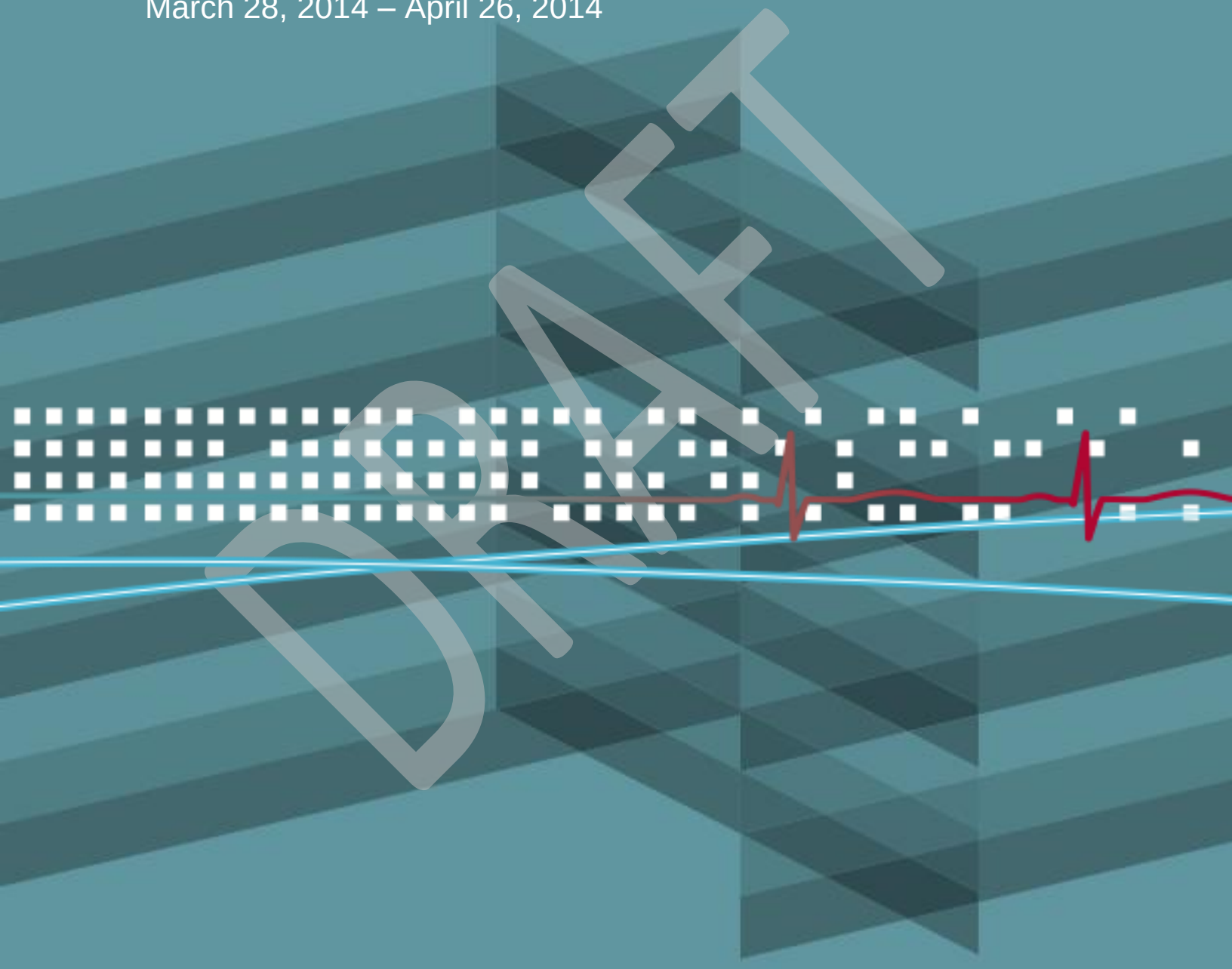
Guidelines For TeleICU Operations

DRAFT FOR OPEN PUBLIC COMMENTS
March 28, 2014 – April 26, 2014



American Telemedicine Association
Quality Healthcare Through Telecommunications Technology

American Telemedicine Association

Guidelines for TeleICU Operations

Draft for Comments
March 27, 2014

ACKNOWLEDGEMENTS

The American Telemedicine Association (ATA) wishes to express sincere appreciation to the ATA TeleICU Practice Guidelines Work Group and the ATA Practice Guidelines Committee for their invaluable contributions in the research, writing and development of the following guidelines.

(Alphabetical Order)

Practice Guidelines Work Group

Chair: Theresa M. Davis PhD, RN, NE-BC, Clinical Operations Director, enVision eICU, Inova Health System, ATA TeleICU SIG Chair

Work Group Members

Connie Barden RN, MSN, CCNS, CCRN-E, Baptist Health South Florida, TeleICU, Representative of the American Association of Critical Care Nurses
Steve Dean MS Health Informatics, Telemedicine Director, Inova Health System
Amnon Gavish Sc.D. Senior Vice President, Vertical Solutions, Vidyo Inc.
Irene Goliash RN, Philips Clinical Program Manager
Susan Goran RN, MSN, MaineHealth, VitalNetwork Operations Director
Andrew Graley, Director of Healthcare EMEA
Pat Herr RN, Avera eICU Care Director
William Jackson MD, MBA, Inova Health System, Medical Director Critical Care & Telemedicine
Edward Loo MSECE, Inova Health System, Telemedicine Engineer
James P. Marcin MD, MPH, UC Davis Children's Hospital
John Morgan Morris PhD, CISCO
David E. Morledge PhD, CCC-A, DABNM, FASNM, Neurostatus LLC
Carol Olff RN, MSN, CCRN-E, NEA-BC, Director Critical Care Services & Critical Vision TeleICU Center, John Muir Health
Teresa Rincon RN, BSN, CCRN-E, FCCM, UMass Memorial Medical Center Operations Director TeleICU
Stephanie Rogers RN-BC, BSN, MBA, Managing Director, Critical Care, Cerner Corporation
Herb Rogove DO, FCCM, CEO, C3O Telemedicine, ATA Board Member
Rebecca Rufo RN, DNc, Presence Health System, Director Telehealth Clinical Innovation
Elizabeth Thomas, MBA, Marketing Director, InTouch Health
Marc T. Zubrow MD, FACP, FCCM, FCCP, Vice President, Telemedicine University of Maryland Medical System, Representative of the Society of Critical Care Medicine

