Tele-ICU Enhancements

Making the Move: From Bedside to Camera-Side

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The tele-intensive care unit (tele-ICU) uses sophisticated telemedicine technology and a remote team of critical care experts, including nurses, to provide continuous monitoring, assessment, and interventional services to a large number of patients across multiple ICUs. This new practice environment offers experienced critical care nurses an opportunity for career and knowledge expansion while reducing some of the physical and emotional risks encountered at the bedside. The role of the tele-ICU is still evolving but focuses on 4 areas of responsibility: performing virtual rounds, managing patient alerts, providing ICU support, and coaching or providing teaching moments. The transition from the bedside into the tele-ICU role can be complex as tele-ICU nurses encounter ICU acceptance barriers and a lack of or a change in professional identity. A formal orientation program focused on competency is necessary for the successful transition from bedside nurse to tele-ICU nurse. (Critical Care Nurse. 2012;32[1]:e20-e29)

Health care organizations continue to explore new strategies designed to address the complex challenges of resource availability and quality care in today’s intensive care units (ICUs). Patient safety concerns persist and medication errors alone account for 78% of serious medical errors in the ICU. Variables such as the participation of an intensivist in the oversight of patient care, an adequate nurse to patient ratio, and the experience level of the nurse are critical success factors for error interception. However, current and projected shortages of physicians and nurses seriously endanger organizations’ ability to improve patient safety. In lieu of experienced ICU nurses, increasing numbers of new-graduate registered nurses, travelers, or temporary staff are hired to fill current vacancies. This lack of ICU nursing experience may further contribute to error rates and patient safety risks. The convergence of the shortage of staff with the increased demand for services is forcing many hospitals to explore innovative strategies for improving care at the bedside.

The tele-ICU, also referred to as the eICU (Philips-VISICU, Baltimore, Maryland) or virtual ICU, is a solution for addressing patient safety and quality improvement. The tele-ICU uses sophisticated telemedicine technology and a remote team of critical care experts to provide continuous monitoring and interventional services to geographically disparate ICUs. Although the tele-ICU team is usually made up of intensivists and critical care nurses, some program models include other clinical experts such as a pharmacist or physician extenders.

The remote team has access to wide-ranging data on patients, including real-time waveforms (eg, from electrocardiography, arterial catheter, or pulmonary artery catheter), medication history, results of laboratory tests, clinical documentation, and radiology images and reports. A high-fidelity video camera mounted in each patient’s room provides the tele-ICU team with “eyes and ears” for direct assessment of patients and communication with the bedside team. Decision support tools and a robust alert system enhance the team’s ability to identify and correct the subtle changes in a patient’s condition that may herald a worsening status. The tele-ICU team does not replace bedside care but instead provides complementary or adjunct care. Through collaboration with the ICU team, the tele-ICU facilitates timely interventions with the...
potential to reduce patients’ complications and improve mortality.\textsuperscript{11}

Currently approximately 10% of all ICU patients are supported by tele-ICU programs.\textsuperscript{11,12} Despite the increasing use of tele-ICUs, many ICU nurses have had little exposure to the tele-ICU environment and do not understand the role of the tele-ICU nurse. The focus of this article is to explore the role, benefits, and challenges for nurses functioning as tele-ICU nurses.

The Role of the Tele-ICU Nurse

The tele-ICU is located either adjacent to an ICU, or more commonly, at a remote, centralized site. The space occupied by the technology and staff is referred to as the “CORE,” the “bunker,” or “the box.”\textsuperscript{13} The box is usually a large open room that houses 1 workstation per 30 to 35 patients. Each workstation has multiple computer screens for data display, keyboards, a headset, and other necessary equipment.\textsuperscript{13} The openness of the environment encourages the communication and collaboration among the tele-ICU team. Although there may be some site-specific variability in tele-ICU workflows, the tele-ICU nurse’s work tends to be focused on 4 areas: (1) virtual rounding, (2) alert recognition and response, (3) providing bedside team support, and (4) coaching and collaboration.

