



Technology/Monitoring

Staff acceptance of a telemedicine intensive care unit program: A qualitative study ☆☆☆★★★

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ABSTRACT

Purpose: We conducted an evaluation to identify factors related to intensive care unit (ICU) staff acceptance of a telemedicine ICU (Tele-ICU) program in preimplementation and postimplementation phases.

Methods: Individual or group semistructured interviews and site observations were conducted with staff from the Veterans Affairs Midwest Health Care Network Tele-ICU and affiliated ICUs. A qualitative content analysis of preimplementation and postimplementation transcripts and field notes was undertaken to identify themes positively and negatively influencing Tele-ICU acceptance.

Results: Telemedicine ICU training, Tele-ICU understanding, perceived need, and organizational factors emerged as influencing acceptance of the Tele-ICU before implementation. After implementation, Tele-ICU understanding, impact on work systems, perceived usefulness, and relationships were factors influencing acceptance and utilization. Barriers to implementation included confusion about how to use the Tele-ICU, disruptions to communication and workflows, unmet expectations, and discomfort with being monitored. Facilitators included positive experiences, discovery of new benefits, and recognition of Tele-ICU staff as complementing bedside care.

Conclusions: Telemedicine ICU implementation is complex. Time and resources should be allocated for local coordination, continuous needs assessment for Tele-ICU support, staff training, developing interpersonal relationships, and systems design and evaluation. Such efforts are likely to be rewarded with more rapid staff acceptance of this new technology.

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1. Introduction

Owing to a shortage of physicians trained in critical care [1,2], many health care systems have turned to telemedicine intensive care units (Tele-ICU) to assist with patient care in their ICUs. Tele-ICU programs vary in technological and organizational complexity, but typically involve audio, video, and electronic communication connecting a centralized support center (Tele-ICU) with geographically dispersed ICUs to assist in patient monitoring and management. Literature on the impact of Tele-ICU programs is complex [3,4]. Some studies have demonstrated that Tele-ICU coverage is associated with improved guideline adherence, lower rates of preventable complications, lower hospital and ICU mortality, and shorter hospital and ICU lengths of stay [5,6], but other studies demonstrated little benefit [4,8,9].

Studies addressing staff acceptance of Tele-ICUs are equally complicated [7]. Some studies cite improved communication, accessibility, patient safety, and resident education as perceived benefits associated with Tele-ICUs [10–13]. Other studies report apprehension about the effect of Tele-ICUs on existing workload, workflow, and staffing levels, discomfort being monitored, and questions regarding the necessity of additional oversight and cost [14–17]. Although several

recent studies have discussed staff acceptance of Tele-ICUs, few have evaluated longitudinal changes in staff acceptance [10–12], examined the impact of Tele-ICU implementation across different types of ICUs [10,16], or presented findings from a range of users and stakeholders [11,16]. Although Tele-ICU is still relatively new and our understanding is limited [18], few studies have used qualitative methods to analyze social and cultural factors influencing staff acceptance of Tele-ICU [16,19,20]. Our study addresses many of these gaps.

In this qualitative study, we asked clinicians and administrators to discuss the early impact Tele-ICU implementation had on care processes, practices, and workplace relationships. We conducted observations and individual and group interviews at a Tele-ICU support center and 7 ICUs during the pre- and post-Tele-ICU implementation period to explore changes in participant perceptions, expectations, and attitudes toward Tele-ICU. This article reports findings and discusses implications for successful Tele-ICU implementation.

2. Methods

2.1. Setting

The Veterans Health Administration is piloting Tele-ICU programs in 3 Veterans Integrated Service Networks (VISNs) to increase access to intensivists, reduce treatment variability between ICUs, and reduce patient transfers to non-Veterans Affairs (VA) facilities. The first advanced Tele-ICU was implemented in the VA Midwest Health Care Network (VISN 23), which serves more than 400 000 geographically dispersed veterans from ten highly rural Midwestern states [21]. VISN 23 includes 8 ICUs at 7 facilities that vary substantially in their structural and organizational characteristics (Table 1) [22]. Intensive care units are located within 3 tertiary care medical centers (Iowa City, Iowa; Minneapolis, Minn; and Omaha, Neb), a small urban hospital (Des Moines, Iowa), and 3 rural hospitals (Fargo, ND, Ft Meade, SD, and Sioux Falls, SD).

