Implementation of telemedicine intervention in ICUs associated with better outcomes for patients

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Intensive care units (ICUs) that implemented a telemedicine intervention that included offsite electronic monitoring of processes and detection of nonadherence to best practices had lower hospital and ICU mortality, lower rates of preventable complications, and shorter hospital and ICU lengths of stay, according to a study that will appear in the June 1 issue of *JAMA*. The study is being published early online to coincide with its presentation at a meeting of the American Thoracic Society

"Patient needs and societal costs of adult critical care have increased as predicted from population-based models, and more efficient methods of delivery of care are needed. A tele-intensive care unit is a promising technological approach designed to systematically alter processes of care that effect outcomes. Tele-ICU can be defined as the provision of care to critically ill patients by health care professionals located remotely. Tele-ICU clinicians use audio, video, and electronic links to assist bedside caregivers in monitoring patients, to oversee best practice adherence, and to help create and execute care plans. Tele-ICU programs have the potential to target processes that are associated with better outcomes including shorter response times to alarms and abnormal laboratory values, more rapid initiation of life-saving therapies, and higher rates of adherence to critical care best practices," according to background information in the article.

To examine which tele-ICU-related process changes are associated with

better outcomes, Craig M. Lilly, M.D., of the University of Massachusetts Medical School, Worcester, Mass., and colleagues evaluated the association of a tele-ICU intervention with the risk of dying in the hospital and length of stay and the relationship of best practice adherence and preventable complications to these outcomes. The study, performed from April 2005 through September 2007, included 6,290 adults admitted to any of 7 ICUs (3 medical, 3 surgical, and 1 mixed cardiovascular) on 2 campuses of an 834-bed academic medical center.

The off-site tele-ICU team included an intensivist and used tele-ICU workstations. Among the responsibilities of the team were reviewing the care of individual patients; performing real-time audits of best practice adherence; monitoring system-generated electronic alerts; auditing bedside clinician responses to in-room alarms; and intervening when the responses of bedside clinicians were delayed and patients were deemed physiologically unstable. The off-site team had the ability to communicate with bedside clinicians or directly manage patients by recording clinician orders for tests, treatments, consultations, and management of life-support devices.

After an analysis of the data from the study period, the researchers found that the hospital mortality rate was 13.6 percent during the preintervention period compared with 11.8 percent during the tele-ICU intervention. The ICU mortality rate was 10.7 percent for the preintervention group and 8.6 percent for the tele-ICU group. The length of hospital stay was 13.3 days in the preintervention group and 9.8 days in the tele-ICU group, and length of ICU stay was 6.4 days in the preintervention group and 4.5 days in the tele-ICU group.

The tele-ICU intervention period compared with the preintervention period was associated with higher rates of best clinical practice adherence for the prevention of deep vein thrombosis (99 percent vs. 85

percent), prevention of stress ulcers (96 percent vs. 83 percent), best practice adherence for cardiovascular protection (99 percent vs. 80 percent), prevention of ventilator-associated pneumonia (52 percent vs. 33 percent), and lower rates of preventable complications (1.6 percent vs. 13 percent for ventilator-associated pneumonia and 0.6 percent vs. 1.0 percent for catheter-related blood stream infection). The results for medical, surgical, and cardiovascular ICUs were similar.

For the tele-ICU group compared with the preintervention group, the fraction of patients requiring mechanical ventilation was significantly lower and the duration of mechanical ventilation was significantly shorter. Also, patients in the tele-ICU group were 8 percent more likely to go home, 6 percent less likely to go to rehabilitation or to a long-term care facility, and 2 percent more likely to go to a skilled nursing facility than patients in the preintervention group.

"In conclusion, an adult tele-ICU intervention at an academic medical center that had been previously well staffed with a dedicated intensivist model and had robust best practice programs in place before the intervention was associated with lower mortality and shorter lengths of stay. Only part of these associations could be attributed to following best practice guidelines and lower rates of preventable complications. This suggests that there are benefits of a tele-ICU intervention beyond what is provided by daytime bedside intensivist staffing and traditional approaches to quality improvement …", the authors write.

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