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Smart Phones for Better Managing Eclampsia and Pre-Eclampsia in Pakistan

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Abstract

Existing weak health care systems, especially those in LMICs, undergo a devastating human and economic toll as a result of increasing burden of maternal deaths due to eclampsia and pre-eclampsia. In Pakistan, eclampsia is responsible for one in ten maternal deaths, and claims 2000 maternal lives every year [1]. To meet the sustainable development goal 3-good health and well-being, and particularly target 3.1-reduce the global maternal mortality ratio to less than 70 per 100 000 live births by 2030 [2], it is of utmost importance to reduce the burden of adverse maternal outcomes related to pregnancy hypertension. What might stimulate progress? An apparent and accessible solution is the use of mobile health technology, which offers great promise to support hypertensive disorders during pregnancy and improve current clinical practice as per standard guidelines [3].

Many Low-and Middle-Income Countries (LMICs) have greatly benefited from mobile health (mHealth) solutions, as it offers a novel way in preventing delays in early identification, triage, transport and treatment of pregnancy complications [3,4]. In Tanzania, a mHealth strategy have been used to reduce preeclampsia-eclampsia and maternal and infant death. The mHealth strategy involves an automated vital remote monitoring using a mobile app. On a routine visit, the health worker records the vitals of a pregnant woman which are then sent to a server where the health status of a pregnant woman is determined based on a standard algorithm. Besides, maternal health care experts also assess pregnant women health status and advise them with the correct course of action, particularly in cases where immediate medical attention is required. This strategy also supports in health facility preparedness, based on the information collected on mobile app from pregnant women [5].

The use of technology in the health sector of Pakistan, like other low-middle-income countries, is in its very early stage. Most of the digital health strategies implemented so far, have been tested as pilot projects. One such successful mHealth trial, Community Level Interventions for Pre-eclampsia (CLIP), was conducted in Sindh, Pakistan to evaluate the feasibility of a low cost, technology-focused approach to screen pre-eclampsia and eclampsia by utilizing Lady Health Workers (LHWs) [6]. The intervention involves screening of pregnant women by LHWs for symptoms related to pre-eclampsia. LHWs are required to measure blood pressure and oxygen saturation levels of the women which are then entered into a smartphone-based mobile health application, "PIERS On the Move", which determines the risk of severe pre-eclampsia. This mHealth strategy has reached up to 39,444 pregnant women in the two districts of Sindh and results of the intervention indicates obvious improvement in awareness of the disease and health seeking behavior of women [6,7].

While some work has been done in establishing technology-focused approach to tackle pre-eclampsia and eclampsia in community settings, there is considerable lack of work in the domain of routine monitoring and management of high-risk pregnant women using an innovative technology at the tertiary care level. Majority of deaths occur in LMICs, mainly due to delays in early identification of women at risk, transportation to well-equipped facilities, and prompt treatment. Hence, there is a need to design a low-cost automated vital monitoring program using a mobile app, for measuring blood pressure and other vital signs in high-risk pregnant women on remote basis. The automated vital monitoring intervention could be targeted at high-risk pregnant women visiting out-patient clinics of secondary and tertiary care facilities and automated vital monitoring app can be installed in the smartphone devices of enrolled pregnant women. The app could

remotely record the vital signs and related symptoms in high-risk pregnant women, between antenatal appointments and the routine monitoring records could be accessed by primary physician in real-time to advice women on the best course of action. The technology focused approach would support in routine monitoring and management of high-risk women.

In most LMICs, including Pakistan, health care systems are not readily adopting mHealth and Information and Communication Technologies (ICTs) for ensuring better management of hypertensive disorders of pregnancy. The adoption of mHealth solutions is restricted due to several factors, such as high initial investment and operational cost of mHealth interventions, high cost for mHealth infrastructure including software development, poor internet connectivity in the remote areas, and barrier of using too many local languages in mHealth programs [8]. To successfully integrate mHealth strategy into existing health systems for reducing high burden of maternal deaths caused by hypertensive disorders of pregnancy, more research-based evidence is needed to convince the academics, public health experts, clinicians and policy makers to collaborate and come on common grounds (public-private partnership) to effectively implement this strategy. Alongside, future research should be directed to explore the health providers' and communities' willingness to adopt mHealth solutions principally to ensure better management of eclampsia and preeclampsia in the context of Pakistan.

Keywords: Developing nation; Digital health; Eclampsia; Mobile health; Pakistan; Pre-eclampsia; Smart phones

Declarations

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