**Virtual Rounding**

Assessment, the need for a systematic, dynamic way to collect and analyze data, is a major component of the nursing process occurring in all settings including the tele-ICU. The tele-ICU nurses perform continuous “virtual” rounds to assess patients’ status. Typically, patient information such as history, trends in vital signs, laboratory reports, and clinical documentation are reviewed for any “red flags” that may indicate a need for a more thorough assessment. The in-room camera may be activated to assess a patient visually or to validate ventilator or other equipment settings. If the patient is awake and responsive, the tele-ICU nurse may activate the audio system to speak with the patient as part of the assessment.

Variations from the documented ICU assessment or disconcerting trends are discussed directly with the bedside nurse. For example, at 7 AM, the ICU nurse documented the patient’s cardiac rhythm as “atrial fibrillation”, but at 8:15 AM, the rounding tele-ICU nurse notices the patient has converted to normal sinus rhythm. If the ICU nurse is in the room, a discussion may occur over the audio system. However, if the ICU nurse is not at the bedside, a phone call will alert the nurse, who may or may not be aware of this change in status.

Tele-ICU nurses are often responsible for up to 35 patients in multiple ICUs.\textsuperscript{10} Unlike the ICU nurse, the tele-ICU nurse has minimal ability to provide patients with comfort or establish a therapeutic relationship with the patient and the patient’s family. Instead, rounds are focused on the identification of potential safety issues and/or changes in a patient’s status. The patient’s acuity determines the frequency of rounds; highest acuity patients are reassessed more often, often hourly, whereas the least acute patients may be assessed once or twice a shift.\textsuperscript{10}

The tele-ICU nurse’s rounds are independent of the actions of the bedside nurse; they are meant as additional care, not replacement care. Observations made by the tele-ICU nurse are discussed directly with the bedside nurse and, much like the discussions or observations of an ICU charge nurse, are not typically captured in the patient’s record.

**Managing Alerts**

Interfaces between the bedside monitoring system and the tele-ICU software allow visualization of the same data and waveforms available on the bedside monitors. Unlike a telemetry unit, however, the tele-ICU staff has no audible indication of bedside alarms, nor can they set parameters or reset alarms on the bedside equipment. Addressing the bedside alarms remains the purview of the bedside team.

Vendor-specific tele-ICU software may contain a rules engine that generates alerts unique to the software. Rules engines proactively search for patterns of data that indicate a change in status for the patient. In the Philips-VISICU eCareManager software, physiological, clinical,
medication, and laboratory data are continuously and automatically evaluated as new data become available. Changes in the baseline data may produce an alert, and some alerts are available only to the tele-ICU whereas other alerts are available to both teams. Not every alert heralds a crisis, but each alert must be evaluated within the context of the patient’s condition to determine its significance.

For example, the tele-ICU receives an alert indicating a decrease in the patient’s oxygen saturation. The tele-ICU nurse “puts on the detective’s hat” and looks for information such as waveform accuracy or medications that may explain the change in oxygen saturation. If an obvious indication for the change is lacking, the in-room camera is activated for a visual inspection. If the tele-ICU nurse observes that the patient has removed the oxygen source and concludes that this is the source of the saturation change, the bedside team is notified. Alerts provide an opportunity for further assessment and, depending on the findings, may produce a chance for further collaboration and changes in treatment plans.

**Providing ICU Support**

As well as virtual rounding and alarm investigation, the tele-ICU nurse is responding to specific requests for assistance from the ICU staff (Table 1). For example, during a busy admission of a patient in unstable condition, the tele-ICU may be asked to report the stat blood gas results to the in-room team, to page for portable radiography after intubation, or to provide consultation about the best sedation for the clinical condition. In some programs, the tele-ICU nurse may also provide support to the ICU nurse by assisting with documentation needs, such as importing vital signs into the electronic flowsheet or setting up the flowsheet.

