TRAINING-OF-TRAINERS OF NURSES AND MIDWIVES AS A STRATEGY FOR THE REDUCTION OF ECLAMPSIA-RELATED MATERNAL MORTALITY IN NIGERIA

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ABSTRACT

Background: Preeclampsia and eclampsia (PE/E) are major contributors to maternal and perinatal mortality in Nigeria. Despite the availability of current curriculum at Nigerian schools of nursing and midwifery, the knowledge on the management of PE/E among the students has remained poor. In order to reduce maternal and perinatal mortality in developing countries, targeted training and supportive supervision of frontline health care providers have been recommended. Methodology: A total of 292 tutors from 171 schools of nursing and midwifery participated in the training of the trainers’ workshops on current management of PE/E across the country. Pre- and post-test assessments were administered. Six months after the training, 29 schools and 84 tutors were randomly selected for follow-up to evaluate the impact of the training. Results: Significant knowledge transfer occurred among the participants as the pretest/posttest analysis showed knowledge transmission across all the 13 knowledge items assessed. The follow-up evaluation also showed that the trained tutors conducted 19 step-down trainings and trained 157 other tutors in their respective schools. Subsequently, 2382 nursing and midwifery students were properly trained. However, six of the monitored schools (24.2%) lacked all the essential kits for teaching on PE/E. Conclusion: Updating the knowledge of tutors leads to improved preservice training of the future generation of nurses and midwives. This will likely result in higher quality of care to patients and reduce PE/E-related maternal and perinatal mortality. However, there is need to provide essential training kits for teaching of student nurses and midwives.

Keywords: Eclampsia, hypertension, magnesium sulfate, nurse-midwife tutors, preeclampsia

INTRODUCTION

Hypertensive disorders complicating pregnancy which manifest mainly as preeclampsia and eclampsia (PE/E), account for about 9% of maternal deaths in Africa and Asia and about one-quarter of maternal deaths in Latin America and the Caribbean. It is estimated that every year, eclampsia accounts for about 50,000 maternal deaths worldwide, most of which occur in developing countries. While the race to meet the Millennium Development Goals (MDGs) has intensified, and reducing maternal deaths by three-quarters is a major objective of these commitments, in Nigeria, maternal mortality appears to be increasing rather than reducing. The 2013 Nigeria National Demographic and Health Survey (NDHS) revealed a maternal mortality ratio (MMR) of 576/100,000 live births, which is an increase compared to the 2008 NDHS figure of 545/100,000 live births. New approaches are clearly needed to address maternal mortality in Nigeria.
One such approach is to target the common contributors to MMR with specific interventions. Several studies on maternal mortality in Nigeria showed that PE/E are among the two major causes. In separate studies on maternal mortality in Nigeria, PE/E was responsible for 27.8% of maternal deaths in a teaching hospital at Ilorin,\(^5\) 28.5% in a General Hospital in Kano,\(^6\) 37.5% at a teaching hospital in Port Harcourt,\(^7\) and 43.1% from a Federal Medical Center in a rural area in Jigawa state.\(^8\)

Studies have shown that the gold standard for the prevention and treatment of seizures in patients with PE/E is magnesium sulfate (MgSO\(_4\)). The use of MgSO\(_4\) in patients with severe preeclampsia reduced the risk of progression to eclampsia by more than half and also decreased maternal mortality.\(^{9}-^{11}\) Despite the evidence on the efficacy of MgSO\(_4\), the knowledge on its use has remained poor in the developing countries where it is needed the most.\(^{12}\) Lack of training on the use of MgSO\(_4\) has been identified as one of the factors for the underutilization.\(^{13}-^{15}\) An essential requirement in efforts to reduce maternal mortality is the availability of adequately trained human resources for health (HRH). Previous studies in Nigeria showed that training of health workers on the use of MgSO\(_4\) can reduce eclampsia-related case fatality. The training led to a reduction in eclampsia-related maternal mortality from 15.1% to 3.2% in one study\(^{16}\) and from 20.9% to 2.3% in another.\(^{17}\) Training of HRH has been used in several settings as part of efforts to reduce maternal mortality.\(^{18}\) There is evidence that having sufficient numbers of clinically competent health care workers directly impacts other health outcomes, including infant and maternal survival rates.\(^{19}\)

