TITLE: Central Monitors for Acutely-Ill Cardiac Patients in a Small, Rural Hospital Setting: A Review of Clinical and Cost-Effectiveness

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CONTEXT AND POLICY ISSUES

The assessment of patient parameters, such as heart rate, heart rhythm, blood pressure, and oxygen saturation, is critical to providing high-quality care. Acutely-ill patients require more frequent, if not continuous, monitoring of multiple signs and symptoms as their condition can change rapidly. There is evidence that the quality of care following an acute myocardial infarction in rural hospitals is relatively poor compared with urban centers, which may be partly the result of inefficiencies in patient monitoring. Recent developments in technology have made it possible for wireless sensors to measure and transmit physiological data from multiple patients to a central station for real-time monitoring and recording. Central monitors have the potential to improve the quality of patient care. However, due to various factors such as the need for additional nursing staff and training, this technology may not be suitable for monitoring acutely-ill patients in rural hospitals.

RESEARCH QUESTIONS

1. What is the clinical effectiveness and appropriateness of central monitors for acutely-ill cardiac patients in a small, rural hospital setting?

2. What is the cost-effectiveness of central monitors for acutely-ill cardiac patients in a small, rural hospital setting?

KEY MESSAGE

There is a lack of evidence for the clinical and cost-effectiveness of central monitors for acutely-ill cardiac patients in small, rural hospitals.

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METHODS

A limited literature search was conducted on key resources including PubMed, Ebsco CINAHL, The Cochrane Library (2011, Issue 3), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, and economic studies. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2006 and April 6, 2011.

SUMMARY OF FINDINGS

No health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, or economic evaluations were identified assessing the use of central monitors for acutely-ill cardiac patients in rural hospitals. Review articles and product information of potential interest are listed in the appendix.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING:

Because of the lack of relevant published literature, no conclusions can be drawn concerning the appropriateness, clinical, and cost-effectiveness of central monitors for the care of acutely-ill cardiac patients in small, rural hospital settings.

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APPENDIX: FURTHER INFORMATION

Review Articles


The evolution of patient monitoring on general hospital wards is discussed. Patients on general wards are monitored according to the severity of their conditions, which can be subjective at best. A report by the Commission for Healthcare Audit and Inspection in 2008 indicated dissatisfaction with patient monitoring. Commitment to providing quality health service by healthcare organizations encourages the implementation of other mechanisms for patient care. Remote patient monitoring (RPM), by supplementing the role of nurses, can improve efficiency and patient care on general wards. Developments in technology made it possible for wireless sensors to measure and transmit physiological data from patients to a control room for monitoring and recording. Two approaches in the application of wireless ZigBee sensor networks are discussed and their performances compared in a simulation environment. The role of RPM in early detection of deteriorating patients' conditions, reducing morbidity and mortality rates are also discussed


This paper presents a wireless sensor network system that has the capability to monitor physiological parameters from multiple patient bodies. The system uses the Medical Implant Communication Service band between the sensor nodes and a remote central control unit (CCU) that behaves as a base station. The CCU communicates with another network standard (the internet or a mobile network) for a long distance data transfer. The proposed system offers mobility to patients and flexibility to medical staff to obtain patient's physiological data on demand basis via Internet. A prototype sensor network including hardware, firmware and software designs has been implemented and tested. The developed system has been optimized for power consumption by having the nodes sleep when there is no communication via a bidirectional communication


A key aspect of physiologic monitoring is making sure that alarm information always reaches the appropriate staff members. In this article, we describe some of the fundamental scenarios for alarm notification-what we call alarm-notification
models—that hospitals are using. In the models we discuss, nurses receive information in one of the following ways: Directly from the bedside and central station monitors, perhaps supplemented by interactive central station clients or slave displays From dedicated monitor technicians, called monitor watchers, who observe the care area's central station and relay alarm information to clinicians From dedicated monitor watchers stationed in a remote, centralized location, who receive alarm information and relay it to clinicians We also describe a number of technologies designed to enhance alarm notification, including the risks and controversies surrounding the use of these technologies. The framework provided in this article will help hospitals identify and analyze their alarm-notification options and ensure an effective fit with the rest of their current or planned alarm-management environment

Product Information

9. Central monitoring station software (CMS) [Internet]. Freiburg, Germany: GE Medical Systems; 2003 [cited 2011 April 29].
   Available from: http://www.gehealthcare.com/euen/patient_monitoring/docs/CentralMonitoringStation_e.pdf

10. IntelliVue Information Center [Internet]. Andover (MA): Philips; 2011 [cited 2011 April 29].