Patient care can be reviewed for compliance with best-practice standards such as those for prevention of ventilator-associated pneumonia. When gaps in compliance are identified, the tele-ICU nurse may either alert the bedside team of the oversight or may notify the tele-ICU physician, who enters the order necessary for completion. Many tele-ICU sites also provide other quality services such as screening all patients admitted to the ICU for sepsis, pressure ulcer surveillance, or monitoring glucose control protocols, all of which have led to improved outcomes for patients.

Although data demonstrating the benefits of tele-ICUs in reducing patients’ mortality and length of stay have been reported, no research has quantified the tele-ICU nurse’s contributions to patient care. Philips-VISICU has recently provided software to their eICU customer sites for the electronic collection and tracking of data related to eICU nursing interventions. Regular reports identifying the types of interventions, bedside response, and patients’ outcomes are available for benchmarking purposes and may assist in researching the contributions of tele-ICU nurses to patients’ outcomes as well as in defining the standard for practice of tele-ICU nurses.

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**Table 1** Opportunities for the tele–intensive care unit (tele-ICU) to assist the ICU team

<table>
<thead>
<tr>
<th>Opportunities for the tele-ICU staff to assist the ICU team may vary with the different programs and policies and may include but are not limited to</th>
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<tbody>
<tr>
<td>Placing pages for needed services (eg, laboratory or radiology technicians, specific physicians)</td>
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<tr>
<td>Locating and reporting stat laboratory or radiology results</td>
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<tr>
<td>Importing of frequent measurements of vital signs or other pertinent data during a patient’s crisis, or if the ICU nurse is unavailable</td>
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<tr>
<td>Researching and faxing information about a specific patient’s condition or disease</td>
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<tr>
<td>Reviewing of radiology images to confirm catheter placement</td>
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<tr>
<td>Providing frequent assessment via camera of agitated or restless patients</td>
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<tr>
<td>Acting as a second signature for high-risk drug validation</td>
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<tr>
<td>Assisting with troubleshooting documentation issues within tele-ICU software applications</td>
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<tr>
<td>Identifying potential safety concerns such as bedside alarms being off</td>
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<tr>
<td>Providing consultative services from either the tele-ICU nurse or physician to problem solve patients’ conditions</td>
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<tr>
<td>Acting as in-room support during new or first-time procedures, or to validate policy adherence during procedures</td>
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<tr>
<td>Monitoring compliance with quality measures</td>
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<tr>
<td>Evaluating compliance with best practice</td>
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<tr>
<td>Screening admitted patients for sepsis or other high-risk conditions</td>
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<tr>
<td>Facilitating the development of standardized protocols across the system</td>
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Coaching and Collaboration

The tele-ICU nurse provides significant value to tele-ICU programs by being available to participate in bedside collaboration, education, or coaching opportunities. Novice ICU staff, especially new graduates, often lack confidence in their skills, have deficits in critical thinking and priority setting, or are uncomfortable communicating with physicians. Lack of support during or after orientation may contribute to new-graduate turnover rates of 33% to 69% within the first year of employment. Despite innovative orientation and mentoring models, access to expert nurses may be challenging in the current workplace, especially during off-hour shifts.

The tele-ICU is staffed with highly experienced critical care nurses and intensivists who are immediately available to provide consultations or coaching during the program service hours. Grossman describes coaching as advice given to others to assist a less experienced individual in accomplishing a goal. The coaching and teaching aspect of the tele-ICU nurse’s role has been described as a “virtual charge nurse” and emerging data from tele-ICU sites including Advocate Health Care (C. Welsch, RN, MBA, Vice President, oral communication, January 28, 2010) and MaineHealth suggest that the added support from the tele-ICU has a supplementary benefit of increased retention and reduced turnover of nurses.

An example of a coaching moment from MaineHealth VitalNetwork, Portland, Maine follows:

While performing my rounds on a post-open heart patient admitted earlier in the shift, I noted inappropriate pacing spikes on the patient’s native ECG [electrocardiography] waveform, indicating a sensitivity problem. I phoned the nurse assigned for bedside care, and asked if he had noticed the pacer spikes. He admitted to having only 7 months ICU experience and had not noted, nor demonstrated an understanding of the potential patient risk. Unfortunately, the charge nurse and many of his other ICU colleagues were busy with a patient in crisis at the other end of the unit. I asked the nurse to go into the patient’s room while I turned on the camera. Over the camera, I was able to review the various pacemaker settings with the nurse and was present as he made the appropriate adjustments. He was relieved to have me “there in the room” with him, as he had never made the changes to the pacer before. Later in the shift, I was able to review the situation with the charge nurse and she was able to reinforce my teaching with this novice nurse.