ATA Standards and Guidelines Committee

Chair: Elizabeth A. Krupinski, PhD, Professor & Vice Chair of Research, Department of Medical Imaging, University of Arizona

Committee Members

Nina Antoniotti, RN, MBA, PhD, Director of Telehealth, Marshfield Clinic TeleHealth Network
David Brennan, MSBE, Director, Telehealth Initiatives, MedStar Health
Anne Burdick, MD, MPH, Associate Dean for Telemedicine and Clinical Outreach, Professor of Dermatology, Director, Leprosy Program, University of Miami Miller School of Medicine

Jerry Cavallerano, PhD, OD, Staff Optometrist, Assistant to the Director, Joslin Diabetes Center, Beetham Eye Institute
Helen K. Li, MD, Adjunct Associate Professor, University of Texas Health Science Center
Lou Theurer, Grant Administrator, Burn Telemedicine Program, University of Utah Health Sciences Center
Jill M. Winters, PhD, RN, President and Dean, Columbia College of Nursing

ATA Staff

Jordana Bernard, MBA, Senior Director Program Services
Jonathan D. Linkous, CEO

American Telemedicine Association

Guidelines for TeleICU Operations

Table of Contents

Preamble

The American Telemedicine Association (ATA) brings together diverse groups from traditional medicine, academia, technology and telecommunications companies, e-health, allied professional and nursing associations, medical societies, government and others to overcome barriers to the advancement of telemedicine through the professional, ethical and equitable improvement in health care delivery.

ATA has embarked on an effort to establish practice guidelines for telemedicine to help advance the science and to assure the uniform quality of service to patients. They are developed by panels that include experts from the field and other strategic stakeholders, and are designed to serve as both an operational reference and an educational tool to aid in providing appropriate care for patients. 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.

The purpose of these guidelines is to assist practitioners in pursuing a sound course of action to provide effective and safe medical care that is founded on current information, available resources, and patient needs. The guidelines recognize that safe and effective practices require specific training, skills, and techniques, as described in each document. The resulting products are properties of the ATA and any reproduction or modification of the published guideline must receive prior approval by the ATA.

The practice of medicine is an integration of both the science and art of preventing, diagnosing, and treating diseases. Accordingly, it should be recognized that compliance with these guidelines alone will not guarantee accurate diagnoses or successful outcomes. If circumstances warrant, a practitioner may responsibly pursue an alternate course of action different from the established guidelines. A divergence from the guidelines may be indicted when, in the reasonable judgment of the practitioner, the condition of the patient, restrictions or limits on available resources, or advances in information or technology occur subsequent to publication of the guidelines. Nonetheless, a practitioner who uses an approach that is significantly different from these guidelines is strongly advised to provide documentation, in the patient record, that is adequate to explain the approach pursued. (1)

Likewise, the technical and administrative guidelines in this document do not purport to establish binding legal standards for carrying out telemedicine interactions. Rather, they are the result of the accumulated knowledge and expertise of the ATA work groups and other leading experts in the field, and they are intended to improve the technical quality and reliability of telemedicine encounters. The technical aspects of and administrative procedures for specific telemedicine arrangements may vary depending on the individual circumstances, including location of the parties, resources, and nature of the interaction.

SCOPE

The following teleICU guidelines were developed to assist practitioners in providing assessment, medical intervention, continuous monitoring and/or consultation to the critical care population using telecommunication technologies. The guidelines focus on a network of audio-visual communication and computer systems for the delivery of critical care services. These interactive encounters link patients and Intensive Care Units (ICU) with remote and on site healthcare practitioners to enhance clinical practice and quality outcomes for the critically ill patient. The guidelines apply specifically to teleICU services and do not prescribe or recommend overall clinical protocols for ICU patient care. Rather, the focus is on the unique aspects of delivering collaborative care through the teleICU model.

DEFINITIONS

Terms and definitions that are commonly used in telemedicine/teleICU are available on the ATA website. For this document there are several terms that need to be defined specifically:

- "Telemedicine" – telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status. Telemedicine includes a growing variety of applications and services using two-way video, email, smart phones, wireless tools and other forms of telecommunications technology. Telemedicine is not a separate medical specialty. It is a delivery tool or system. Closely associated with telemedicine is the term "telehealth," which may be used interchangeably with telemedicine, but is sometimes used to encompass a broader definition of healthcare that uses telecommunications technologies. Videoconferencing, transmission of still images and other data, e-health including patient portals, mHealth, remote monitoring, continuing medical education, and medical call centers, are all considered part of telemedicine and telehealth (ATA, 2007).
- "Organization" – includes organizations, institutions and business entities.
- "Health Professionals" – refers to individuals.
- "Shall, should, and may" – this document contains requirements, recommendations, or actions that are identified by text containing the keywords "shall," "should," or "may." **"Shall"** indicates a required action whenever feasible and practical under local conditions. These indications are found in bold throughout the document. **"Should"** indicates an optimal recommended action that is particularly suitable, without mentioning or excluding others. **"May"** indicates additional points that may be considered to further optimize the healthcare process. **"Shall not"** indicates that this action is strongly advised against.

- "TeleICU" is a network of audio-visual communication and computer systems which provide the foundation for a collaborative, inter-professional care model focusing on critically ill patients. TeleICU service is not designed to replace local services, but to augment care through the leveraging of resources and the standardization of processes.

INTRODUCTION

TeleICU is the critical care application of telemedicine. The terms "teleICU," "virtual ICU," "remote ICU," and "eICU®" all refer to the same care concept; a centralized or remotely based critical care team is networked with the bedside ICU team and patient via state-of-the-art audiovisual communication and computer systems (Goran, 2010). Approximately 13 % of the nation's adult ICU beds have tele-ICU coverage with a majority of coverage in academic and private hospitals (NEHI, 2013).

This patient population has the highest cost impact in any organization. The patients are critically ill with many concurrent and emergent needs that occur throughout their ICU stay. The teleICU team is comprised of clinical experts such as an intensivist and critical care nurses. By using advanced communication technologies, these teams are able to leverage clinical expertise across a spectrum of patients in a variety of clinical settings.

The model of care depends upon several factors including the number of patients requiring TeleICU services, patient acuity, existing bedside resources (includes both human and technology/equipment resources), and contractual arrangements. The models of care described below are general; specific programs may include various combinations of each.