A window of opportunity is the preservice training period when student midwives are still at school. The young students are active and ready to learn. In Nigeria, the curriculum for training of nurses and midwives on PE/E and MgSO\(_4\) has been updated and approved by the Nursing and Midwifery Council of Nigeria (NMCN). Despite this, a preliminary survey indicated that it was not being implemented across all schools of nursing and midwifery in Nigeria mainly due to the fact that the tutors in those schools lacked the knowledge as well. The objective of this program was to update the knowledge and skills of tutors in schools of nursing and midwifery in Nigeria and to evaluate if there was a transfer of knowledge and skills between the tutors and their students.

**METHODOLOGY**

This was a project conducted by Population Council (PC), an international nongovernmental organization, in collaboration with the NMCN. The NMCN identified 292 nurses and midwifery tutors (NMT) from 171 schools of nursing and midwifery spread across all the six geo-political zones of Nigeria. PC organized a 2-day training-of-trainers (TOT) workshop on the current management of PE/E, which was conducted by two experienced obstetricians and a midwife. The workshops took place at separate times in all the regions of Nigeria. A total of 9 TOT workshops took place from August, 2012 to April, 2013.

Each workshop was preceded by a pretest assessment which was responded to by all the NMT. The training of the NMT revolved around building their capacities in line with the currently-approved curriculum of nursing and midwifery training in the country on the management of PE/E. The knowledge of the participants was also updated on the use of MgSO\(_4\) for the management of PE/E. The training covered introductory segments (which revolved around the contribution of PE/E to maternal mortality in Nigeria), current management of PE/E, calculation of dosages, and monitoring and detection of toxicity of MgSO\(_4\). There was also a session on case management which gave practical examples of three different clinical scenarios involving patients that were managed for PE/E. Each session was interactive and exposed the participants to real life scenario learning. The practical segment took place on the 2\(^{nd}\) day of the workshop. Participants were grouped into their various schools. A subtle competition was encouraged among the participants by recognizing the best presentations. It consisted of ‘mock training’ by each participant in turn acting as the tutors while the rest of the participants acted as students. This practical training emphasized the application of multi-media facilities and the physical use of training kits needed for the management of PE/E which included syringes and needles, MgSO\(_4\) ampoules, sphygmomanometer, stethoscopes, urinalysis strips, patellar hammer, and ampoules of calcium gluconate. The teaching strengths and weaknesses of the NMT were identified and improved upon through the responses of all the participants and the trainers. The practical training was fun to the participants and aided improved participation and facilitated learning. The NMT also came up with a work plan on how they would implement what they had learnt and impart the knowledge and skills to their students. At the end of the 2-day training, a posttest
assessment was conducted to ascertain the impact of the training on the participants.

Following the training, all the NMT returned back to their schools and were expected to step-down the training to their fellow tutors and students using the updated knowledge on PE/E. Each school was given two copies of training manual on PE/E developed by PC to serve as reference material, both for the NMT and their students. A monitoring team from the PC, NMCN, and the obstetricians and midwives (who conducted the initial TOT) visited some of the schools 6 months after the TOT to evaluate the training. The monitoring team did not visit all the schools but chose a representative random sample of 29 nursing and midwifery schools, 13 from the North and 16 from the Southern regions of Nigeria. The monitoring team observed the number of step-down training that had been conducted by the NMT, and the number of tutors and students trained on the updated curriculum and assessed the performance of the students through direct interactions. The team also visited the training areas to assess the availability or otherwise of training kits that are essential for the preservice teaching of PE/E.

RESULTS

A total of 292 NMT were trained at the TOT from 171 schools of nursing and midwifery in Nigeria, out of which 84 NMT from 29 schools were randomly selected by the NMCN and followed up 6 months after the intervention. The posttest analysis showed improvement in knowledge and understanding among the tutors over the preintervention scores.