Benefits of Working in a Tele-ICU

Risk Reduction and Career Expansion

Despite the desire to provide direct patient care, many nurses find years of physical and emotional demands too burdensome to remain at the bedside. The moving and lifting of patients’ equipment contributes to the incidence of injuries, making nursing top the list of occupations most associated with work-related musculoskeletal disorders. Nurses practicing in critical care environments are among those reporting the highest level of physical demands. Research results of Trinkoff and colleagues correlate higher levels of physical demands with the likelihood of inadequate sleep, use of pain medication, and absenteeism. The emotional workload, as described by Carayon and Alvarado, of direct providers of bedside care in ICUs also exacts a toll. Excessive physical and emotional workload may lead to burnout, with all its related financial and patient safety implications. Experienced nurses with invaluable knowledge may choose to leave the ICU to protect their physical or emotional health.

Changing roles for career growth has always been an option for bedside nurses. However, unless interested in a formal management or education role, or in returning to academia to attain an advanced degree, many nurses are left with little choice but to consider leaving the bedside for further opportunities. Intention to leave often precedes actual nursing turnover; nursing turnover rates are reported to range from 15% to 36% per year with the loss of experience increasingly difficult to replace.

The tele-ICU provides a new role that leverages the ICU nurse’s expert knowledge and skills while dramatically reducing the physical and emotional demands of bedside care. Experienced nurses can still influence
patient care and support ICU colleagues in a new and challenging work environment. At MaineHealth VitalNetwork (MHVN), a 120-bed tele-ICU program located in Portland, Maine, a satisfaction survey was distributed in 2008 and 2009 to 29 tele-ICU nurses with a mean 2-year response rate of 79%. When asked to designate the reasons for working in the tele-ICU, a 2-year mean of 60% of respondents indicated that the primary reason was for “relief from physical or emotional stress.” Additionally, 29% (7 of 24) of MHVN nurses expressed the intention to leave the ICU within 1 year before the tele-ICU option. All 7 nurses, with a mean of 19 years of ICU experience, have continued in positions either shared between the ICU and the tele-ICU or by working full-time at MHVN, providing replacement cost savings of $389,319 annually.21

Teamwork and Knowledge Expansion

Tele-ICU nurses tend to be highly experienced10 and the tele-ICU team quickly explores and shares the expertise of each team member. Stafford et al observed significant “open communication,” “collegiality,” and a sense of “esprit de corps” among the tele-ICU team. Stafford and colleagues further emphasize that the closeness is not unique to just the tele-ICU nursing staff, but the nurses and physicians function “as a true team” and value the role, knowledge, and expertise that each member contributes to the team.13 In such an environment, team learning occurs as members contribute to the shared knowledge base through the inquiry and advocacy of knowledge and ideas. The MHVN 2008 and 2009 staff satisfaction surveys validate the observations of Stafford et al. Three themes emerged from MHVN as the primary tele-ICU nurse satisfiers: (1) the collaboration of the tele-ICU team members, (2) the ability to assist ICU peers and affect patients’ outcomes, and (3) the shared learning environment.

