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## Use of Telemedicine for ICU Patients Not Linked With Improvement in Survival

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Experts recommend that intensivists (intensive care physicians) care for ICU patients onsite because of an associated lower rate of illness and death. "However, there is a shortage of intensivists, which has led to the use of telemedicine technology to allow intensivists to remotely and simultaneously care for patients in several ICUs (ICU telemedicine [tele-ICU]), thus extending their reach," the authors write. "Remote monitoring may be a partial solution for the intensivist shortage, but it is expensive, its use is increasing, and there are few data in the peer-reviewed literature evaluating its effect on morbidity and mortality."

Eric J. Thomas, M.D., M.P.H., of the University of Texas Health Science Center at Houston, and colleagues assessed the effect of a tele-ICU intervention on mortality, complications, and length of stay (LOS) in 6 ICUs of 5 hospitals in a large U.S. health care system by measuring these outcomes before and after implementation of the tele-ICU. The study included 2,034 patients in the preintervention period (January 2003 to August 2005) and 2,108 patients in the postintervention period (July 2004 to July 2006). Almost two-thirds of the patients in the postintervention group had physicians who chose minimal delegation to the tele-ICU ( $n = 1,393$  [66.1 percent]), in which the tele-ICU intervened only for patients in life-threatening situations. Physicians delegated full treatment authority to the tele-ICU for 655 patients (31.1 percent).

The tele-ICU system included a remote office equipped with audiovisual monitoring and a computer workstation providing real-time vital signs with graphic trends; audiovisual connections to patients' rooms; early warning signals regarding abnormalities in a patient's status; and access to imaging studies and the medication administration record. Tele-ICU physicians conducted rounds based on subjective assessments of illness severity.

The researchers found that the observed hospital mortality rates were 12.0 percent in the preintervention period and 9.9 percent in the postintervention period. After adjustment for severity of illness, there were no significant differences associated with the telemedicine intervention for hospital mortality. ICU mortality rates were 9.2 percent in the preintervention period and 7.8 percent in the postintervention period, with the difference also not significant after adjustment.

The observed average hospital LOS among patients who survived to discharge was 9.8 days preintervention and 10.7 days postintervention; the observed average ICU LOS for the patients who survived to transfer was 4.3 days for the preintervention period vs. 4.6 days for the postintervention period, with neither difference significant.

"There was a significant interaction between the tele-ICU intervention and severity of illness, in which tele-ICU was associated with improved survival in sicker patients but with no improvement or worse outcomes in less sick patients," the researchers write.

"Implementation of a tele-ICU was not associated with a reduction in overall hospital mortality for patients in these 6 ICUs. The lack of apparent benefit may be attributable to low decisional authority granted to the tele-ICU as well as to varied effects across different types of patients. Given the expense of tele-ICU technology, the conflicting evidence about its effectiveness, and the existence of other effective quality improvement interventions for ICUs, further use of this technology should proceed in the context of careful monitoring of patient outcomes and costs."

Editorial: Evaluating Telemedicine in the ICU

Erika J. Yoo, M.D., and R. Adams Dudley, M.D., M.B.A., of the University of California, San Francisco, write in an accompanying editorial that evaluating the effectiveness of telemedicine is challenging.

"Given the heterogeneity of tele-ICU systems and the hospitals adopting them, it is unlikely that any single study can definitely address the benefits of telemedicine for the critically ill. Rather, literature syntheses will be the most important approach to improving the understanding of the effects of tele-ICU support."

"Tele-ICU is a potentially valuable change in ICU care, but its complexity means that 'tele-ICU improves care' is not a testable hypothesis. Therefore, performing and synthesizing tele-ICU research will be challenging. If future studies include more description of which components of ICU care were present before tele-ICU and which were added, it would be easier to interpret the results."

Adapted from materials provided by JAMA and Archives Journals.

Journal Reference:

Eric J. Thomas; Joseph F. Lucke; Laura Wueste; Lisa Weavind; Bela Patel. Association of Telemedicine for Remote Monitoring of Intensive Care Patients With Mortality, Complications, and Length of Stay. JAMA, 2009;302(24):2671-2678

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