Bedside Nurse Acceptance of Intensive Care Unit Telemedicine Presence

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Since 2010, health care organizations have rapidly adopted telemedicine as part of their health care delivery system to inpatients and outpatients. The application of telemedicine in the intensive care unit is often referred to as *tele-ICU*. In telemedicine, nurses, nurse practitioners, physicians, and other health care professionals provide patient monitoring and intervention from a remote location. Tele-ICU presence has demonstrated positive outcomes such as increased adherence to evidence-based care and improved perception of support at the bedside. Despite the successes, acceptance of tele-ICU varies. Known barriers to acceptance include perceptions of intrusiveness and invasion of privacy. (*Critical Care Nurse.* 2018;38[6]:e1-e4)

The use of intensive care unit (ICU) telemedicine programs has grown significantly in the United States over the past 15 years.[1] More than 10% of beds in ICUs are now covered by an ICU telemedicine program[1]—a sharp increase from 2003, when just 0.9% of total ICU beds received the same coverage.[1] This technology is one solution used in the provision of care to critically ill patients.

History of Telemedicine

The American Telemedicine Association (ATA) defines telemedicine as "the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status."[2] Telemedicine describes a system or method for delivering health care.[2] Telemedicine falls within the broader category of health care delivery considered telehealth. Telehealth includes all health services provided using telecommunications technology, including transmission of images, remote monitoring, and medical call centers.[2] Telehealth has been used since the 1870s, when telephone communications were used to reduce unnecessary patient office visits.[3] Since that time, developments in technology have permitted transmission of radiologic images, cardiac rhythms, diagnostic consultations, and asynchronous and synchronous remote monitoring.[3]

In 2009, the Health Information Technology for Economic and Clinical Health Act was created to stimulate the adoption of electronic health records and promote health care information technology, including the secure exchange of electronic health information. The United States has made great technological advancements with the implementation of electronic health records, electronic prescribing, and mobile health tools.[4] Advancements in the secure transmission of health information have facilitated further expansion of telemedicine services provided to patients in a variety of health care settings.

Telemedicine use by first responders has become more common. The best evidence is in stroke management, where conclusive evidence of the significant positive effect of telemedicine on clinical outcome has led to its recommendation for stroke management.[5] Telemedicine could enhance emergency medical services by helping expedite urgent patient transfer, improving remote consultation, and enhancing supervision of paramedics and nurses.[5] In

Tele-ICU staff are members of the care team, place orders, review laboratory test results and imaging studies, and document patient care actions.

the inpatient setting, telemedicine is a second set of eyes monitoring the patient from a remote location. The specialty application of telemedicine in the ICU is often referred to as ICU telemedicine or tele-ICU.

Outcomes research in tele-ICU reflects a diverse picture. Conflicting literature exists on whether tele-ICU systems demonstrate a direct effect in reducing hospital length of stay. However, tele-ICU has been correlated with a reduction in ICU and hospital mortality and morbidity rates.[6,7] Tele-ICU has also played a role in improving clinical outcomes by decreasing time to interventions such as timely response to clinical alerts and alarms.[6,7] Health

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care organizations that have invested time, money, and education in inpatient telemedicine monitoring have seen considerably higher adherence to best practices.[6-8] For example, tele-ICU implementation has been linked to increased use of evidence-based protocols for sepsis, ventilator-associated pneumonia, and blood transfusions, which has had a positive influence on quality improvement and patient care.[8] Tele-ICU departments also have collaborated with nursing and some have taken on the role of daily quality auditing.[9] Because of this practice change, documentation of certain nursing quality metrics, such as use of restraints and incidence of pressure ulcers, has resulted in increased adherence to evidence-based practices and regulatory guidelines.[10,11]

Tele-ICU Operations and Coverage Patterns

The ATA has created practice guidelines for telemedicine to advance the science and ensure the quality of care provided for patients.[2] The guidelines are developed by panels that include telemedicine experts and other strategic stakeholders, and are designed to serve as an operational reference and an educational tool to aid in providing appropriate care for patients.[2] The guidelines generated by ATA undergo a thorough consensus and rigorous review, with final approval by the ATA board of directors. Existing products are reviewed and updated periodically.[2]

The purpose of these guidelines is to assist practitioners in pursuing a sound course of action to provide effective and safe medical care founded on current information, available resources, and patient needs.[8] In the guidelines, the ATA recognizes that safe and effective practices require specific training, skills, and techniques, as described in each document.[2]

Tele-ICU staffing levels are determined by the type and number of patients who require monitoring, the availability of resources at the monitored sites, and the tele-ICU program model. For example, academic settings with house staff and fellow availability and 24/7 local intensivist staffing may require less tele-ICU physician service than a community hospital managed by the hospitalist service.[2] According to national trends, nurses who wish to work in a tele-ICU should have a minimum of 3 to 5 years of critical care experience. A specialty certification is preferred and may be required. Staffing variations include but are not limited to 24/7 coverage by physicians and nurses, 24/7 nursing staffing

with evening and night physician staffing, and night operation only.[2]

Tele-ICU systems continuously monitor for and alert staff to acute changes or trends in physiology. The tele-ICU team requires the same access as the bedside team to data elements related to patient care (eg, vital signs, results of laboratory tests, radiologic images, orders, and notes) to assess patients' status accurately and identify actual and/or potential issues related to patient care.[10] By using sophisticated alert systems, subtle changes in a patient's condition are assessed for the purposes of early intervention and prevention of a crisis for the patient.[10] Staff in the tele-ICU use video and audio technology to perform assessments and communicate with patients, their families and loved ones, as well as caregivers.[11] Bedside caregivers may contact the tele-ICU for patient care advice and guidance. Tele-ICU staff are members of the care team, place orders, review laboratory test results and imaging studies, and write progress notes.