The tele-ICU team is a pivotal teaching resource, especially during the nighttime hours when few in-house resources are available. Immediate access to expert nurses and physicians, software decision support tools, and an online, interactive medical knowledge base provides additional teaching and learning opportunities. Many programs invite new ICU nurses to spend time in the tele-ICU as part of the orientation process; this encourages future contact with the tele-ICU for consultation.10,14 Tele-ICU programs also help prepare students for future care by providing an unusual clinical experience for nursing, pharmacy, and medical students/residents.29,30 Other benefits of working in a tele-ICU are highlighted in Table 2.10,13,29

Challenges of Working in the Tele-ICU

Acceptance of the ICU

Publications elucidating the clinical benefits of the tele-ICU program emphasize the potential impact of ICU acceptance in achieving successful outcomes.8,11 Tension between interprofessions is not uncommon in the ICU, but can threaten the delivery of the quality of health care.31 Lingard et al identified a “perception of ownership” of specialized knowledge, technical skills, equipment, clinical territory, and even the patient in the ICU. Ownership was perceived as both collective (our patient), and individual (my patient); collective ownership promoted collaboration between members of the ICU team, but often excluded collaboration with staff outside the ICU. Lingard et al further suggest that teams trade “valued commodities” such as resources, respect, knowledge, and goodwill during collaborative work. It is only through the appreciation of ownership and trade that team members are able to anticipate reactions, deflect obstructions, and achieve individual goals while maintaining team cohesion.32

“Reluctant” collaboration is often witnessed by staff in the tele-ICU. Efforts to improve acceptance and integration of the remote team into the ICU are ongoing and must include strategies that acknowledge the perception of ownership and trade. Joint tele-ICU and ICU staff meetings or focus groups can provide a forum for discussion of the “rules of the game.”32 Communication strategies and shared goals that encourage the ICU’s ownership expansion to include the tele-ICU while encouraging the trade of mutual respect and knowledge are advantageous.

Staffing models in the tele-ICU may also influence acceptance. Many tele-ICUs have staff that work both in the tele-ICU and the home ICU. Having shared positions may encourage ICU acceptance because of existing established relationships and trust.16 Other models use only dedicated positions, believing that this model increases the stability of the tele-ICU team and improves staff satisfaction.29 Future research to identify the most effective staffing
pattern for the enhancement of ICU acceptance is highly desirable.

The role of leadership is also pivotal to creating an environment of reciprocal respect and cooperation. Mutual ICU/tele-ICU goals and accountabilities must be determined and implemented at all levels in both units. Judicious care in hiring the tele-ICU team is imperative; staff with demonstrated clinical knowledge and judgment, patience, and an ability to provide reassurance are critical for relationship building. Leaders in both the ICU and the tele-ICU must model the desired behaviors to encourage necessary behavioral change.

**Communication Challenges**

The sharing of information is a vital component of the ability of the tele-ICU team to support patient care. Communication between the teams must be professional, nonjudgmental, and offensive because either individual or technical communication issues can threaten the success of the program.

Excellence in clinical skills without corresponding communication skills will diminish the success of the program. Competency requires that the tele-ICU nurse be both “able” and “willing” to communicate effectively. To be able, the tele-ICU nurse must achieve comfort and skill at the manipulation of the audiovisual system. Special emphasis on successful audio/video communication should occur during tele-ICU orientation for both the tele-ICU nurse and intensivist. Process and technical policies and procedures should be available and reviewed on a regular basis.

The “willing” component of competency indicates an approach from the tele-ICU team that is always patient, sensitive to voice intonation, and nonjudgmental. Scripted messaging may be valuable for attaining consistency in tele-ICU interactions and is helpful for those learning to speak over the audio system. Consistency in tele-ICU messaging may also enhance the ICU team’s comfort by establishing expectations and minimizing unpleasant surprises in communications with the tele-ICU (E. Cowboy, MD, Via Christi Health System, Kansas, oral communication, April 3, 2009).

Communication competency of all tele-ICU staff and physicians should be measured, reassessed, and expanded to ensure excellence. Often the burden is on the tele-ICU to maintain the lines of open communication.

