

Architectural design for remote patient monitoring system implementation in haematology units: a proposed model

Research – Methodology

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Abstract

Information and communication technology (ICT) has been pivotal in healthcare. In particular, wireless communication and wearable sensors technology have garnered more attention in healthcare. They allow for real-time healthcare monitoring systems, early diagnosis, and timely treatment, which can significantly reduce unnecessary loss of lives primarily due to delays of response healthcare providers, Furthermore, low healthcare professionals-to-patient ratios.

This study proposes a framework of remote patient monitoring (RPM) for managing haemophilic children in Egypt. This program is designed for health data management inside the Regional Blood Transfusion Center (RBTC) at the Therapeutic Unit in Alexandria. Meanwhile, it employs a descriptive-analytical method to investigate the impact of Wireless Body Sensor Networks (WBSN) on the timely collection of physical health data. Moreover, this study outlines a planning strategy for integrating Wireless Body Area Network (WBAN) technology into telemonitoring systems, emphasizing its applications within healthcare, particularly in haematology.

The results of this study indicate the effectiveness of RPM in improving patient experience, and medication compliance, and reducing hospital readmissions. RPM monitors wirelessly patients' physiological parameters in real-time transmitting data to the Electronic Medical Record (EMR) in real-time, and alerting healthcare providers when abnormal readings are detected. The study concludes that home therapy can

lead to prompt and optimal treatment, thereby reducing pain, dysfunction, and long-term disability for patients.

Keywords

Wireless Body Area Network (WBSN); Remote Patient Monitoring (RPM); Medical information

3.Problem of study

Usually, remote patient monitoring RPM measures symptoms of chronic conditions, such as cardiac diseases, diabetes, and asthma. RPM or telemonitoring is a way that allows clinicians to observe patients' physiological parameters remotely and to intervene if abnormalities appear. [25] People with multiple chronic conditions are suffering from the increasing risk of day-to-day body system failure and increased mortality rates.[26] Therefore, implementation of the RPM program at the therapeutic unit needs to define the problems faced by healthcare practitioners, which are summarized as follows:

- **Information:** in some cases, there are suffering from adverse reactions that develop within 72 hours of completion of the transfusion. At the same time, some blood disorders don't cause noticeable symptoms. In this situation, the healthcare team should monitor the overall health, paying close attention to any new signs or symptoms that develop. Additionally, children can't express their pain clearly, moreover, miscommunication between their parents and healthcare providers except for a few calls and sending some images on WhatsApp group that of course, negatively reflects on clinical decision support.
- **Cost:** in fact, Healthcare resource utilization is affected by direct medical costs which include the cost of visits to doctors, investigations, low funds for some treatment, and complications management. as well as, indirect costs associated with the management of haematology diseases. it includes costs of productivity loss, caregiver time, and transport to the health care facility, in addition, Blood disorder patients suffer from multiple intangible costs which include psychological stress and withdrawal from society.
- **Care Plan:** caregivers are unable to track the patient's activities and reduction of fatigue, as evidenced by reports of increased movement and ability to perform desired activities. Also, increase the family risk of infection

as evidenced by a fever infection, and implementation of preventive measures such as proper hand washing.

- **Follow up:** even with good healthcare, complications can develop, and when they do, they usually require immediate medical attention. Some can quickly become life-threatening without treatment. For example, excessive internal bleeding is one common complication that requires medical care right away.

4. Methodology

This descriptive-analytical study examines the impact of Wireless Body Sensor Networks (WBSN) on timely physical data collection to enhance healthcare. It also explores WBSN-enabled self-monitoring programs for remotely monitoring patients with chronic Haemophilia and presenting standard care. The study involved interviews with 17 children with haemophilia, their parents, 2 haematology doctors, and 5 caregivers. Interview questions focused on four main topics: abnormal sign measurement, team eligibility, patient eligibility with consideration of severity of disease, and program framework. This study introduces a planning strategy for integrating Wireless Body Area Network (WBAN) technology into telemonitoring systems, emphasizing its applications within healthcare, particularly in haematology.