

HEALTH INFORMATICS -SMART BED TECHNOLOGY IN HEALTH CARE

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INTRODUCTION

The increase in life expectancy over the years has resulted in an increase in the population of the elderly. While the overall population of India will grow by 40% between 2006 and 2050, the population of those aged 60 and above will increase by 270%. By 2021, the elderly in the country will be 143 million. Presently, the elderly population is divided into three categories: the young old (60-70) the middle-aged old (70-80) and the oldest old (80 plus).

Hospital beds are where most geriatric patients spend the majority of their time, smart beds help geriatric patients stay safe, and help nurses analyse information and improve patient care. The beds connect to EMR networks to send patient data and help nurses monitor patient statistics such as movement and weight changes, most accidents occurring at medical institutions treating elderly patients with mobility impairment are bedsores and fall accidents. One of the reasons for this high rate of

accidents is the lack of nursing personnel. In order to aid caregivers in nursing elderly patients who are not able to move about freely, in this paper, we propose a design and implementation of a smart bed.

SCOPE OF SMART BEDS IN HOSPITAL

- Smart beds use a sensor, placed under the mattress, to help prevent patient falls.
- The technology also creates reports of patient movement that nurses can look at for patterns.
- It communicates with other devices such as X-rays or blood-pressure monitors to monitor a patient's health and automatically make necessary adjustments.
- It could be used to measure and reduce the risks of apnea
- If the bed determines that a patient ceases breathing, it will automatically change positions until the condition improves.

HOW DOES SMART BED WORKS?

Smart patient beds will have a remote monitoring system which keeps a track of the patient. It contains unique sensors for body temperature, heartbeat, blood, oxygen and pressure sensors, among others. These signals are required and necessary for the doctors to monitor the health of the patients. This system is located in the hospital beds and transfers all patient signals to the supervisor, especially in those cases which require intense care.

This critical information is sent to the central system of the hospital and enables health supervisors to instantaneously review and monitor patient's vitals. In addition, this system sends alert messages, or signals, to the supervisors in case of any sudden change in the status of the patient during that period of time

The smart bed system will ease the burden of the hospital staff who is responsible to monitor the patient's condition. Significantly, smart beds have succeeded for healthcare providers to predict, detect and prevent unscheduled bed exits.

The scope of smart hospital beds is in budding stage and is expected to create an impact in the medical system with the increase of its commercialization. There are some factors, such as the increasing demand for comfort from hospitals, rising healthcare expenditure, on-going technological advancements and growing prevalence of chronic diseases, which are driving the growth of smart bed technology in health care industry.

The innovative system called In Touch bed monitors the exit of patient from bed and to weigh patients, assess their risk for pressure ulcers. The bed also provide opportunities to clinicians to set protocol reminders that help prevent patient falls and ventilator-associated pneumonia.

RESEARCH EVIDENCES

The study conducted in South Korea had come out with a novel approach to contact-free respiration monitoring that addresses the shortcomings by employing a highly sensitive capacitance sensor to detect variations in capacitive coupling caused by breathing. They developed a prototype system consisting of a synthetic-metallic pad, sensor electronics, and iPhone interface was built and its performance compared experimentally to the gold standard technique (Respiratory Inductance Plethysmography) on both a healthy volunteer and SimMan robotic mannequin. The prototype sensor was found effective in capturing respiratory movements over breathing rates of 5-55 bpm.

Similar study conducted in 2011, CSIRO took the initiative to develop Smarter Safer Homes technology. The platform infers the Activities of Daily Living information from a passive sensor-enabled environment and correlates the information with home-based health monitoring measurements. The use of sensors enables the information to be captured in an unobtrusive manner. This information is then provided to the individual in the household through an iPad application while information can also be shared with formal and informal carers. The platform has undergone a few pilot studies to explore an objective and individualised approach to Activities of daily living based on an individual's profile and its applicability in multi-resident home setting in individual's in regional Queensland.

Another study conducted to construct an Inexpensive Node for Bed Exit Detection (INBED), a comprehensive signalling system for fall prevention for geriatric population. It is a wireless sensor network infrastructure via IEEE802.15.4 and highly-specialized open hardware in-house developed wearable. The device, which will be attached to the patients, can detect several types of movement. Occurring events are forwarded to the nursing staff immediately by using the self-organizing and scalable network including wide area network integration. The system can help to relieve the staff while the personal freedom of movement and privacy of patients is increased.

CONCLUSION

Smart beds could be the comfort device for the patient in future in various ways and of course it also helps the health care professionals in sensing the patient's health condition on continuous watch throughout the day. The hard part of this technology is that affording the health care expenses arises out of such technology cannot be borne by the people from economically backward families.

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