- *Continuous Care Model:* Continuous care is monitoring of the patient without interruption for a defined period of time (e.g. on an 8, 12, or 24 hour basis).
- *Episodic Care Model:* Episodic care occurs intermittently with a periodic consultation on a pre-determined schedule (e.g. during patient rounds) or at unscheduled times.
- *Responsive Care Model:* In this model virtual visits are prompted by an alert (e.g., telephone call, page, monitor alarm) (Reynolds, 2011; Reynolds, 2012).

These teleICU clinical models function as a safety net for patients, nurses, and physicians. Using remote video and voice technology, teleICU leverages critical care expertise while striving to improve patient outcomes through the consistent use of evidence-based medicine in collaboration with the ICU clinical teams.

The following guidelines are designed to aid in the development of effective, safe and sustainable teleICU practices. These guidelines are intended to promote standardization of teleICU care delivery thus impacting clinical outcomes. It is advised that guidelines, position statements, and standards from other professional organizations and societies be reviewed and incorporated into practice. Such organizations include (but are not limited to) the American Association of Critical Care Nurses, Society of Critical Care Medicine, the American College of Chest Physicians, and the Critical Care Societies Collaborative (http://ccsconline.org/).

Core Guidelines for TeleICU Operations

1. Administrative Guidelines

Organizations

Professional entities providing and receiving teleICU services **shall** follow the agreed upon standard operating and administrative policies and procedures of the governing organization.

Leadership

Executive leadership **shall** cultivate a shared vision of the incorporation of the teleICU model of care into the innovative care delivery model. This vision should be clearly articulated throughout the entire organization for enhancement, cooperation and understanding.

Executive leadership should incorporate principles of change management and the American Association of Critical Care Nurses (AACN) Healthy Work Environment Standards (AACN 2005) to guide strategic planning and executive decision-making.

Executive leadership should recruit and develop leaders to implement and sustain care models that support interprofessional partnerships with the goal of transforming clinical work by building collaborative relationships to enhance patient care (Rufo, 2009, AACN 2013).

Executive leadership **shall** ensure that teleICU clinical leaders are appropriately positioned within the organization to participate in key decision making forums with the authority to make necessary decisions. Policies and procedures **shall** reflect that teleICU roles are integrated into the critical care team including quality assurance processes and sentinel event review.

Escalation processes should be created and sustained to focus on patient safety and allow healthcare professionals advocacy on behalf of patients and their families regardless of practice setting. All healthcare professionals should have a mechanism to report, investigate and resolve issues surrounding patient safety and quality. The mechanism should be non-punitive and sensitive to assuring that the close collaborative relationship between the teleICU and ICU staff is not compromised (Goran, 2012; AACN 2013).

Human Resource Management

The organization **shall** create guidelines, which specifically describe teleICU roles and responsibilities, appropriate staffing models, hours of operation, methods of communication, procedures around routine and emergency care delivery and chain of command for escalation processes. These guidelines should match the needs of the patient population and bedside healthcare professionals. Each organization should support resource management for orientation, staff development and competency of teleICU programs (Goran, 2011; Davis, 2012; AACN 2013).

Health Professionals: Regulatory Consideration

TeleICU professionals **shall** be fully licensed, registered and credentialed with their respective regulatory, licensing, and accrediting agencies and with consideration to administrative, legislative, and regulatory requirements of the site where the patient and healthcare professional are located. This **shall** include all federal and state regulations regarding prescriptive authority and **shall** be updated as changes occur.

State licensure and regulation rules are undergoing increasing national and regional debate. Both the American Telemedicine Association (www.americantelemed.org) and the Federation of State Medical Boards (FSMB)

(http://www.fsmb.org/grpol_telemedicine.html) are excellent resources to research the most current state requirements to practice telemedicine.

Healthcare professionals **shall** be aware of their locus of accountability and all requirements (including those for liability insurance) that apply when providing teleICU services. The teleICU leadership and the organization's legal counsel should insure that the malpractice carriers are notified when a new clinician is planning to provide clinical services via telehealth. Likewise, when a physician is no longer providing clinical care, the carrier should also be notified.

The use of teleICU modalities **shall** establish a healthcare professional-patient relationship which includes all responsibilities inherent in that relationship.

TeleICU healthcare professionals may need to negotiate with local facilities to allow an exemption from certain obligations contained in the facilities' regulations and bylaws (e.g., TB testing requirement, ER call, non ICU related committee meetings) while providing teleICU services. This should not exempt teleICU healthcare professionals from participation in local hospital committees relevant to the teleICU program.

Healthcare professionals providing teleICU services **shall** have the necessary clinical preparation, orientation, ongoing education and professional development to ensure they possess the necessary competencies to promote quality care and patient safety (Ries, 2009; Goran, 2011; Davis, 2012; Ruesch, 2012; AACN 2013).

Privacy and Confidentiality

TeleICU healthcare professionals and healthcare organizations in the United States **shall** incorporate the requirements for privacy and confidentiality in accordance with the Health Insurance Portability and Accountability Act (HIPAA) and the Health Information for Economics and Critical Health Act (HITECH). In the United States, additional state regulations **shall** be followed for privacy, confidentiality and patient rights apply above and beyond requirements in place for general health care interactions. TeleICU services provided to patients physically located in other countries **shall** operate in conformance with the privacy laws in effect for that country. Other international laws **shall** be consulted and implemented as appropriate.

Policies and procedures **shall** address the privacy and security needs of the patient from both a technological and human rights perspective. Examples include capabilities communication restrictions and processes that protect patient privacy during remote video assessment.

Organizations providing teleICU services **shall** have policies to maintain patient privacy/confidentiality when visitors from outside of the organization tour the teleICU center.

All ICU patients and families **shall** receive information which includes the role of the teleICU program in patient management, the use of the technology, and how confidentiality is maintained (Jahrsdoerfer, 2013).

Some state regulations require consent for telemedicine consultations so these **shall** be included as part of the organizations general consent process. More often, telemedicine consent is included in the conditions of admission.

Fiscal Management

Organizations **shall** establish a budget that encompasses the cost of implementation, which may include items such as: hardware, software, data lines, licensing fees, personnel, supplies, and real estate. The budget should also include on-going expenses related to the maintenance of the program, which may include items such as hardware and software upgrades, equipment replacements and staff education.

The budget should also identify current and projected future revenue for operating the teleICU services. Revenue items may include payer reimbursements, private contributions, grants and general support from the healthcare facility and/or healthcare system.

Organizations may consider a financial model that addresses possible expansion and/or enhancement of the teleICU services. Fiscal metrics should be customized to reflect the goals of the individual teleICU program and require regular reevaluation at the executive level.

