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TeleICU

A Second Set of Eyes

Background

In recent years there has been an increase in the number of patients needing highly specialized ICU care (i.e. pediatric liver transplant recipients).

Tele-ICUs offer a solution to this problem by enabling highly specialized intensivists to help and contribute to the care of a large number of ICU patients. Moreover, Tele-ICUs also offer opportunities to conduct education and training.

Tele-ICUs make experienced intensivists and critical care nurses who are dedicated to the management of ICU patient care available to the staff at times when these resources are not present in the physical ICU.

Background

What are Tele-Intensive Care Units (Tele-ICUs)?

Tele-ICUs are networks of audio-visual communication and computer systems that link critical care doctors and nurses to intensive care units in other, remote hospitals.

The intensivists can communicate by voice with the remote ICU personnel and can receive televised pictures and clinical data about the patients. Direct patient care is provided by the doctors and nurses in the ICU.

Background

Overview of technology used.

A Tele-ICU system should contains hardware and software solutions that collects and assembles patient data and transmits it (including video and voice) from one ICU to the other.

The patient data include physiological status (e.g., EKG and blood oxygenation), treatment (e.g., the infusion rate for a specific medicine or the settings on a respirator), medical records, and access to the radiology exam.

Benefit of TeleICU

Many studies in literature show the advantages obtained using telemonitoring systems in ICU.

NEHI, a Massachusetts-based nonprofit, recently proposed addressing the staffing shortage through the use of tele-ICU.

In tandem with the Massachusetts Technology Collaborative, NEHI conducted a study beginning in 2008 to gauge the impact of tele-ICU technology on patient mortality and ICU length of stay. The organizations collected data from an academic medical center and two community hospitals.

According to the data, tele-ICU technology decreased patient ICU mortality by 20% and total hospital mortality rates by 13% at the academic medical center. At one of the community hospitals, ICU-adjusted mortality rates dropped by 36%. Patient ICU stays decreased by 30%, or an average of two days at the academic medical center.

Benefit of TeleICU

- Reduction of ICU LOS ratios (observed/expected) -46.8% in the tertiary hospital, -36.4% in the regional hospitals.
- Hospital LOS ratios were -21% in the tertiary hospital, -20.3% in the regional hospitals.
- Both ICU and hospital LOS were reduced ($p < 0.001$) and across the health system were associated with an annual reduction in 4146 ICU days and 572 hospital days.

Financial benefit of a tele-intensivist program to a rural health system. Zawada, et al. Chest. 2007;132(4):444

Outcome	Pre-eICU (n=189)	Post-eICU (n=2.622)	p
ICU Mortality (%)	8.4	3.1	0.0003
Hospital Mortality (%)	11.1	6.0	0.01
ICU LOS (d)	7.53/1.95 [0.17-180.4]	3.78/1.77 [0.17-156.3]	0.007
Hospital LOS (d)	21.0/11.0 [0.52-190.4]	16.57/9.2 [0.46-345.8]	0.04

ICU and hospital LOS are presented as Mean/Median (range) in days.

Effect of telemedicine on mortality and Length of stay in an University ICU. Benjamin A Kohl, Jacob T Gutsche, Patrick Kim, Frank D Sites, Edward A Ochroch, Anesthesiology and Critical Care, University of Pennsylvania, Philadelphia, PA Crit Care Med. 2007;35(12):A22..

ISMETT Implementation

In ISMETT Implementation the components of the TeleICU system are:

- Videoconference equipment allowing the remote physicians to discuss cases, perform rounds with the onsite clinicians, and view the patient.
- IT systems that allow to share:
 - Vital signs
 - Radiology images
 - Current and past therapy
 - Physicians' documentation

ISMETT Implementation

Despite the availability of many different personal **videoconference solutions** (Skype, Messenger, etc.) on the market, a professional system should be preferred.

