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Portable Health Clinic System for Maternal and Child Health Care in COVID-19 Pandemic Situation

Rafiqul ISLAM[a,1], Kimiyo KIKUCHI[b], Yoko SATO[b], Rieko IZUKURA[a], Mariko NISHIKITANI[a], Nusrat JAHAN[c], Meherun NESSA[d], Fumihiko YOKOTA[e], Ashir AHMED[f] and Naoki NAKASHIMA[a]

[a] *Medical Information Center, Kyushu University Hospital, Fukuoka, Japan*
[b] *Graduate School of Medical Science, Kyushu University, Fukuoka, Japan*
[c] *Grameen Communications, Dhaka, Bangladesh*
[d] *Holy Family Red Crescent Medical College & Hospital, Dhaka, Bangladesh*
[e] *Institute for Asian and Oceanian Studies, Kyushu University, Fukuoka, Japan*
[f] *Graduate School of Information Science & Electrical Engg, Kyushu University, Japan*

Abstract. Rural women in developing countries do not have any option but to visit the distant city to see the obstetricians and gynecologists in case of any maternal and child health issues. However, it becomes more difficult to travel during the COVID-19 pandemic situation. Thus, the telehealth service using the Portable Health Clinic can be very effective for maternal and child health care services. Since the PHC system provides home delivery services through the local health workers, the rural women can avail regular continuum of care services. This study found a 300% increase in participation in the continuum of care. This is not because they receive the service at home but also because they can receive consultancy from urban specialist doctors without travel during the pandemic situation.

Keywords. Maternal & Child Health, COVID-19, Telehealth, MCH Triage Protocol, Portable Health Clinic

1. Introduction

COVID-19 pandemic brings a lot of suffering to our social lives including healthcare facilities. The number of annual deaths of women caused by maternal issues globally is approximately 295,000 [1]. The annual deaths of children aged under 5 years are approximately 5,300,000. About 40% of deaths among this are occurring within the first 28 days of life or during the neonatal period. This is to note that the majority of these deaths occur mostly in underdeveloped or developing countries. Most of these deaths could be prevented if access to healthcare services was ensured [2]. While this is a difficult issue in the developing world under ordinary situations, the situation has deteriorated during the COVID-19 pandemic. Although there is already a huge shortage of MCH care services in the local hospitals in rural Bangladesh, many facilities stopped

[1] Corresponding Author,Rafiqul ISLAM, Associate Professor, Medical Information Center, Kyushu University Hospital, 3-1-1, Maidashi, Higashi-Ku, Fukuoka 812-8582, Japan; E-mail: islam.rafiqul.072@m.kyushu-u.ac.jp.

this service for tackling COVID-19 patients. Even though the service is there in some facilities, the supplies of medicine, oxygen, and other emergency resources become limited. Therefore, the village women find no option but to receive the services from the quacks and traditional birth attendants. This has worsened the situation further.

To tackle this situation, a low-cost but appropriate approach to technology can play an important role. The Portable Health Clinic (PHC) system has been developed as a telehealth system for primary health care [3]-[4]. To tackle the Maternal and Child Health (MCH) care issues, the MCH module has been added to the PHC system.

2. Methods

2.1. PHC for Maternal and Child Health Care

The PHC system was initially designed for primary healthcare with a special focus on non-communicable diseases (NCDs). However, this modular system can easily be converted for other services. There are four major components in the PHC system and these are: 1) a set of medical devices for a health checkup and a tablet PC installed with a PHC application for data sharing, 2) a trained village health worker with a diploma in healthcare (paramedics), 3) an online server system for health data management with user interfaces for patients, health workers, and doctors, and 4) a call center of a panel of doctors.

In the service delivery process, the health worker visits a patient with the PHC box. She then (i) collect various vital information about the patient using medical sensors and a survey questionnaire, (ii) insert the data into the PHC application for triage to classify the patients into 4 categories on the risk scale, namely, green (healthy), yellow (caution), orange (affected) and red (emergent), (iii) in case of orange and red patients, a notification goes to the urban call center doctor, (iv) doctor monitors the vital data, makes a video conference with the patients and finally, writes a prescription using PHC application, and (v) the prescription comes out printed from the printer installed in the PHC box and delivered to the patient by the health worker with the verbal explanation. Thus, the patient gets the total solution in a few minutes being at home.