Management of Patient Records

The teleICU **shall** determine processes and policies for documentation, storage, and retrieval of health records consistent with the organizational, industry and governmental standards. Interoperability should be prioritized to ensure the seamless flow of information between patient information systems to enhance clinical support and promote continuity of care.

Documentation

Policies and procedures regarding clinical documentation that originates from the teleICU **shall** be established in compliance with organizational legal and risk management oversight. The goal of such documentation should be clarity of the teleICU clinical intervention and a complete clinical picture that is integrated into the permanent record.

Patient Rights and Responsibilities

Patients and families **shall** be informed and educated about the role of the teleICU in the integrated care delivery model. The use of remote care healthcare professionals and audio/visual technology **shall** be included as part of teleICU specific patient education.

Healthcare professionals should be particularly thoughtful with the use of audio/visual technology for the provision of patient/family privacy and sensitivity to cultural considerations. This may include appropriate language translation services for patients and families.

Apprehensions regarding the role of the teleICU and/or components of the audio/visual technology should be addressed collaboratively with the

patient/family, the teleICU and the bedside team and may be addressed through organizational policies (Golembeski, 2012; Jahrsdoerfer, 2013).

Quality and Outcomes

TeleICU services **shall** have in place a systematic quality improvement and performance management process that complies with all organizational, regulatory, or accrediting requirements. The quality indicators **shall** include the critical components of providing teleICU services and **shall** be used to make programmatic and clinical changes based upon best practice principles, evidence-based guidelines and clinical research. TeleICU, administrators and ICU healthcare professionals should be in alignment to meet specific program outcomes and process measures recognizing that in addition to shared goals, the ICU and teleICU might have unique metrics based on their different contributions to the program. A process for the reporting and dissemination of quality metrics and outcomes should be defined for both administrative and operational staff analysis.

TeleICU value is optimized by increasing quality and access while controlling cost. Ongoing monitoring and evaluation of costs, access, and quality should be performed by both the teleICU and the organization to identify opportunities for enhanced value (Rufo, 2009; Rufo, 2011a; Rufo, 2011b; Young, 2011; AACN, 2013; Lilly, 2013).

Research Protocols

Research involving the teleICU's contributions to patient care and clinical outcomes should be encouraged and supported by the organization; such research opportunities shall be in compliance with the organization's IRB approval process (Kahn, 2011).

Physical Considerations

The physical layout (including space, equipment placement, secure examination space) and ergonomics of both the teleICU and ICU suites are best addressed early in the planning process. This process should include input from clinicians, technology engineers and physical plant engineers. Architectural design should consider communication essentials between and among teleICU team members and the ICUs.

2. Clinical Application for the Practice of TeleICU

Setting Program Goals

Executive leadership **shall** direct teleICU and local ICU leadership in the review of program goals and the determination of priorities. TeleICU service is not designed to replace local services, but to augment care through the leveraging of resources and the standardization of processes.

Operational execution **shall** be designed to attain program goals within defined standards of care. TeleICU programs frequently have similar goals including improved patient outcomes, cost savings and the leveraging of resources, but the structure of each program may vary depending upon the organizational goals,

types of available technical and human resources and types of ICUs receiving service.

Operational/Service Hours

TeleICU leadership **shall** provide clear communication of service hours with all local ICU participants. The majority of continuous care models provide service with 24/7 nursing presence. The teleICU RN performs continuous rounding based on patient acuity, evaluates alerts (vendor dependent) for intervention, and assists the local team as requested or indicated. The most common teleICU RN to patient ratio is 30–35 patients per RN. However ratios should be determined by the type of technology utilized and additional nursing tasks required, such as the auditing of quality indicators. In most continuous teleICU models, there is a 24/7 nursing service, even if physician hours are more limited, for the enhancement of the continuity of patient care (Goran, 2011; AACN 2013).

The hours of teleICU physician presence are dependent upon the balance between program goals and intensivist availability. Currently, the most common model provides the teleICU physician during the overnight hours (1900 – 0700) when most hospital resources are limited or are on-call; although in larger programs intensivist coverage may be provided 24/7. The teleICU physician could monitor 100-250 patients depending on program design. Some programs augment the intensivist staffing with a critical care nurse practitioner or physician's assistant, others add additional RNs to triage for the intensivist, or provide a second non-intensivist physician such as a hospitalist or internal medicine physician. TeleICU intensivist availability does not obviate the necessity for local physician care for critically ill patients. Other teleICU resources such as teleICU pharmacists, educators or others may provide hours based on resource availability and program goals (Ries, 2009).

Episodic or responsive teleICU models and their service hours vary as per the model structure and resource availability.

Types of Patients Served

The executive, ICU and teleICU leadership **shall** determine the scope of teleICU patient service.

By definition, the teleICU service is designed to provide oversight and interventional services to critically ill patients. However, how an organization defines the utilization of the teleICU resource and/or the utilization of the ICU geographic space varies. For example, an 8-bed community ICU may house step-down or intermediate care patients in the same geographic space as the ICU patients. The average daily ICU patient census could be 4 with an additional 3 non-ICU patients. The decision to provide teleICU services to all patients, regardless of status, in this geographical location **shall** be determined by the teleICU and ICU leadership team.

Additionally, some teleICU programs provide service to critically ill patients located outside the traditional ICU environment, such as Post Anesthesia Care Units (PACU), Emergency Departments, Rapid Response Teams (RRT) or Long Term Acute Care Hospitals (LTACHs) with the use of either mobile or hardwired technology. Given the rapid expansion of wireless technology, it is anticipated that

critical care resources and expertise may be deployed in a variety of non-traditional settings based on patient need and program goals. Once the scope of teleICU responsibility is determined, flexibility should be based on patient needs and the maintenance of the standard of care according to the goals of the teleICU program.

Staffing Models

The executive and teleICU leadership **shall** determine the type of staffing model most efficacious in achieving program goals.

Staffing models and ratios are influenced by the type and number of patients monitored, the availability of resources at the sites monitored and the teleICU program model. For example, academic settings with house staff and fellow availability and/or 24/7 local intensivist staffing may require less teleICU physician service than a community hospital managed by the hospitalist service where the teleICU physician assumes all care responsibilities during the overnight hours. Given the remote nature of the teleICU model, the physician staffing model **shall not** replace the need for bedside resource availability for invasive and/or emergency care provisions such as chest tube placement, central line placement or intubation. All teleICU physician staffing models are designed to support and supplement the plan of care of the attending physician of record (Reis, 2009).

