5. e-Health Services in Supporting Pregnant Women

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Abstract:

eHealth services include mHealth and eHealth services.
mHealth stands for the use of mobile communication technologies such as mobile phones and PDAs for health services and information.
eHealth stands for the use of information and communication technology (ICT) devices like computer, mobile phone and communication satellite for the health services and information.
With the low cost handsets and the penetration of mobile network globally, persons who do not have access to local landline telephones are using mobile phones on a regular basis. Mobile eHealth services can be personalized because the data collected and the conditions receiving the services are personal to the individual user.
Application of mobile technologies and information and communication technology (ICT) to the health sector is a recent phenomenon. Various studies in this arena tried to relate the quality of life of the pregnant women with mobile applications. Thus, mobile eHealth technology plays a vital role to enhance and support independent living of the pregnant women. Moreover, it is found that mobile eHealth services are made user friendly for the pregnant women.
This paper is an attempt to show that mobile eHealth services are a perfect companion of the pregnant women in various stages of pregnancy. Thus, it assists them in independent living even while living in the remote areas. Therefore, the necessity to analyse the requirements of the pregnant women and their technological skills as user of the eHealth services arises before deployment of it.

Keywords:

Maternal care, eHealth services, mHealth services, pregnant women, Mobile technologies, Quality of life.

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Introduction

Gunther Eysenbach in the article "What is e-health?", defined eHealth as, "ehealth is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies."

Some examples of mobile eHealth services are MediMob, Vidyo solution, WebMD (www.webmd.com), Babycenter (www.babycenter.com), GlicOnline, Operation ASHA, RapidSMS, Gamified, Mosio, Mobile Alliance for Maternal Action (MAMA), Womens and health alliance international (WAHA), Jacaranda, iBGStar, iHealth, eGame, House monitoring system, Radio-frequency identification (RFID), weight sensor, MegaKoto, Find-me cares wrist watch etc.

Review of Literature

World Health Organization (WHO) defines maternal health as health of the pregnant women during pregnancy and after childbirth. According to WHO, increased maternal mortality rate (MMR) shows the low quality of maternal health care provided to the mothers. Most of the maternal deaths were occurring due to low access to the services that include regular checkups and emergency services. During the year 1990- 2010, decline in maternal deaths was up to 47%. Some of the reasons behind the decrease in maternal mortality might be due to improved medical technology and services for contraception and family planning (WHO, 2014).

Medical professionals of previous generations had to do much more hard work because at that time diagnostic technology and computerised machines were very less in use. Today, computerised machine monitor patients continuously and more diagnostic tests could be performed with the help of automated machines more quickly and accurately. Thus, Manual work is reduced which save time of medical practitioners and patients.

According to United Nations Population Fund (UNFPA), the fifth millennium development aims at reducing MMR by 75% between 1990 and 2015. But, interestingly, 75% decrease in MMR is already found in 10 countries between years 1990 to 2010 before the targeted year 2015. They are: Estonia 95%, Maldives 93%, Belarus 88%, Romania 84%, Bhutan 82%, Equatorial Guinea 81%, Islamic Republic of Iran 81%, Lithuania 78%, Nepal 78%, Vietnam 76% (UNFPA, 2012).

Apart from eHealth services, various other common factors associated with the declining of MMR are: improvement in the skills of midwives, nurses and doctors, family planning program, women education, empowerment, wealth and living standards.

WHO defined maternal care as the health care during pregnancy, childbirth and the postpartum period. After the childbirth, maternal care is about the quality of the relationship that is established by a mother to her child that is maintained throughout the period until the child reaches twelve to fifteen months.

Thus, maternal care for mother includes both Antenatal care and postnatal care.

Antenatal care (ANC) phase starts from 8-12 weeks till 41 weeks of pregnancy. According to Frimleypark (2005), ANC helps pregnant women to make plans that are right for them in terms of their nutrition, food habits and daily exercise. ANC involves a series of appointments to a specialized midwife, nurse, or doctor specialized in pregnancy and childbirth.

Postnatal care (PNC) phase starts after the birth of a child and last up to 6 - 8 weeks. PNC supports the baby, mother and her whole family for a healthy life structure for newborns as well as mothers.

Objectives of the study

The three fold objectives of this study are:

1. To understand the pregnant women's attitude towards mHealth and eHealth services.
2. To analyse different mHealth and eHealth services to aid maternal care.
3. To analyse how simply comprehensible and cost-effective mHealth and eHealth services aid maternal care.

Methodology

In this short paper, we have studied the requirements of the pregnant women. Thereby, we tried to understand the attitude of pregnant women towards eHealth services. Finally, we tried to analyse how simply comprehensible and cost-effective eHealth services aid maternal care.

Discussion

Pregnant women requirements

The important factors of maternal care include, household work pressure, Lack of husband and family support in household work, Lack of skilled care at pregnancy, Inadequate access to and utilization of quality care, Poor maternal nutrition, Low institutional deliveries, etc. Moreover, the

pregnant women requirements depend upon their lifestyle. Therefore, it is necessary to know whether she lives alone or lives as a couple. Then only the introduction of eHealth services is possible and easy.