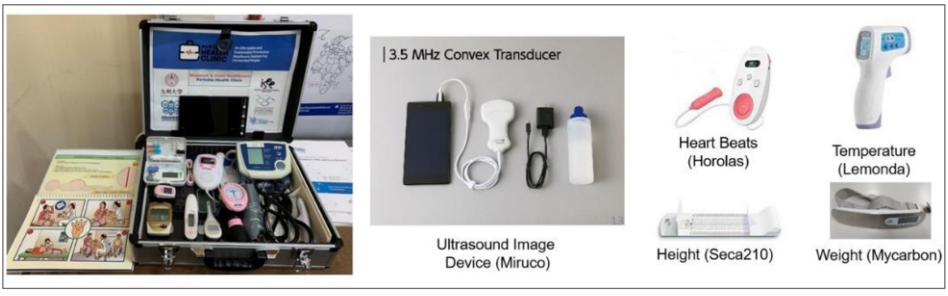

Figure 1. MCH Device Box

The basic PHC box has been equipped with various medical devices for collecting fourteen vital information. These are BMI, hip-waist ratio, body temperature, blood pressure, pulse rate, arrhythmia, oxygenation of the blood, blood glucose (random), cholesterol, uric acid, urine sugar, urine protein, hemoglobin, and blood grouping. For the MCH module of the PHC system, it adds a few new medical devices, namely, a fetal

doppler, a handy ultrasound, and a newborn's stethoscope, height, and weight measuring tool [Figure. 1].

2.2. Continuum of Care in the PHC System

The MCH module of the PHC system adopts the continuum of care as a service protocol proposed by the WHO [5]. Therefore, it basically follows the 8 stages of antenatal and postnatal service using a telemedicine system. These checkups are conducted (1) within 4 months of pregnancy, (2) within 6 months, (3) within 8 months, (4) within 9 months, (5) right after delivery, (6) on 2 days after delivery, (7) on 7 days after delivery, and (8) after 6 weeks of delivery. The newborn`s health checkup is also conducted together with the mother in the final 4 stages. The health worker prepares a service calendar of all 8 care for each patient. The patients receive home delivery service by female health workers as per the calendar which gives them more confidence and a safe feeling. The online doctor connects to the patients from the city. If needed, the doctor may refer to the nearest convenient hospital. In addition to these 8 stages of care, this MCH care service provides 2 more care to both mother and the baby at the age of 6 months and 1 year of the baby.

2.3. Triage Logic for MCH Care

Like the basic PHC system, the MCH care system has also adopted a triage protocol to classify the health status of the patients. The triage logic for antenatal and postnatal care of the mother and the newborn are different [6]. Also, there are separate triage logics for the motherhood and childhood checkup. This triage function is very important because it assists the health worker to identify the risk level of the individual patients and then she can refer the critical cases (orange and red) to the remote experts.

Figure 2. MCH Service Delivery during COVID-19 Pandemic

2.4. MCH Service Delivery during COVID-19 Pandemic

The MCH service was started in a village in Bangladesh in the middle of 2019. However, the sudden appearance of the COVID-19 pandemic in February 2020 interrupted the service from time to time [Figure. 2]. There were two lockdowns and one self-confinement period declared by the local government. Although the home delivery service was stopped during the first lockdown there was phone-based online care during the self-confinement and second lockdown period. The rest of the time, the health workers could provide home delivery services maintaining all COVID-19 etiquette.

3. Results

We have provided this service to a village of 14,000 people covering 194 pregnant women in the intervention area of about 7,000 people. We had a baseline survey on 125 mothers and it was found that there was not a single mother (0%) who attended 4 antenatal and 3 postnatal care in the normal pre-COVID situation although similar continuum care is available in the village health complex. The mothers who attended at least 1 antenatal and 1 postnatal care were only 11.2%. However, the MCH project of the PHC system could ensure that 10% of mothers attended care in all 8 stages and 37% attended 4 antenatal and at least 1 postnatal care even under the COVID-19 pandemic.

4. Discussion

Although the attendance to the continuum of care under this MCH service has been improved by about 300% the number is still very low. One of the main reasons is that most of the pregnant women leave the village for their parents' home before delivery as a local tradition and miss the postnatal care services. Some of them move to city hospitals for delivery as this program does not cover the delivery support. They also miss a few postnatal services from this program but they may attend the service in the hospital which was not counted in this result.

5. Conclusions

The village women do not have awareness of the necessity for attending the continuum of care but they feel it is enough to see the doctor only during the delivery time unless they have any severe symptoms. Therefore, this research found very poor participation in the continuum of care in the village health complex. The PHC system can be a potential tool for ensuring maximum participation because they can attend this service at home even during the COVID-19 pandemic situation. They also like this MCH care service because they can see a doctor from home and this service should be continued.

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