Group. "Hospital Mortality, Length of Stay and Preventable Complications among Critically Ill Patients Before and After Tele-ICU Reengineering of Critical Care Processes." *JAMA* 305, no. 21 (2011): 2175–83.
- ^x Young, L. B., P. S. Chan, X. Lu, B. K. Nallamothu, C. Sasson, and P. M. Cram. "Impact of Telemedicine Intensive Care Unit Coverage on Patient Outcomes." *Archives of Internal Medicine* 171, no. 6 (2011): 498–506.

^y Willmitch, B., S. Golembeski, S. S. Kim, L. D. Nelson, and L. Gidel. "Clinical Outcomes after Telemedicine Intensive Care Unit Implementation." *Critical Care Medicine* 40, no. 2 (2012): 450–54.