In this regard, the following requirements of the pregnant women need utmost care:

1. They are active or not in day to day activities.
2. Health problem if any.
3. Dietary and nutrition.
4. Basic daily living supports like, transport, shopping, laundry, cooking etc.
5. Motivation and encouragement for independent living.
6. Physiological health records.
7. Skills and necessity for mHealth and eHealth services.
8. Awareness about mHealth and eHealth services and its benefits.
9. System security requirement for maintenance of privacy.
10. Proficiency in English language for getting information through internet.
11. Education

Therefore, for the eHealth services to be effective, it should be secure, flexible, usable, affordable, user-friendly and trustworthy (CHMI, 2010).

Pregnant women's attitude towards eHealth services

In the present era of technology, health care turned to eHealth service. Biomedical diagnostic technologies are improving the lives of the pregnant women due to which researchers are being more focused on information and communication technology (ICT) for health. According to WeHealth, an international working group on women's access and ICT's use, ICT's new innovative ideas are supporting pregnant women by monitoring, managing, motivating and helping them to live in comfortably during their pregnancy.

According to Romano (2007), for efficient utilization of ICT, education and awareness to the pregnant women is an important factor. Childbirth educator who uses traditional methods of teaching to the pregnant women does not view ICT as a competitor, but as a potential source of the information and community building for the pregnant women. Pregnancy information on the internet is considered as the fastest method as compared to the reading materials found from libraries.

Thus, the prime requirements of pregnant women in terms of technology are:

1. Awareness and acceptance the technology for health monitoring.

2. Easily comprehensible feedback system.

3. Reliable transfer/functioning/interpretation and analysis of data.

4. Emergency alarm system.

In case of new technologies, people are unaware about it unless they use or they see others using it. After the use of the technology, some see and feel certain changes in their personal or family life and they say that they are satisfied with the technology. The acceptance or non-acceptance of the technology by any pregnant women largely depends upon her skills (i.e., skilled or unskilled) and participation (i.e., active or inactive). On the other hand, a system with reliability, user interface, privacy, affordability, usability and trust worthy nature may attract her for registration or signing up.

Results/Findings

eHealth services

eHealth services include mHealth and eHealth services.

mHealth stands for use of mobile communication technologies such as mobile phones and personal digital assistance (PDA)s for health services and information.

eHealth stands for use of information and communication technology (ICT) devices such as computer, mobile/smart phone and communication satellite (internet) for the health services and information.

According to Vital Wave Consulting (2011), both mHealth and eHealth are inextricably linked. Both of them are used to improve health conditions and their technologies worked together. With the low cost handsets and the penetration of mobile network globally, persons who do not have access to local landline telephones are using mobile phones on a regular basis.

Technologies used in eHealth services

It is necessary that the traditional face to face health services and eHealth services work together filling each other's gap and complement each other with their good and bad aspects.

According to the type of device used and means of using in eHealth services, WHO (2012) have categorised some technologies used in eHealth services in the following manner:

Devices:

1. Camera
2. Computer
3. GPS
4. PDA or tablet computer
5. Phones: smart phone, cell phone, landline phone
6. Radio
7. Remote/portable diagnostic tool
8. Smart card
9. Unique ID (e.g., biometric scanner, Radio-frequency identification RFID)
10. Other

Means of using e-services:

1. Software
2. Voice
3. Text messaging
4. Internet
5. Video conference

The above technologies are used mainly for the following purposes:

1. Geographic access
2. Patient communication
3. Diagnosis and treatment
4. Data management
5. Streamline financial transactions
6. Mitigate fraud and abuse

Software applications

In eHealth service, the user receives real-time health management service as personalised service from the application service provider (ASP) enabled by software specially designed for the same. Here, user is charged with certain amount for the service.

In mHealth service, real-time health management process includes:

1. Gathering of periodic or random input, i.e. capturing the biodata signal of users like pulse rate, ECG, blood pressure, body temperature, etc. with the help of a Biosensor attached to the user or to a mobile device for capturing the data.
2. Database management.
3. Data mining i.e., knowledge extraction and decision support.

4. mHealth service platform supports all of the diverse services. It is the middleware for supporting and integration of diverse services such as, biodata capturing, handling, storing, managing and analysing modules that can be shared between the mHealth services.

Policy implications

According to Shahriyar (1990), the use of Intelligent Mobile Health Monitoring System (IMHMS) can be one solution for some severe emergency. IMHMS includes Intelligent Medical Server (IMS) and Patient Personal Home Server (PPHS). In case of emergency, an alert SMS can be sent by a patient to the hospital so that the situation is observed by a doctor from the specific threshold that is learned from IMS. IMS is controlled and monitored by physicians. IMS can study previous treatment records of the patient that are received from mobile that act as the PPHS. Whenever a doctor examines, the treatment records are stored in a central database. After records are mined through data mining technology, information is processed. The feedback is sent to the mobile or informs the medical authority in case of emergency situations.

