

Chapter 8

An Online Neonatal Intensive-Care Unit Monitoring System for Hospitals in Nigeria

Peter Adebayo Idowu

Obafemi Awolowo University, Nigeria

Franklin Oladiipo Asahiah

Obafemi Awolowo University, Nigeria

Jeremiah Ademola Balogun

Obafemi Awolowo University, Nigeria

Olayinka Olufunmilayo Olusanya

Tai Solarin University of Education, Nigeria

ABSTRACT

This paper presents an online monitoring system for the storage and retrieval of physiological data from neonates admitted into the Neonatal intensive care units (NICU) of Obafemi Awolowo University Teaching Hospital, Ile-Ife, Nigeria. In order to develop this system, the requirements of the proposed system were identified and analyzed as system and user requirements independently and the requirements were designed using the Unified Modeling Language (UML) tools. The system was implemented using Web 2.0 technologies such as, the hypertext markup language (HTML), the cascading styling sheets (CSS), PHP and MySQL. With the system, storage and retrieval of information by the nurses and any authorized users will be easy.

INTRODUCTION

A neonatal intensive care unit (NICU), also known as an intensive care nursery (ICN), is an intensive care unit specializing in the care of ill or premature newborn infants. The first newborn intensive care unit located in the United States was designed by Louis Gluck in October 1960 at Yale–New Haven Hospital

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in New Haven, Connecticut (Gluck, 1985). A NICU is typically directed by one or more neonatologists and staffed by nurses, nurse practitioners, pharmacists, physician assistants, resident physicians, respiratory therapists, and dietitians (Whittfield et al., 2004). Many other ancillary disciplines and specialists are available at larger units. The term neonatal comes from neo, new, and natal, pertaining to birth or origin (Harper, 2010). Neonatal nurse practitioners are advanced practice nurses that care for premature babies and sick newborns in intensive care units, emergency rooms, delivery rooms and special clinics. Prematurity is a risk factor that follows early labour, a planned caesarean section or pre-eclampsia—a condition in pregnancy regarding high blood pressure.

Continuous health monitoring for neonates provides crucial parameters such as cessation of breathing, heart rhythm disturbances and drop in blood oxygen saturation etc. More than 50% premature infants show deficits in their further developments such as developmental delay, speech and language delay, behavioral, attention and learning problems. Medical conditions including chronic lung disease, apnea and bradycardia, transient thyroid dysfunction, jaundice and nutritional deficiencies are potential contributing factors (Perlman, 2001; Perlman, 2003).

Newborn babies who need intensive medical attention are often admitted into the NICU. The NICU combines advanced technology and trained healthcare professionals to provide specialized care for the tiniest patients. NICUs may also have intermediate or continuing care areas for babies who are not as sick, but do need specialized nursing care. About 10% of all newborn babies require care in a NICU. Vital parameters of clinical relevance for neonatal monitoring include body temperature, electrocardiogram (ECG), respiration, and blood oxygen saturation (Polin and Fox, 1992). Body temperature is monitored with adhesive thermistors; ECG and respiration are obtained by adhesive skin electrodes. The oxygen saturation of the blood is monitored by a pulse oximeter with the sensor applied on the foot or palm of the neonate.

Continuous health monitoring is crucial for the survival of the ill and fragile infants admitted at NICUs through the collection and identification of vital signs information. The process of monitoring and collecting information from the medical sensors attached to infants placed at NICUs by nurses at times may prove very challenging with additional problems associated with keeping constant and up-to-date information of the state of infants monitored at any time from remote locations by doctors.

There is presently no system available to make information monitored by nurses during regular wards rounds at NICU stored and accessible by other medical practitioner assigned to the NICU at any time and from any remote location using the Internet. There is the need for the development of a web-based monitoring system capable of storing and making infants vital signs recorded at the NICU available to other medical staffs as and when due. This paper presents a web-based monitoring system for the storage and retrieval of vital signs information captured from neonates admitted into the NICU and made available to other authorized medical personnel.

Related Work

A number of published works exists which are focused on the development of monitoring systems for neonatal monitoring systems alongside other health-related monitoring systems. Following are a number of related works considered in the review of literature.

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