Table 1 shows the knowledge transmission among the tutors between the pre- and post-tests as a percent of correct responses at the TOT. Across all the 13 questions, the tutors were examined on, the percentage of correct responses increased significantly ($P < 0.01$) between the pre- and post-test. The overall median knowledge scores (25–75 percentile) of the NMT at the preintervention stage and at the postintervention stage were 8.0 (6.0–9.0) and 11.0 (10.0–12.0), respectively, over a maximum possible knowledge score of 13 [Figure 1]. The independent samples Mann–Whitney U-test confirmed a significant difference between the median knowledge scores between the pre- and post-tests. In addition, while very few NMT (2.4%) demonstrated knowledge of all the 13 issues under consideration at the pretest. At the posttest, however, the proportion increased significantly to about 14% ($P < 0.001$).

To be specific, while only over half (57.2%) of the tutors could define preeclampsia before the training, this rose to 88.9% after the training. Similarly, only 62.7% knew of the symptoms and signs of severe PE before the training as compared with 90.1% after the training. Knowledge on use of appropriate vasodilators for severe hypertension rose to 79.3% from a baseline of 36.6%, and while only 46.9% of the subjects could describe hypertensive disease in pregnancy at baseline, the percentage rose to 70.3% after the training. In the same vein, only 22.3% and 16.8%, respectively, knew the maintenance dose of MgSO$_4$ for treating severe PE/E and Calcium gluconate as an antidote for MgSO$_4$ toxicity. These rose to 76.3% and 82.6%, respectively, after the training.
For the follow-up assessment of schools, the results indicated that the trained NMT conducted 19 step-down training when they went back to their respective schools and trained 157 other tutors. Within 6 months of building the capacities of the tutors, a total of 2,382 nursing and midwifery students were taught on PE/E and the use of MgSO₄ in the appropriate subject areas. While, for example, the nursing students were taught through the family health topics, the midwifery students received their education during their complicated obstetric classes.

Tables 2 and 3 present the evaluation results of the monitoring visit 6 months after the TOT. The independent samples Mann–Whitney U-test of difference between two distributions show that there were no significant differences between schools in the Northern and Southern regions of Nigeria with respect to the number of tutors trained, the number of tutors teaching MgSO₄, the number of step-down trainings conducted by the NMT, the number of tutors trained in the step-down trainings, and the number of students eventually trained. The Fisher’s exact test also showed that there was no significant difference between the Northern and Southern regions in respect of nursing and midwifery schools where teaching was being conducted. The monitoring team was however not satisfied with the response of the students of one of the schools in North-Western Nigeria as the students did not demonstrate that they were adequately taught by their tutors following interaction with the monitoring team. Six schools (24.2%) did not have all the essential training kits on PE/E. The monitoring team gave a feedback to the managers of all the schools that were visited.

**DISCUSSION**

The year 2015 marks the time for nations to reflect on their efforts toward attaining the MDGs. From the findings of the most recent NDHS, Nigeria, will not achieve the 5th MDG, which targets the reduction of maternal mortality by 75% by the year 2015 from the 1990 baseline findings. According to the data on the trends in maternal mortality, the MMR baseline for Nigeria in 1990 was 1200/100,000 live births as compared to 560/100,000 in 2013, thus representing a 53% reduction. This figure is far off the 75% mark reduction anticipated. This intervention was conceived in response to the need for the country to accelerate deployment of innovative solutions to rapidly reduce maternal mortality. In order to reach as many practicing nurses and midwives within the shortest possible time, the institution of pre-service training of tutors appeared to be good a starting point. What this project set out to do was to ensure that midwives were armed with adequate knowledge and skills for management of PE/E at graduation from their respective schools. The preservice period presents an opportunity to mold the mind of the young midwives about to commence their practice with the necessary knowledge and skills to make them contribute effectively toward the reduction of maternal mortality in Nigeria.