Commonly, a minimum of 3-5 years of recent critical care experience is required for a teleICU nursing position with specialty certification either required or preferred. TeleICU nursing models include *dedicated*, *shared* or a *hybrid* models. In the dedicated model, the teleICU nurse works only in the teleICU; bedside hours may be required annually to maintain competence, however are not assigned as such. Orientation and transition to the role of the teleICU nurse can be optimized in this model. In the shared model, the teleICU nurse works hours both in the teleICU and is also scheduled at the bedside in one of the participating ICUs. The hours can occur in the same week, for example, working a total of 24 hours each week at the teleICU and 12 hours/week in the ICU; or may be part of a rotation schedule, working 2 weeks out of a 6-week schedule in the teleICU. TeleICU/ICU integration may be enhanced as the teleICU nurse is perceived as a regular part of the team, and not an outsider. However, the shared model requires significant collaboration between the teleICU manager and the ICU manager on the topic of holiday, weekend, rotation, and vacation scheduling. In the hybrid model, a combination of the other two occurs. Some staff works only in the teleICU while others enjoy the combination of providing both onsite care and remote care. This model optimizes teleICU staff satisfaction while allowing nurses with strong critical care knowledge to still provide patient care and staff mentoring even though the physical demands of the bedside prohibit their participation with onsite care. Each model has benefits and challenges; it is not unusual for the model to change over time with the changing needs of the program (Goran, 2010).

TeleICU Workflows

The teleICU leadership **shall** determine workflows within the teleICU program based on current evidence, efficacy, clarity, chain of command and the optimization of teleICU resources. Workflow algorithms should provide step-by-step guidance to address both normal and unexpected work patterns. For example, the teleICU RN notes changes in the patient status which require medical

intervention; and the action may vary depending upon whether the teleICU physician is currently present.

Some workflows are specific to the inner workings of the teleICU center. Rounding protocols, use of the audio-video technology, responding to alerts, inter-teleICU communication processes and protection of patient information are a few examples of teleICU workflows. Similar to bedside alarms, each alert requires evaluation to determine whether it requires intervention and the criteria for action shall be determined by the teleICU health professionals utilizing the best evidence-based information available as well as protocols established by the device manufacturers.

The method of communication with the bedside team will vary depending upon the urgency of the status change and predetermined communication pathways. The communication may occur between various teleICU team members (teleICU physician, nurse, or pharmacist) and members of the local team and the method of communication may be telephone, or use of the video technology available. Each teleICU/ICU program should include a predetermined chain-of-command process for escalation of emergent situations. (Reis, 2009; Goran, 2010; Barden, 2012; Williams, 2012).

Other workflows **shall** be developed and vetted with the onsite ICU partners such as planned versus unplanned downtimes, teleICU/ICU chain-of-command communication, system troubleshooting, and disaster planning. The algorithms should provide a basis for standardization and continuity of teleICU workflows but should also be fluid enough to provide guidance during unusual situations.

Integration Strategies

Optimal teleICU performance is strongly dependent on the partnership and integration between the teleICU and the ICU team. A collaborative care delivery model should be established and maintained in order to achieve shared outcomes. The six standards (skilled communication, true collaboration, effective decision making, authentic leadership, appropriate staffing and meaningful recognition) identified in the American Association of Critical Care Nurses (AACN) Standards for Establishing and Sustaining Healthy Work Environments are critical to the optimal functioning of the teleICU (Goran, 2012). In particular, skilled communication, true collaboration, and effective decision-making **shall** be present for teleICU and ICU program success (AACN 2005; AACN 2013).

Successful integration is influenced by the tone established and modeled by the critical care leadership team who encourage integration by weaving the teleICU into ICU care activities which fosters interprofessional relationships. Strategies for integration **shall** be designed and implemented during program development and can include joint staff meetings, unit champions, research projects, involvement of the teleICU in unit committees, QI initiatives, orientation, and similar joint activities. Continued professional development and team learning are necessary for the sustainment and growth of the teleICU and ICU team (Goren, 2012; Lilly 2012; Rufo, 2012; Williams, 2012; Khunlerkit, 2013).

Roles

Professionals providing teleICU services **shall** demonstrate the knowledge, skills, and experience needed to provide complex assessment, high-intensity therapies

and interventions, and continuous clinical vigilance. Demonstrated competency in communication, collaboration, decision making, systems thinking, cultural diversity and computer literacy are essential to program success (AACN, 2013).

The continuous care model of teleICU is typically staffed with experienced intensivist physicians, critical care nurses, Advanced Practice Healthcare professionals (e.g., Nurse Practitioners, Physician Assistants), pharmacists, additional clinical experts (e.g., wound care specialists, specialty physicians), and information services. Other models also include multidisciplinary members such as pharmacists, data entry staff, quality management consultants, educators and clinicians for training fellows and residents. The teleICU leadership **shall** develop policies and procedures to address initial and ongoing competency assessments for teleICU healthcare professionals and support staff.

Responsibilities

The responsibilities of the TeleICU should be defined based on the organizational priorities and goals for the program. Such responsibilities may include, but not be limited to, consultation, clinical assessment, acute care interventions, emergency response, clinical decision support, routine rounds, care coordination, triage, disaster support, education, and mentoring.

Optimal teleICU performance is strongly dependent upon the partnership and trust built between the ICU providers at the patient bedside and the teleICU team. A collaborative care delivery model should be established and maintained in order to achieve these outcomes (Lilly, 2011; Goran, 2012; AACN, 2013).

Organizations should develop and implement standardized guidelines around documentation provided by the teleICU (e.g., documentation of "significant" changes in care, physician orders, notes, healthcare professionals communication, and hand-offs).

Orientation

The teleICU professionals and support staff **shall** have a competency-based orientation and/or comprehensive training including but not limited to communication protocols, technology, troubleshooting, patient privacy and confidentiality, ethical practice, evidence- best practices, roles and responsibilities, quality metrics and documentation. Orientation requirements for the organization must also be met as part of the general teleICU orientation. Special attention should be focused on the communication and collaborative aspects of the teleICU role for all team members. Team training between all members of both the teleICU team and members of the ICU team may provide a more cohesive program (Goran, 2011; Goran, 2012; AACN, 2013).

Competency

The teleICU leadership **shall** develop policies and procedures to address initial and ongoing competency assessments for teleICU care healthcare professionals and support staff.

