

How Technology will Change Intensive Care Unit Practice In hospitals

*Dr. Hanan Mohammed Mohammed,*Dr. Manal Salah Hassan

*Assistant Professor of Medical-Surgical Nursing Department, Faculty of Nursing, Ain Shams University, Egypt

**Professor of Medical-Surgical Nursing Department, Faculty of Nursing, Ain Shams University, Egypt

Corresponding Author: Dr. Hanan Mohammed Mohammed.

Abstract: *The intensive care unit (ICU) is due for a makeover. Even though healthcare technology itself has improved, there haven't been many advances in care administered in the ICU since the 1960s. Some doctors are working to change that by better integrating new tech advances into daily ICU processes. Applying the best evidence to support nursing practice and generating new knowledge for use in practice are the hallmarks of excellence and allow practitioners to meet patient care quality and safety priorities. Although identifying a patient care problem comes easily to staff nurses, the process of clarifying the problem and channeling those ideas through to a practice change can be daunting for bedside nurses.*

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I. Introduction

Computerized equipment is increasingly used in fast-paced healthcare environments such as Intensive Care Units (ICU) where core decisions must be made quickly⁽¹⁾. These computerized technologies contribute to improving patient care. The range of computerized equipment used in the daily work of an ICU nurse is extensive, with the manner in which ICU nurses practice and the methods employed in documenting patient care directly related to these computerized technological advances. However previous research has identified a problematic relationship between nursing practice and the use of advancing computerized technologies⁽²⁾. Senior management usually makes decisions about computerized hardware and software selections in healthcare facilities, including ICUs. As a result, computerized equipment can vary from department to department and between hospitals⁽³⁾. Biomedical Engineering Departments attempt to maintain asset registers detailing the type and amount of equipment utilized in a healthcare facility. However, these registers provide little information on the complexities of each piece of equipment⁽⁴⁾. Computerized technology in healthcare is constantly evolving and being updated in the workplace hence it is relevant and timely to "take stock". This study was undertaken to determine the range and contemporaneity of computerized equipment currently used by nurses in ICUs and to ascertain the degree of uniformity of hospital monitoring systems in acute care areas^(5,6). This data will provide preliminary information for future research investigating the training needs of ICU nurses in the use of computerized equipment. Contemporaneity and user friendliness of the equipment was of particular interest as these are known to strongly impact on clinical nursing practice affecting education, time management, confidence and knowledge⁽⁷⁾. Technology is improving patients' experience and care at hospitals every day. Facilities can take advantage of many different options to boost outcomes and satisfaction, especially regarding some of its most vulnerable patients in intensive care⁽⁸⁾.

II. Electronic Intensive Care Unit (Eicu)

An Electronic Intensive Care Unit (eICU) is a form of telemedicine that uses state of the art technology to provide an additional layer of critical care service. An eICU may also be referred to as a tele-ICU. Advances in telemedicine technology are transforming the way patients in the ICU are receiving care, Nurses use telemedicine for a variety of duties related to patient care in the ICU, from monitoring trends in vital signs and providing medical management to detecting arrhythmias and preventing falls. Since more payors are starting to recognize telemedicine as a service that's eligible for reimbursement, your hospital may be able to take advantage of this technology in your facility's ICU to improve patient outcomes⁽⁹⁾. An eICU support center can provide care to patients in multiple hospitals. The goal of an eICU initiative is to optimize clinical expertise and facilitate 24-hour-a-day care by ICU caregivers, whether the caregivers are down the hall from the patient that's being monitored or in another city. Two-way cameras, video monitors, microphones and smart alarms connected by high speed data lines provide eICU caregivers, who are called intensivists, with real-time patient data around the clock. Intensivists can also communicate with on-site caregivers through dedicated telephone

lines. eICUs are often funded through a combination of federal and charitable grants in conjunction with private funding. The technology infrastructure provides medical personnel with the ability to track outcomes, both for individual patients and for the medical facility that runs the eICU ⁽¹⁰⁾

III. Endless Alarms

One of the biggest problems providers are trying to solve is alarm fatigue in the ICU. Various types of equipment and devices, such as pumps and pulse-rate monitors, all end up making noise at once. Eventually doctors and nurses end up tuning the sounds out, which can be dangerous for patients if an alarm is actually serious. Often, these sounds are due to the inability of devices to communicate with each other. The article mentions what's being done to change this – particularly, updating devices so they're able to seamlessly transmit and share patient information ^(1,11). This would not only reduce the likelihood of duplicate alarms sounding, it would also make the lives of clinical staff much easier. They'd have to deal with fewer machines setting off false alarms, so they can spend more time with patients. Many medical device vendors have committed to making their products more capable of interoperability and sharing data between other devices from different manufacturers. So better device communication is coming in the not-too-distant future ⁽⁸⁾.