PE/E were particularly targeted because of their high contribution to maternal mortality in Nigeria with reported figures ranging from 27.8% to 43.1%. Also, this intervention was executed with the knowledge that several other partners were working in tandem to reduce maternal mortality from other common causes of maternal mortality in Nigeria such as Pathfinder International which was working on postpartum hemorrhage and IPAS on unsafe abortion. In addition, there are several on-going safe motherhood programs being supported by the federal and state governments. As an example, the Federal Ministry of Health has been implementing the Midwife Service Scheme, which posts midwives to rural areas in all sections of Nigeria.
The TOT model was used to reach the pre-service midwives in this study. This modality saves cost and enables the transfer of knowledge to large groups of individuals. The initial training of 292 NMT led to the transfer of knowledge and skills to 2382 preservice nurses/midwives, from only 29 schools out of the 171 schools that were trained, just within 6 months of commencement. Its disadvantage, however, is that the step-down training have to be supervised through monitoring visits to ensure that the correct knowledge and skills are transferred to the final beneficiaries.

The pretest at the TOT showed that the NMT had a fairly high knowledge about PE/E considering the median knowledge score of 61.5%. This is expected of tutors who are actively teaching students. Thus, the statistically significant increase in the posttest scores suggested that despite the impressive baseline score, unmet need for correctly identifying PE still exists among the tutors. Even more important, however, where the practical skills that were taught at the TOT. These skills were guided by the scores noted at the pretest. Calculations of dosages, detection and treatment of toxicity of Magnesium sulphate had been reported as being difficult and confusing for nurses and midwives in practice, and this was clearly shown in the low scores on those items in the pretest. This was simplified when it was practically demonstrated using syringes and vials of MgSO$_4$. Indeed, some of the participants confessed that they were seeing MgSO$_4$ for the first time at the TOT. Other practical steps that were considered difficult such as monitoring for toxicity using deep tendon knee reflex and administration of calcium gluconate were all adequately covered at the TOT.

The monitoring visits were important to ensure that the knowledge transferred at the TOT reached the final targets, who were the preservice midwives. Interaction with the students in their classes showed that they were adequately taught. However, the students of one of the schools in the North-West of Nigeria did not respond appropriately to the queries of the monitoring team. This finding was reported to the school management during the postvisit feedback meeting. It was resolved that the students were to be taught properly and the tutor to pay careful attention to ensure that the correct knowledge was disseminated.

Unfortunately, about 25% of the schools did not have adequate training kits. This finding was also reported to the management of all the affected schools. It was expected the training kits would be provided by the various school managements in view of the importance of the practical training.

Having trained preservice midwives, it remains a challenge whether they will be allowed to utilize their knowledge in the management of PE/E. The World Health Organization and the Federal Ministry of Health of Nigeria now advocate that physicians should shift some tasks to nurses and midwives and from nurse/midwives to community health extension workers.[23] This recommendation is necessary to increase the availability of skilled health care providers at the primary level of care where the need is highest. This has also been recommended by other studies in Nigeria.[24,25] When physicians allow skilled midwives to perform some roles traditionally carried out by them, they will be freed to move on to other equally important tasks. It is anticipated that task shifting in the management of PE/E will help in the reduction of its contribution to maternal mortality.

The intervention had some limitations. Acquiring knowledge is not the same as utilizing it. Due to resource limitations, the preservice midwives could not be followed up to see if they will utilize the knowledge correctly while managing patients with PE/E and contribute to a reduction in maternal mortality. However, this is recommended as a focus for future studies. Similarly, the monitoring team could not visit all the schools whose tutors attended the TOT.

**CONCLUSION**

This program was targeted at preservice midwives. Their teachers were successfully trained on the current management of PE/E through a TOT intervention. The knowledge and skills were then transferred to the preservice midwives. It is anticipated that the well-trained midwife will manage patients with PE/E effectively, and this will result in the reduction of maternal mortality in Nigeria.

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Conflicts of interest
There are no conflicts of interest.

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