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**Table 2** Examples of possible benefits for the nursing staff working in a tele–intensive care unit (tele-ICU)\(^a\)

<table>
<thead>
<tr>
<th>Category</th>
<th>Specific benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career expansion/risk reduction</td>
<td>Opportunity to use current experience and knowledge to remain involved in the care of critically ill patients without being at the bedside. Potential reduction in emotional stress; rare congruence between family and ICU staff expectations; less sense of emotional loss due to end-of-life care and decision making. Ability to mentor less experienced staff.</td>
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<tr>
<td>Expanded learning</td>
<td>Collaborative teamwork; open environment that encourages collaboration between staff members in the tele-ICU; information and knowledge are shared freely with time for discussion. Exposure to a variety of specialty ICUs and various conditions that patients may have; allows an increase in breadth of knowledge with increased assessment capabilities; can increase understanding of how care is provided in various sized and acuity ICUs, which broadens perspective. Increased opportunity to work directly with tele-ICU intensivist, pharmacist, or other experts to enhance self-learning. Time to research online for clinical questions or areas of interest. Relaxed atmosphere in which to work with orients and students; students can learn without the fear of injuring patients. Increased autonomy encourages inquiry skills to provide knowledgeable assessment of care, and ability to provide service to the ICU. Ability to attain competency based on needs of various ICUs.</td>
</tr>
<tr>
<td>Relaxed environment</td>
<td>Easier to take time for lunch and breaks. Fewer distractions; easier to control work flow. Exercise encouraged; exercise equipment often readily available. More ability to attend staff meetings or committee meetings without concerns about coverage of patient care.</td>
</tr>
</tbody>
</table>

\(^a\) Based on data from Myers and Reed, Stafford et al, and Zapatochny-Rufo.
and staff members complain about “walking on eggshells” during ICU/tele-ICU conversations. Joint ICU/tele-ICU events such as staff meetings, quality initiatives, or educational offerings may provide further opportunity to enhance the shared communication process.

Technical issues that cause audio distortion or delay contribute further to ICU dissatisfaction and must be resolved promptly. Many tele-ICUs provide video access as 1-way, the tele-ICU staff can see into the patient’s room, and are heard but not seen by the staff in the ICU, further contributing to mistrust. Feedback from programs with new 2-way video is very positive, with significant improvement in ICU acceptance and use of the tele-ICU (G. Roberts, TeleHealth Director, OhioHealth and C. Jenkins, Operations Director, Banner Healthcare, oral communications, May 29, 2009), encouraging programs to budget for conversion to 2-way video access.

Physical Demands

Although the tele-ICU provides far fewer physical demands than at the bedside, there are unique physical challenges related to the environment. Tele-ICU nurses and physicians spend 8 to 12 hours at computer screens and are at risk for eye strain, repetitive-motion wrist injuries, and neck strain from viewing data on multiple screens. Ergonomic evaluations may assist in minimizing risk by identifying preventative solutions. Moreover, the tele-ICU setting encourages a sedentary lifestyle, and although many tele-ICU sites have exercise equipment available, use may not be optimal. Programs may need to engage in incentives, challenges, or games to encourage healthy behaviors.

Lack of Identity

Professional identity includes the attributes, beliefs, values, motives, and experiences by which individuals define themselves in their professional lives. Critical care nurses have long enjoyed a perception of increased status and autonomy, mastery of technology, respect of physicians, and administrative support that contributes to their sense of identity. That identity builds within the ICU practice environment and provides the social acceptance of the peer group. However, moving to a new role or changing from one setting to another means that a new professional identity must be forged through the process of role transition. Tele-ICU nurses are forging a new role identity. Many are discouraged to find their contributions devalued by their bedside peers, as they are no longer viewed as “real” nurses.

Tele-ICU leaders can assist staff in developing a new identity by adopting the guidelines of ROLES (Table 3). Identity is necessary to job satisfaction, and if role transformation cannot be accomplished, tele-ICU nurses may become dissatisfied, which leads to turnover of tele-ICU staff. Establishing national standards of practice and competency for the tele-ICU nurse will be 1 strategy to assist in the development of the unique identity of the tele-ICU nurse. Other challenges to the role of the tele-ICU nurse are identified in Table 4.

Making the Move

The application, hiring, and orientation process for a tele-ICU nurse position usually mirrors the system’s process for hiring any employee. The job description (Table 5) is similar to that of the ICU nurse, but with a different focus. The transition from providing care for 1 or 2 critically ill patients to monitoring and assessing care for 25 to 35 patients requires a significant paradigm shift and the development of a new meaning of “caring” for the patient.