ICU Training

Adequate orientation and training of the ICU staff and physicians in the role of the teleICU and its technology is vital to enhance collaboration between the teleICU and ICU team. Ongoing training may be necessary during software upgrades, for new ICU employees and physicians or in response to quality initiatives.

Training should encourage staff acceptance of the use of teleICU services. This should include efforts to build trust and develop integrated team workflows incorporating both onsite and teleICU staff (Goren, 2012; Mullen-Fortino, 2012, Rufo, 2012; Williams, 2012*).*

Patient/Family Education

Patient/family education is a right; teleICU programs **shall** provide the necessary information to educate both the patient and family to the following components of the teleICU: role of the teleICU in care provision, in room technology, protection of patient privacy and dignity, role of the patient/family in communication with the teleICU, and the role of consent in the teleICU standard of care.

A variety of learning options should be developed to address various learning styles. For example: brochures, an A/V kiosk in the waiting room, in room posters on the use of the camera, and/or online resources. Careful attention should also be paid to the appropriate comprehension level for patient/education tools. However, teleICU research has indicated that the preferred method of patient/family education is verbal information directly from the ICU nurse. ICU staff should be provided the appropriate educational materials and encouraged to orient the patient/family to the teleICU technology along with other ICU room orientation. Patients/families should also be provided contact information should they have additional questions or concerns (Golembeski, 2012; Jahrsdoerfer 2013).

Quality/Program Performance

The ability to demonstrate impact and value on patient outcomes is highly dependent upon the collaborative relationship established between the teleICU and ICU (Lilly, 2011; Lilly, 2012).

Organizations providing teleICU programs **shall** have a systematic quality improvement and performance management process that complies with any organizational, regulatory, or accrediting requirements for outcomes management.

The quality improvement indicators **shall** address the critical components or outcomes of providing teleICU services and **shall** be used to make programmatic and clinical changes based on best practice principles, evidence-based guidelines, and current research.

Outcome metrics may include direct measures of care such as ICU mortality, length of stay or time on ventilators. Proxy measures such as patient, family, or ICU staff satisfaction, and financial measures such direct cost of care may be included. TeleICU quality process metrics such as the number of interventions, response time or staff satisfaction should also be measured.

TeleICU leadership **shall** provide education and interpretation guidance for the ICU team concerning implications of the outcome data.

Documentation

Documentation and Electronic Health Record: Coordination and integration of the EHR within the teleICU should be done as it is important for the prevention of errors and timely access to accurate patient data.

Workflow and Communication: Documentation policies and procedures **shall** be developed for the successful patient care hand-off or transfer of responsibility. Direct peer-to-peer communications **shall** be encouraged to minimize possible miscommunications.

Data Retrieval: There should be the ability to access and review current data from both the teleICU and bedside facilitates communication and decision making process.

3. Technical Guidelines

Equipment

Organizations should refer to the American Telemedicine Association's Core Guidelines for Telemedicine Operations documentation for baseline technical requirements.

Organization **shall** provide technology that optimizes audio and visual clarity for enhancement of clinical assessment (options included real time, two-way audio visual solutions as well as one-way visual surveillance with audio support via traditional phone access). Technology such as assessment peripherals and medical devices ranging from hardwired equipment to 'bring your own device' (BYOD) may be used to address clinical needs.

Organizations should provide adequate telecommunications bandwidth to connect near and far end equipment to support the program goals and assure quality patient care services. The minimum bandwidth used **shall** be determined in consultation with the clinical, information technology and biomedical staff of the host facility, but in general should provide such services at a bandwidth of at least 500 Kbps in each of the downlink and uplink directions. Such services should provide a minimum of 640 x 480 resolution at 30 frames per second. Depending on the service provided, higher bandwidth speeds may be needed, as determined by the healthcare professional. Because different technologies provide different video quality results at the same bandwidth, each end point shall use bandwidth sufficient to achieve at least the minimum quality shown above during normal operation.

When using a personal computer or mobile device, the healthcare professional should use high quality cameras and audio equipment. Devices **shall** have up-to-date antivirus software and a personal firewall installed. Healthcare professionals should ensure their personal computer or mobile device has the latest security patches and updates applied to the operating system and third party applications that may be utilized for this purpose (Turvey, 2013).

Healthcare professionals and organizations should utilize mobile device management software to provide consistent oversight of applications, device and data configuration and security of the mobile devices used within the organization (Turvey, 2013).

When the healthcare professional uses a mobile device, special attention **shall** be placed on the relative privacy of information being communicated over such technology and ensuring access to any patient contact information stored on the mobile device is adequately restricted (Turvey, 2013).

Mobile devices **shall** require a passphrase or equivalent security feature before the device can be accessed. If multi-factor authentication is available, it should be used. (Turvey, 2013).

Mobile devices should be configured to utilize an inactivity timeout function that requires a passphrase or re-authentication to access the device after the timeout threshold has been exceeded. This timeout should not exceed 15 minutes (Turvey, 2013).

Mobile devices should be kept in the possession of the healthcare professional when traveling or in an uncontrolled environment. Unauthorized persons **shall not** be allowed access to sensitive information stored on the device, or use the device to access sensitive applications or network resources (Turvey, 2013).

Healthcare professionals should have the capability to remotely disable or wipe their mobile device in the event it is lost or stolen (Turvey, 2013).

Remote management of the system should permit far end camera control (FECC), maintenance or diagnostic capabilities such as auto restart, remote configuration, proactive monitoring and/or alerts.

System should allow point-to-point connectivity from within or outside of the healthcare facility.

Organizations should consider technology interoperability when selecting systems for integration of other telemedicine services or documentation systems.

Systems shall comply with current FDA regulations, and should meet FDA Class-II medical device requirements, HIPAA requirements and any regulatory requirements such as Waste Electrical and Electronic Equipment (WEEE) environmental requirements for restriction on hazardous substances.

All efforts **shall** be taken to make audio and video transmission secure by using point-to-point encryption that meets recognized standards. Currently, FIPS 140-2, known as the Federal Information Processing Standard, is the US Government security standard used to accredit encryption standards of software and lists encryption such as AES (Advanced Encryption Standard) as providing acceptable levels of security. Healthcare professionals should familiarize themselves with the technologies available regarding computer and mobile device security, and should help educate the patient (Turvey, 2013).

Organizations **shall** ensure proper testing and maintenance for all functionalities for each newly installed infrastructure or endpoint.