ICU Nurse Acceptance of Tele-ICU

Tele-ICU is not a replacement for care at the bedside; rather, the tele-ICU augments this care. Successful integration of the tele-ICU into the care team requires sharing of knowledge, goals, and respect.[12] In studies of staff acceptance of tele-ICU programs, varying outcomes have been demonstrated.[12-14] Acceptance may be explained as "the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support."[15,16] Barriers to successful implementation include apprehension about the intrusiveness of tele-ICU monitoring, nurses' perception that they are being spied upon, and concerns about the impact of the tele-ICU on existing workload.[17,18]

Lack of buy in or acceptance may affect bedside clinicians' willingness to receive and enact recommendations from tele-ICU providers.[14] Number of years of nursing experience negatively correlates with intention to use technology and nurses with longer tenure may benefit from receiving information earlier and more frequently than those with a shorter tenure.[18] An understanding of change management theories and application of concepts in the Technology Acceptance Model (TAM) may assist nursing leaders in planning interventions that influence nurses' intention to use tele-ICU technology.[18,19]

The TAM was developed to provide a framework for understanding determinants of computer acceptance.[20]

The TAM presents a model involving 2 key determinants: perceived usefulness and perceived ease of use. Perceived ease of use has a direct effect on perceived usefulness. Both characteristics contribute to an individual's attitude toward using a system and, therefore, actual system use.[20,21] Facilitators of the acceptance and adoption of telemedicine include education, relationship building, and communication.[17]

Lewin's change management theory provides a framework for looking at change and transition to acceptance as 3 distinct stages.[22] The beginning of the process is to achieve an understanding of why the change is necessary. This stage, known as unfreezing, involves introducing the concept and providing evidence that the change is needed.[22] Support of the integration of a tele-ICU may involve presentation of data about system enhancements, desired outcomes, and benefits anticipated from integration of the tele-ICU into the existing workflows. In this preimplementation period, a multimodal education strategy may be helpful. As described in the TAM, perception of usefulness and of ease of use are correlated with the individuals' intent to incorporate technology into their practice.[20] Perception of usefulness is bolstered when physicians and administrators embrace the need for

> Optimal patient care is the central focus of interaction between nurses in the tele-ICU and nurses at the bedside.

change and demonstrate support.[19] Moeckli et al[17] found introducing tele-ICU nurses to bedside ICU nurses, facilitating workflow discussions, and organizing site visits to the tele-ICU facilitated acceptance of the program. Mullen-Fortino et al[18] surveyed 72 critical care nurses to determine their perception of usefulness of a nocturnal tele-ICU program. Survey results reinforced the importance of relationships: 79% of nurses felt that maintaining a personal familiarity with the telemedicine staff was important.

The second stage of Lewin's change management theory is transition, or change.[22] During this stage, new thoughts and behaviors are developed. Workflow may be adapted to incorporate the tele-ICU while new policies reflecting collaborative commitment to evidence-based bundles of care may be deployed.[9,17] Initiatives are designed to align with the organization's mission and vision.[16] Education should be tailored to meet the needs of the specific site, and staff involvement in planning and

evaluating workflows may positively influence acceptance and integration of the tele-ICU program.[13-15]

The third stage of Lewin's theory is referred to as refreezing. During this stage, stability is achieved and collaboration with the tele-ICU has been implemented. Ongoing education may be necessary to support changes in workflow and reinforce expected behaviors.[16,17] Positive interactions help establish buy in and enhance acceptance by bedside staff.[17] In a systematic review, Young et al[13] found that initial concerns regarding the impact of tele-ICU are often alleviated once systems are in place.[13]

Recommendations from the American Association of Critical-Care Nurses Tele-ICU Practice Guidelines may be used during any phase of tele-ICU implementation.[12] The guidelines were designed to facilitate the creation of a practice environment in which the tele-ICU nurse is integrated into the optimal care of the patient and family.[12] Collaboration and communication are essential elements of tele-ICU integration. Establishing a positive relationship between nurses in the tele-ICU and at the bedside is fundamental to successful implementation of the tele-ICU. Optimal patient care is the central focus of interaction.[12]

Conclusion

As ICU telemedicine evolves and more caregivers are exposed to opportunities to collaborate with tele-ICU programs, the practice of remotely monitoring patients will become more widely accepted. As with any new technology introduced to health care, there are obstacles to overcome. Education of health care workers on the intent and use of the technology and implementation of strategies to enhance communication and collaboration are vital to acceptance. There is an opportunity for continued research and publication demonstrating the strategies for successful integration of tele-ICU into the care model as well as the impact of tele-ICU on nursing practice. CCN

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