A formal orientation process with the completion of baseline competencies is important as a component of role transition. As in the ICU, ongoing competency must be assessed, maintained, demonstrated, and improved to meet professional and regulatory standards. Tele-ICUs function similarly to other hospital units with opportunities for the tele-ICU nurse to participate in continuing education, staff meetings, quality improvement goals, and various care committees that may contribute to professional development. Staff satisfaction rates should be measured, analyzed, and used to improve the working environment.
**Table 4** Examples of challenges to the tele-nurse role

<table>
<thead>
<tr>
<th>Category</th>
<th>Specific challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptance of the intensive care unit (ICU)</td>
<td>Concern that the tele-ICU is “watching” the ICU staff to observe errors, serve as “big brother,” or “tell us how to provide care”  &lt;br&gt; Fear that the addition of the tele-ICU may change nurse to patient ratios or lead to reductions in staff  &lt;br&gt; Concern that patients’ privacy will not be respected  &lt;br&gt; Fear that referral patterns will be disrupted  &lt;br&gt; Lack of confidence in the skill level of the tele-ICU team</td>
</tr>
<tr>
<td>Communication challenges</td>
<td>Use of audio/video equipment for in-room communication; equipment may malfunction and cause frustration with communication  &lt;br&gt; Lack of respect in communications from ICU; ICU may ignore efforts from the tele-ICU</td>
</tr>
<tr>
<td>Environmental challenges</td>
<td>Risk of repetitive motion injury related to continuous use of mouse, keyboard, and multiple computer screens for data display  &lt;br&gt; Sedentary lifestyle increasing risk for deep venous thrombosis, weight gain, lack of exercise  &lt;br&gt; Boredom if census or acuity is low for the staffing pattern, especially on nights  &lt;br&gt; May need to provide own meals and snacks if at remote site; may have different security needs</td>
</tr>
<tr>
<td>Satisfaction challenges</td>
<td>If in a shared position between tele-ICU and ICU:  &lt;br&gt; Scheduling of rotation, weekend, holidays, and vacations must be balanced between 2 units  &lt;br&gt; Necessary to meet competency requirements on 2 units  &lt;br&gt; Double requirements for staff meetings  &lt;br&gt; Different ability to meet requirements of professional ladder  &lt;br&gt; Potential loss of CCRN status  &lt;br&gt; Difficulty in establishing a new professional identity…where do I belong?  &lt;br&gt; Less contact with patients and their families; staff may experience a lack of satisfaction without direct feedback from patients or patients’ families  &lt;br&gt; Family members/friends do not understand job role, “not a nurse any more”</td>
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*Based on data from Myers and Reed, Stafford et al, and Zapatochny-Rufo.*

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**Answering the Questions: Research Opportunities**

Many questions about the value and impact of tele-ICU programs remain, despite peer-reviewed research demonstrating cost savings, improved mortality rates, and reduced length of stay at both rural health care facilities and academic centers. Further research is necessary to answer many questions, including the following: What are the variables that determine which ICU patients may benefit the most from tele-ICU care? What specifically about the tele-ICU care contributes to improved outcomes? How do staffing patterns and program construct influence outcomes? How are the contributions of the tele-ICU nurse quantified? How do communication patterns between the tele-ICU and ICU influence patients’ outcomes? What are the variables that comprise the most cost-effective tele-ICU programs? How does the tele-ICU team collaboration influence ICU acceptance? What is the perceived value of the tele-ICU among patients and their families? What is the best way to prepare students for working in this new environment?