Organizations **shall** implement planned and unplanned downtime procedures that ensure continued service and may include the use of appropriate back-up technologies. Examples may include: N+1 redundancy, geographic dispersed infrastructure, fast failover, and failure notifications/alerts.

Policies and procedures **shall** proactively address on-going equipment maintenance, anticipated equipment and software upgrades, performance of periodic remote tests for operation and functional verification, evaluation of resource allocation and 24/7 technical support.

Infection Control

Organizations **shall** have infection control policies and procedures in place for the use of teleICU equipment and patient peripherals that comply with organizational, legal, and regulatory requirements.

Data Policy and Procedure

Organization **shall** implement policies that address adequate data storage and retrieval, device security, time zone management, and follow long term storage standards such as Storage Management Initiative Specification (SMI-S).

References

American Association of Critical Care Nurses. *AACN standards for establishing and sustaining healthy work environments; a journey to excellence*. Aliso Viejo, CA: American Association of Critical-Care Nurses; 2005.

American Association of Critical Care Nurses. *AACN teleICU nursing practice guidelines.* Aliso Viejo, CA: *American Association of Critical-Care Nurses*; 2013.

Barden C, & Davis TM. The tele-ICU: a new frontier in critical care nursing practice. *AACN Adv Crit Care*. 2012;23(3):287-8.

Critical Care Societies Collaborative. (http://ccsconline.org/)

Davis TM, Barden C, Olff C, Aust MP, Seckel MA, Jenkins CL, Herr P, Hawkins C, Griffin P, Deibert W. Professional accountability in the Tele-ICU: The CCRN-E. *Crit Care Nurs Q.* 2012;35(4):353-6.

Golembeski S, Willmitch B, Kim SS. Perceptions of the care experience in critical care units enhanced by a tele-ICU. *AACN Adv Crit Care.* 2012;23(3):323-9.

Goran SF. A second set of eyes: An introduction to Tele-ICU. *Crit Care Nurse*. 2010;30(4):46-55.

Goran SF. A new view: tele-intensive care unit competencies. *Crit Care Nurse*. 2011;31(5):17-29.

Goran SF, Mullen-Fortino M. Partnership for a healthy work environment: tele-ICU/ICU collaborative. *AACN Adv Crit Care.* 2012;23(3):289-301.

Goran SF. Making the move: from bedside to camera-side. *Crit Care Nurse*. 2012;32(1):e20-9.

Jahrsdoerfer M. & Goran S. (2013). Voices of family members and significant others in the tele-intensive care unit. *Crit Care Nurse***.** 33(1):57-67.

Kahn JM, Hill NS, Lilly CM, Angus DC, Jacobi J, Rubenfeld GD, et al. The research agenda in ICU telemedicine: a statement from the Critical Care Societies Collaborative. *Chest.* 2011;140(1):230-8.

Khunlertkit A, Carayon P. Contributions of tele–intensive care unit (Tele-ICU) technology to quality of care and patient safety. *J Crit Care*. 2013;28(3):315e1-12.

Lilly CM, Cody S, Zhao H, Landry K, Baker SP, McIlwaine J, et al. Hospital mortality, length of stay, and preventable complications among critically ill patients before and after tele-ICU reengineering of critical care processes. *JAMA.* 2011;305(21):2175-83.

Lilly CM, Fisher KA, Ries M, Pastores SM, Vender J, Pitts JA, et al. A national ICU telemedicine survey: validation and results. *Chest.* 2012;142(1):40-7.

Lilly CM, McLaughlin JM, Zhao H, Baker S, Cody S, Irwin RS. A multi-center study of ICU telemedicine reengineering of adult critical care. http://journal.publications.chestnet.org/ accessed 12/6/13.

Mullen-Fortino M, DiMartino J, Entrikin L, Mulliner S, Hanson CW, Kahn JM. Bedside nurses' perceptions of intensive care unit telemedicine;21(1):24-31.

NIFTE Research Consortium, 2003

NEHI produced for The California Healthcare Foundation 2013 Wendy Everett editor http://www.nehi.net/publications/79/emerging_practice_patterns_in_teleicu_care
Reynolds HN, Bander J, McCarthy M. Different systems and formats for tele-ICU coverage: Designing a tele-ICU System to optimize functionality and investment. *Crit Care Nurs Q.* 2012;35(4):364-77.

Reynolds HN, Rogove H, Bander J, McCambridge M, Cowboy E, Niemeier M. A working lexicon for the tele-intensive care unit: we need to define tele-intensive care unit to grow and understand it. *Telemed J E Health*. 2011;17(10):773-83.

Ries M. Tele-ICU: a new paradigm in critical care. *Int Anesthesiol Clin*. 2009;47(1):153-70.

Ruesch C, Mossakowski J, Forrest J, Hayes M, Jahrsdoerfer M, Comeau E, et al. Using nursing expertise and telemedicine to increase nursing collaboration and improve patient outcomes*. Telemed J E Health. 2012*;18(8):591-5.

Rufo R. Tele-ICUs, Part 2: Adding value to the health care equation. *Crit Care Nurs Q.* 2011;34(3):182-6.

Rufo R. Using the Tele-ICU care delivery model to build organizational performance, Part 1. *Crit Care Nurs Q*. 2011;34(3):177-81.

Rufo RJZ. The virtual ICU: pathway to improved performance. *Nurs Manage.* 2009;40(1):39-42.

Rufo RJZ. Behind the scenes with integrated telemedicine. *Nurs Manage*. 2011;42:6-9.

Rufo RZ. Use of change management theories in gaining acceptance of telemedicine technology. *Crit Care Nurs Q.* 2012;35(4):322-7.

Turvey C, Coleman M, Dennison O, Drude K, Goldenson M, Hirsch P, Jueneman R, Kramer GM, Luxton DD, Maheu MM, Malik TS, Mishkind MC, Rabinowitz T, Roberts LJ, Sheeran T, Shore JH, Shore P, Heeswyk FV, Wregglesworth B, Yellowlees P, Zucker ML, Krupinski EA, and Bernard J. ATA Practice Guidelines for Video-Based Online Mental Health Services. *Telemedicine and e-Health.* September 2013, 19(9): 722-730. doi:10.1089/tmj.2013.9989.

Willmitch B, Golembeski S, Kim SS, Nelson LD, Gidel L. Clinical outcomes after telemedicine intensive care unit implementation. *Crit Care Med.* 2012;40(2):450-4.