The VISN 23 Tele-ICU system links patients and bedside clinicians in ICUs to a team of critical care specialists located at the Tele-ICU support center in the Minneapolis VA. Planning for the Tele-ICU program began in 2008 as an extension of quality improvement projects initiated through an ICU Collaborative in 2005 to 2006 and continued through the VISN 23 Critical Care Guidance Committee [23]. The Tele-ICU came online in 2011, and all ICU beds were active in February 2012. Tele-ICU implementation was executed by individual facility and Tele-ICU staff. Although predominantly focused on technical and organizational components of Tele-ICU implementation, Tele-ICU leadership also used several strategies to establish relationships and build buy-in, including attempts to involve ICU clinicians in decisions, collaborative workflow design with ICU management and staff, and face-to-face interactions through network-wide meetings and ICU site visits.

Tele-ICU clinicians access patient information through electronic medical records (Computerized Patient Record System), physiological bedside monitors (eg, heart rate, mean arterial pressure, and oxygen saturation), Picture Archiving and Communications System digital imaging, and ICU clinical information systems (Philips IntelliVue Clinical Information Portfolio), as well as using Philips VISICU eCareManager (v3.7.1) software for patient and population management (Philips Healthcare, Andover, MA). Two-way real-time audio-video links connect ICU and Tele-ICU staff. Two critical care nurses and 1 intensivist staff the Tele-ICU 24 hours and 21 h/d, respectively. Including the Spokane VA Medical Center (not included in this study), 80 ICU beds are monitored.

2.2. Data collection

Our interdisciplinary research team was comprised of a medical anthropologist (H.S.R.), social scientists (J.M., C.C.), and a physician with experience in mixed-methods research (P.C.). Three authors

Table 1
Characteristics of VISN 23 ICUs, including tele-ICU coverage

	Minneapolis VA	Des Moines VA	Iowa City VA	Omaha VA	Fargo VA	Ft Meade VA	Sioux Falls VA
ICU level	Level 1	Level 2	Level 2	Level 2	Level 3	Level 3	Level 3
ICU type	MICU	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed
No. of intensivists (no. of FTEE)	6 (6)	2 (2)	7 (2.6)	8 (1)	1	0	1
%RNs with CCRN certification	21	8	17	11	0	0	20
No. of ICU beds (no. of operational beds)	10 (6)	9 (6)	10 (10)	16 (11)	5 (4)	4 (4)	6 (6)
On-call in-house ICU coverage for evenings, nights, weekends	Resident only	Resident, MOD	Resident only	Resident, MOD	MOD	Attending physician only	Resident only
No. of assisting personnel FTEEs (eg, nursing assistant)	3	1	0	0	0	0	1
Pharmacist and respiratory therapist dedicated to ICU	Yes	Yes	No	Yes	Partial	No	No
Tele-ICU level of support ^a	1	1	2	1	1	1	1
Month/Year of Tele-ICU launch	August/2011	January/2012	December/2011	August/2011	August/2011	February/2012	January/2012 ^b
Month/Year of CIS launch	May/2011	February/2012	November/2011	November/2011	October/2011	October/2012	June/2012

FTEE, full time employee equivalent; CCRN, Critical Care Registered Nurse; MOD, Medical Officer of the Day; CIS, Clinical information system.

^a The surgical service at the Omaha VA opted for level 1 Tele-ICU support, whereas the medicine service received consultation only.

^b A phased implementation occurred in November 2011 without access to waveforms. New monitors were installed in January 2012, and the Tele-ICU staff then had full access to patients' real-time physiological data.

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