The videoconferencing system may have the following characteristics:

- High Definition 720p 30/60 fps or 1080p resolution delivering a life-like video conferencing experience;
- Wireless connection;
- Allow sharing of a PC desktop;
- Highly mobile, small footprint, equipped with battery power;
- AES encryption for HIPAA compliancy; UL 60601 compliant power supply for use in patient care environments;**
- Easy addition of medical peripheral devices with integrated switch box and connection panel (digital in-band stethoscopes and video scopes);
- Pan-tilt-zoom camera;
- Adjustable height to maintain eye contact.



ISMETT Implementation

In hospitals where a **vital sign monitor** network is available, a web application can be added with a relatively small investment allowing vital sign remote monitoring. In these cases, the application can be shared to the remote physician using the videoconference desktop sharing functionality or giving access to the remote physicians to the application.



In hospitals where this application is not available, the videoconference equipment may supply the system functions: patient vital signs can be reviewed during the rounds by focusing the camera on the vital sign monitor.

ISMETT Implementation

Radiology images can be shared using the hospital web PACS. This application can easily be shared with the remote physician using the desktop sharing functionalities of the videoconference system. Once again, should the application not be available the videoconference equipment can be used to review the radiology images during the rounds.



Requirements

Minimal Requirement	
Internet High speed connection	High speed HDSL balanced internet connection. Connection speed >10 Mbps in upload and download. Hospital connection can be used.
Videoconferencing system	<p>Wireless videoconferencing system on trolley.</p> <ul style="list-style-type: none"> - High Definition 720p 30/60 fps or 1080p resolution delivering a life-like video conferencing experience; - Wireless connection; - Allow sharing of a PC desktop; - Highly mobile, small footprint, equipped with battery power; - AES encryption for HIPAA compliancy; UL 60601 compliant power supply for use in patient care environments; - Easy addition of medical peripheral devices with integrated switch box and connection panel (digital in-band stethoscopes and video scopes); - Pan-tilt-zoom camera; - Adjustable height to maintain eye contact. <p>A COMPUTER ON WHEEL WITH A GOOD HD CAMERA CAN BE USED</p>
Additional requirements	
WEB PACS	To give the remote physiciant the possibility to access the PACS images
Vital sign web monitoring system	To give the remote physiciant the possibility to access vital sign
EMR	To give the remote physiciant the possibility to access all the lab and teraphy information on the patient

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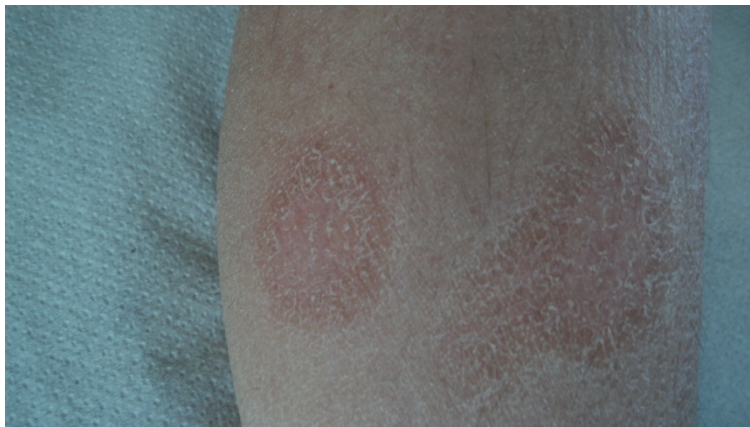
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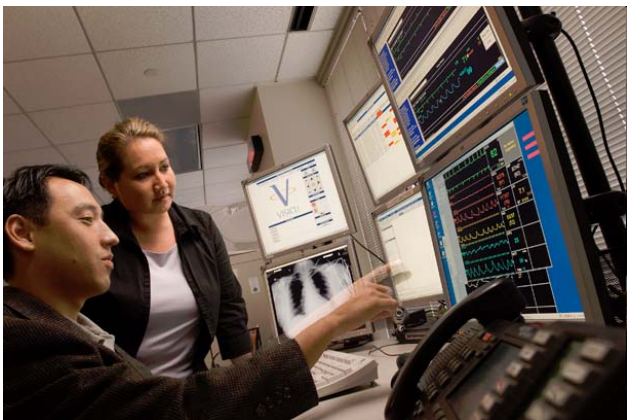
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