Young LB, Chan PS, Lu X, Nallmothu BK, Sasson C, Cram PM. Impact of telemedicine intensive care unit coverage on patient outcomes: a systematic review and meta-analysis. *Arch Intern Med.* 2011;171(6):498-506.

Recommended Reading

Goran SF. Measuring tele-ICU impact: does it optimize quality outcomes for the critically ill patient? *J Nurs Manag*. 2012;20(3):414-28.

Gorman MJ. Tele-ICU comes of age: studies, hospital five-year results validate effectiveness of the technology*. Health Manag Technol.* 2011;32(12):8, 10-1.

Groves RH, Jr., Holcomb BW, Jr., Smith ML. Intensive care telemedicine: evaluating a model for proactive remote monitoring and intervention in the critical care setting. *Stud Health Technol Inform.* 2008;131:131-46.

Heath B, Salerno R, Hopkins A, Hertzig J, Caputo M. Pediatric critical care telemedicine in rural underserved emergency departments. *Pediatr Crit Care Med.* 2009;10(5):588-91.

Kohl BA, Fortino-Mullen M, Praestgaard A, Hanson CW, Dimartino J, Ochroch EA. The effect of ICU telemedicine on mortality and length of stay. *J Telemed Telecare.* 2012;18(5):282-6.

Lilly CM, Thomas EJ. Tele-ICU: experience to date. *J Intensive Care Med.* 2010;25(1):16-22.

Lilly CM, Zuckerman IH , Badawi O, Riker RR. Benchmark data from more than 240,000 adults that reflect the current practice of critical care in the United States. *Chest.* 2011; 140(5):1232 – 1242.

Marcin JP, Nesbitt TS, Kallas HJ, Struve SN, Traugott CA, Dimand RJ. Use of telemedicine to provide pediatric critical care inpatient consultations to underserved rural Northern California. *J Peds*. 2004;144(3):375-380.

Marcin JP, Schepps DE, Page KA, Struve SN, Nagrampa E, Dimand RJ. The use of telemedicine to provide pediatric critical care consultations to pediatric trauma patients admitted to a remote trauma intensive care unit: A preliminary report. *Pediatr Crit Care* 2004; 5(3):251-6.

McNelis J, Schwall GJ, Collins JF. Robotic remote presence technology in the surgical intensive care unit. *J Trauma Acute Care Surg*. 2012;72(2):527-30.

Meidl TM, Woller TW, Iglar AM, Brierton DG. Implementation of pharmacy services in a telemedicine intensive care unit. *Am J Health Syst Pharm*. 2008;65(15):1464-9.

Munoz RA, Burbano NH, Motoa MV, Santiago G, Klevemann M, Casilli J. Telemedicine in pediatric cardiac critical care. *Telemed J E Health*. 2012;18(2):132-6.

Rabert AS, Sebastian MM. The future is now: implementation of a tele-intensivist program. *J Nurs Adm.* 2006;36(1):49-54.

Rincon F, Vibbert M, Childs V, Fry R, Caliguri D, Urtecho J, et al. Implementation of a model of robotic tele-presence (RTP) in the neuro-ICU: Effect on critical care nursing team satisfaction.. 2012;17(1):97-101.

Roberts G, Dewoody S. Lights, camera, collaboration: Implementation of an eICU orientation program. *Crit Care Nurse*. 2008;28(2):e12.

Rogove H. How to develop a Tele-ICU model? *Crit Care Nurs Q.* 2012;35(4):357-63.

Rogove HJ, McArthur D, Demaerschalk BM, Vespa PM. Barriers to telemedicine: survey of current users in acute care units. *Telemed J E Health*. 2012;18(1):48-53.

Rufo B. Tele-ICU: Positive return on investment. *Health Aff* (Millwood). 2009;28(6):1859-60.

Sapirstein A, Lone N, Latif A, Fackler J, Pronovost PJ. Tele ICU: paradox or panacea? *Best Pract Res Clin Anaesthesiol*. 2009;23(1):115-26.

Shahpori R, Hebert M, Kushniruk A, Zuege D. Telemedicine in the intensive care unit environment--a survey of the attitudes and perspectives of critical care clinicians. *J Crit Care.* 2011;26(3):328 e9-15.

Stafford TB, Myers MA, Young A, Foster EG, Huber JT. Working in an eICU unit: Life in the box. *Crit Care Nurs Clin North Am*. 2008;20(4):441-50.

Venditti A, Ronk C, Kopenhaver T, Fetterman S. Tele-ICU "myth busters". *AACN Adv Crit Care*. 2012;23(3):302-11.

Vespa P. Robotic telepresence in the intensive care unit. *Crit Care.* 2005;9(4):319-20.

Wilcox ME, Adhikari NK. The effect of telemedicine in critically ill patients: systematic review and meta-analysis. *Crit Care*. 2012;16(4):R127.

Williams L, Hubbard, KE, Daye O, Barden C (2012). Telenursing in the intensive care unit: Transforming nursing practice. *Crit Care Nurse*. 32(6): 62-69.

Wilson LS. Technologies for complex and critical care telemedicine. *Stud Health Technol Inform*. 2008;131:117-30.

Witzke A. Trends in telemedicine. *Nurs Crit Care*. 2007;2:46-54.

Wood D. Tele-ICU saves money as well as lives. *Telemed J E Health*:. 2011;17(2):64.

Yager PH, Cummings BM, Whalen MJ, Noviski N. Nighttime telecommunication between remote staff intensivists and bedside personnel in a pediatric intensive care unit: A retrospective study. *Crit Care Med*. 2012;40(9):2700-3.

Yeo W, Ahrens S, Wright T. A new era in the ICU: The case for telemedicine. *Crit Care Nurs Q.* 2012; 35(4): 316-21.

Zawada ET, Jr., Herr P, Larson D, Fromm R, Kapaska D, Erickson D. Impact of an intensive care unit telemedicine program on a rural health care system. *Postgrad Med.* 2009;121(3):160-70.

Zawada ET, Jr., Kapaska D, Herr P, Aaronson M, Bennett J, Hurley B, et al. Prognostic outcomes after the initiation of an electronic telemedicine intensive care unit (eICU) in a rural health system. *S D Med*. 2006;59(9):391-3.

Zhang P, Kumabe A, Kogure Y, Akutagawa M, Kinouchi Y, Zhang Q. New functions developed for ICU/CCU remote monitoring system using a 3G mobile phone and evaluations of the system. Conf Proc IEEE Eng Med Biol Soc. 2008;2008:5342-5.