Chapter 17
Monitoring and Assisting Maternity–Infant Care in Rural Areas (MAMICare)

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ABSTRACT

Presented is the project called MAMICare, which is motivated by the alarming number of maternity and infant deaths in rural areas due mainly to a poor monitoring of pregnancy progress and lack of appropriate alerting mechanism in case of abnormal gestation evolution. This work proposes an information technology solution based on mobile devices, and health sensors such as ECG (electrocardiogram), stethoscope, pulse-oximeter, and blood-glucose meter to collect automatically relevant health data for a better monitoring of pregnant women. This article addresses the status of the maternity infant death problem especially in rural areas of Mexico. It reviews some applications of IT in health systems (known also as Electronic Health or simply e-Health) and discusses how these are related to the presented proposal and how they differ. The article presents the proposed solution and discuss the current status of the work.

1. INTRODUCTION

The lack of appropriate maternal and child health in rural areas results in an alarming number of maternity and infant deaths (World Health Organization, UNICEF, UNFPA and The World Bank, 2012). In Mexico, although the infant and maternal mortality has been declining (maternal mortality fell from 89.0 to near 50 per 100 000 live births between 1990 and 2010), the states of Chiapas, Oaxaca, and Guerrero have high rates, with mortality rates highest among indigenous children. The leading causes of death continue to be associated with hypertension, hemorrhages, and other complications of delivery (World Health Organization, 2006) that could be avoided. It has been demonstrated in other countries that by means of an information technology approach several medical conditions such as maternity care can be intelligently monitored, managed and treated

on a long term (Blank et al., 2013, Mougiakakou et al., 2010). Such approaches can be studied and technology can be adapted to the particular conditions of maternity care and information technologies access in the rural areas of Mexico.

Current health conditions in Mexico present a downward trend in overall maternity and infant mortality. However, it is highly remarkable that unequal access to healthcare services prevails as a challenge in the country (World Health Organization, 2006). More specifically rural areas are the ones lacking the high quality services needed to reduce maternal and infant mortality in the whole region. According to a study, health services and human health resources (such as equipped hospitals and well-trained personnel) are more valuable for rural communities (Jennett, Yeo, Scott, Hebert, & Teo, 2005), thus the delivery of these services remotely using accessible technology could help to level up the unequal access to health services. Electronic health records, risk assessment systems, and remote monitoring are just some examples of how technology can be applied in the healthcare field.

The objective of our proposed work is to reduce maternity and child mortality rates in rural areas using information and communication technology (ICT) to strengthen the current health delivery practices for both the mother and child during pregnancy. The goal of this effort is to develop an integrated IT solution similar to our Emergency Remote Pre-Hospital Assistance (ERPHA) project (Muñoz, Avila, Lavariega, González, & Grote 2012). A solution that is suitable for rural areas, focused on the maternity care conditions and considering the technology limitations that prevail in the area are key elements to be considered.

The remainder of the paper is organized as follows: Section 2 presents and discusses current e-Health approaches on which we based our work, including our previous project called ERPHA. In Section 3 we introduce our project to alleviate the maternity infant death situation in rural Mexico.

Finally, in Section 4 we establish our current status and discuss future work in the short and middle term.

2. RELATED WORK

In the past 10 years Information technology (IT) has been used to improve the accuracy of patient records, and health monitoring. Benefits and challenging unsolved problems continue to be the outcomes of such attempts (Bates, 2003), such as electronic health records, remote monitoring, tele-health, health data collection and processing, and clinical decision support systems, to name a few. Groups interested in the IT-Healthcare efforts have gathered and exchanged opinions to identify technological areas with the highest benefits. These groups integrated by members of the public, health care provider and private sectors selected tele-health and electronic health records, in this order, as the most valuable IT approaches. The groups of interest also identified as a disadvantage the changes in the current practices and processes in the delivery of health services (Jennet et al., 2005).

The use of electronic health records (EHR) is one of the most successful examples of the application of IT to support health care services. Research efforts state that EHR is a solution with great potential as EHR strengthens the collaboration between public and primary care (Calman et al 2012). Electronic health records offer additional benefits such as improving public health surveillance by documenting patient data, real-time guiding of the physician interventions using statistical data to generate clinical alerts, improving surveillance and management of a communicable disease, etc. (Calman et al., 2012).

Other research effort focuses in supporting the treatment of patients with type 1 diabetes mellitus. This decision support system (Mougiakakou et al., 2010) provides risk assessment for long-term complications. Data exchange between a unit for

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