Voice communication

mHealth services use voice communication that is easily incorporated through telephone networks. Voice service includes Voice over Internet Protocol (VoIP) and hotline. It is the most common way for health care professionals to advice their patients if they are illiterate or lacks other form of communication such as text messaging, instant or web based messaging. However, voice communications are more expensive than short messaging service (SMS) in mHealth projects. In mHealth projects literate populations choose an SMS service rather than voice communication service due to high level of satisfaction, lower cost, high delivery success and a higher level of intent to change behavior (WHO, 2012).

Text messaging

Text messaging on mobile includes SMS and multimedia messaging service (MMS). SMS is one of the components of phone, web or mobile communication system. MMS extends the core SMS of 160 character length message with possibility to add other media formats e.g. pictures or music. Text messaging and automated SMS alert in eHealth care services are beneficial for remote areas and they provide further benefit to the patients offering recipients confidentiality in the environment where disease like HIV/AIDS is a taboo (Vital wave consulting, 2011; Adesina et al., 2010).

Internet

In mobile eHealth services, the use of internet service includes email, website and instant messaging (WHO, 2014). email message includes text or image that is sent from one device to another for exchange of information. Email is free, although both sender and recipient needs to have their own

email address and needs to be connected to the internet. Getting an email address is very easy through the mail servers such as Gmail, Hotmail or Yahoo. In health service, health care professional finds email easy to use due to easy accessibility, free of cost and a simple logistical setting (Zamani, 2009).

In mHealth services, website act as a significant source of information for different age groups, whether looking for the information about a particular illness or condition, exploring treatment options, comparing prescription, drug prices, searching for health providers or following some health related policy. (Vital wave consulting, 2011; WHO, 2012)

Instant messaging uses text based chat with two or more participants over the internet or other private networks. It is suited for immediate communication because the message is delivered fast and in real time.

Video-conferencing

Video-conference allows two or more people in different locations to communicate simultaneously with video and sound transmissions. Video-conferencing can be operated when the higher capacity broadband network is provided. Moreover, video-conferencing is a low-cost technology that connects different locations people and brings them together without traveling. (Down, 2009)

Conclusion

The low cost and effective mobile eHealth services can be a tool to improve the maternity care in rural communities of the developing countries where geography and demography bring challenges in health awareness and health services. Thus, it can help these countries to reduce MMR.

According to Kanjo (2007), mobile networks are considered as one of the powerful operating system available with a standardized programming language that have made phones smaller computing platform.

Mobile communication technologies enable faster communications among individuals irrespective of time and place. Indeed, it is very interesting that digitizing the real life situation in the form of the game or some applications shows the person the realities of life. It also acts as a very useful tool for sharing ones personal experience privately.Means of using technologies such as voice, text messaging, internet and video conference are commonly available technologies in present generation mobile phones.

This is to be worth mentioned that mobile eHealth services and their technologies are based on WHO requirements. These ehealth service technologies help in communicating to people irrespective of time and place faster than health providers themselves. However, Internet users need to be careful to

seek health information online because it may be inaccurate, incomplete or even dangerous. So, it is challenging to seek out health care information critically, to learn and to be proficient in accessing the health information on the internet. (WHO, 2012)

Mobile eHealth services can be personalised because the data collected and services received are personal to the individual user.

The most applicable eHealth services for pregnant women are:

1. Personalized health monitoring system; and

2. House monitoring system.

The means of using personalized health monitoring system e-services for mobile technologies includes SMS, voice communication, video conferencing, internet, software (mobile applications, eGames) and wireless communications (Bluetooth and infrared). Health monitoring system used along with the mobile services includes blood pressure monitor, blood sugar monitor and wrist watch.

House monitoring system is the use of an ambient sensor such as contact sensor and wireless accelerometer sensors that gathers information of the household activities of the pregnant women. These ambient sensors are smaller than health monitoring devices. But continuous monitoring of this kind of sensors is tedious, as they are not attached to the body like the health monitoring device.

Among all these technologies, SMS alert is the most common technologies applicable for emergency conditions. However, network and electricity are the utmost requirement for their operation. However, the applications operated through wireless communications require battery backup of mobile devices. Therefore, for economic and emergency use, wireless communications should be shut off after the information is transferred from the mobile.

eGames used in HIV counseling replicate the real life situations. These kinds of games might help the HIV infected patients to understand other HIV people's life situations and making them capable of decision making regarding their own life and living choices. As compared to HIV related eGames, still traditional HIV counseling is commonly preferred. But in terms of privacy, security and cost, eGames are more effective.

While eHealth services are extensively used in different countries of the world, In India also, Ministry of Health and Family Welfare has prepared the white paper of the "ehealthcare service" which is expected to raise awareness among the people in the country, who remain completely deprived of the government health services. This system basically will be a web portal; that will help the

government to address the people about every health-related programme and the various schemes that enable them to get free medical treatment. (PTI)

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