IV. Time-Saving Sensors

Another development to save time and improve care in the ICU: the installation of sensors that would alert clinicians about critical tasks they must perform for patients. For example, some patients must have their beds at specific angles to keep them from developing pneumonia. Most nurses currently check angles manually – even using protractors in some cases. But new sensors, costing as little as \$2 each, can monitor the angle of a patient's bed and alert nursing staff when it needs to be adjusted ⁽¹²⁾.

V. Apps To Sort Data

Better data filtering would also be beneficial in the ICU. Hospital equipment collects thousands of data points about each patient per day. Much of it is saved in the patient's records via an electronic health records (EHR) system. But it's not always saved in an organized way, so it's hard for providers to find the information they need about each patient's condition. Several apps have been designed to change that and their creators hope they'll become more common in the ICU as time goes on. One app, called AWARE, is billed as an "electronic intern" that identifies crucial health details doctors need and organizes them based on the organs they affect. EMERGE, another app, analyzes EHR data to let providers know if a proposed course of treatment or medication may be harmful to patients, which can be useful in preventing never events ⁽¹³⁾.

VI. More Tech Benefits

Technology has a host of other benefits for the ICU. Many hospitals don't have full-time critical care physicians on staff. However, facilities can take advantage of telemedicine and have intensivists remotely monitor patients' conditions. Plus, recent research shows that using telehealth in the ICU reduces mortality rates, since remote experts can quickly alert doctors and nurses to significant changes in a patient's condition. Some hospitals are even using technology so staff can make better personal connections with patients in the ICU. They've placed a tablet next to each bed so patients and their families can enter in personal details about themselves, including photos. The tablets also allow them to note their recovery goals and any fears they have about their hospital stay. This helps staff give each patient more personalized care ⁽⁸⁾.

VII. Next Steps

Hospitals need to be aware these options exist for their ICUs. With these new technological advances in mind, it's critical to look over your hospital's current care protocols and decide which practices need to be updated. Because patients in the ICU are critically ill, and hospitals are being judged on patient outcomes, it's key to stay on top of developments regarding any technology that can help you boost the quality of the care your facility provides to its sickest patients ^(6,11).

7.1. Intense Environment

Turner started her nursing career in an ICU, pursuing a critical-care training program after graduation from nursing school. "I liked the fast pace, the high technology and the constant change of environment," she says. "You were doing something different every day. I liked the high-level acuity of the patients". The continual advancements of medicine mean critical-care nurses will always see the most severe cases. Patients who would have been cared for in an ICU five years ago can now be treated on medical floors, while those being treated in the ICU may not have had a chance at survival in the past ⁽³⁾. Ann Roberts is a registered nurse (RN) clinician IV in the coronary medical ICU at Virginia Commonwealth University Health System in Richmond, Virginia. "I love just about everything about my job," says Roberts, who has worked in intensive

care for more than 20 years. "I like my patient population. I like the impact I can make for them. I like working in the university setting, because it's a teaching environment so you're always on the cutting edge of what's coming out"⁽⁵⁾.

7.2. Variety of Employment Options:

Today, most critical-care nurses work in hospital settings in ICUs, cardiac-care units, cardiac catheter labs, telemetry units, progressive-care units, emergency departments and recovery rooms. But critical-care nurses also work in home healthcare, managed-care organizations, nursing schools, outpatient surgery centers and clinics. Critical-care nurses are usually RNs who receive critical-care training from their employer after graduation. Some hospitals have new-graduate programs in critical care. Roberts says she knew she wanted to pursue this field before she graduated. "My school particularly prepared me to work in an intensive-care unit," she says. "I spent three days a week in an ICU preparing to take care of patients, so I didn't have a reality shock when I came out of school "⁽¹⁴⁾. Roberts advises nursing students with an interest in critical care to get "clinical rotations that are in ICUs, that are more than just observational experiences". After nurses have completed a prerequisite number of clinical hours and have been in critical-care practice for at least two years, they're eligible to take an examination and become a certified critical-care nurse (CCRN). This certification is not required to work in critical care and requires continual testing to be maintained ⁽¹⁵⁾. "It's not something that you get for life, and you don't have to do it to work in critical care," Turner says. "It's a big professional kudo, because it's difficult to get."

VIII. Conclusion

While there have been major improvements in intensive care monitoring, including the development of enterprise Clinical Information Systems, the medical industry, for the most part, has not incorporated many of the advances in computer science, biomedical engineering, signal processing, and mathematics that many other industries have readily embraced. Acquiring, synchronizing, integrating, and analyzing patient data remains frustratingly difficult because of insufficient computational power and a lack of specialized software, incompatibility between monitoring equipment, and limited data storage. All of these technical problems are now surmountable. Today, we are on the verge of the data-intensive science era in which hypotheses will be generated automatically among the enormous amount of data available by using computational science with inductive reasoning. In this new era, information technology enabling the development of an integrated critical care informatics architecture that supports clinical decision-making at the bedside will be essential.

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