**Conclusion**

In an environment of increasing complexity in patient care, tele-ICU programs have the potential to transform the culture of bedside care by incorporating the remote team as a secondary layer of patient protection. Clinical experts can continue to make an important contribution to patient care in a new role and environment. The tele-ICU environment encourages autonomy, a sense of team, and professional growth, but requires collaboration from the ICU to make the optimal difference in patients’ outcomes. As more ICUs link to tele-ICU programs, a clear understanding of the tele-ICU nurse’s role in the provision of patient care is integral to the collaborative environment required to improve care to critically ill patients and their families.
Table 5  Job description of tele-intensive care unit (tele-ICU) nurse

This is the job description for the eICU at MaineHealth VitalNetwork; variation will occur to meet the unique requirements of the tele-ICU program at each health care system

**GENERAL SUMMARY:**
The eICU Center registered nurse (RN) is a member of a collaborative care team who is responsible for providing tele-nursing care to a diverse population of critically ill adults across multiple ICUs at various hospitals. The following features govern the role of the eICU Center staff RN:
- Patient advocacy
- Proactive, continuous monitoring
- Prevention
- Evidence-based care
- Telecommunication
- Clinical decision support
- Humane, compassionate ethical care

**REPORTS TO:**
Staff RN reports to the eICU Center operations director when in the eICU.

**ADMINISTRATIVE RESPONSIBILITIES**
1. Collects and analyzes patient and family data for the purpose of assessment, diagnosis, and management.
2. Efficiently assembles a focused assessment of physiological, psychological, and medical record data.
3. Uses critical thinking skills in diagnosing clinical problems and in defining interventions.
4. Reevaluates prior diagnoses and care plans at appropriate intervals in accordance with expected individual patient outcomes.
5. Prioritizes clinical problems accurately and in a timely manner.
7. Responds to routine, urgent, and emergent patient problems appropriately by demonstrating effective decision making. Provides follow-up to ensure problem resolution.
8. Advocates for needs and wishes of patients and their families with regard to health care.
9. Formulates and articulates succinct and comprehensive assessments of real or potential patient problems to the physician intensivist.
10. Solves clinical patient problems independently and in a timely manner; communicates unresolved problems to the intensivist, and takes over monitoring the intensivist's caseload until the situation is resolved.
11. Prevents clinical problems from occurring by:
   - Direct observation via tele conferencing
   - Proactive surveillance of adverse physiological trends
   - Assurance of appropriate ordered prophylactic strategies
   - Medical chart review
   - Appropriate reaction to alarm
12. Updates ICU knowledge of pathophysiology, pharmacology, hemodynamics, bedside technology, and nursing care.
13. Participates in staff meetings.
14. Learns basic and advanced features of eCareManager clinical information software to enhance efficiency with assessment and documentation. Learns and updates word-processing, e-mail and Web-based skills to enhance communication and educational growth.

**QUALITY RESPONSIBILITIES**
15. Effectively communicates with members of the eICU Center team and bedside ICU interdisciplinary team in a collegial manner to provide safe and error-free care during routine care and emergent conditions. Provides courteous, supportive phone communication to employees at hospital sites.
16. Complies with best practices and other care directives that member hospitals have endorsed in response to performance improvement initiatives.
17. Reports clinical, administrative, or technical problems (using a defined reporting process) that result in medical errors, unsafe care, or suboptimal communication between eICU Center and ICU health care professionals.

**SECURITY RESPONSIBILITIES**
18. Maintains patients’ confidentiality
19. Reports unauthorized personnel to Security Administration
20. Reports security breaches to Security Administration

**MINIMUM KNOWLEDGE, SKILLS, AND ABILITIES REQUIRED**
1. Preferred:
   - Baccalaureate degree in nursing
   - Five years of recent experience as a staff nurse in the specialty field of adult critical care
   - Current ACLS provider certification
   - Current CCRN certification

*Continued*
### Table 5 Continued

2. Required:
- Current RN licensure
- Five years of recent experience as a staff nurse in the specialty field of adult critical care
- One to two years of past experience in a role that required effectively communicating and collaborating with health care professionals
- Nursing continuing education (minimum of 10 hours/year)
- Evidence of ability to be a team player
- Evidence of ability to cope well with change
- Proficiency with Windows-based computer operations
- Demonstrated involvement in performance improvement

**Abbreviation:** ACLS, Advanced Cardiac Life Support.

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**References**


