Managing pre–eclampsia and eclampsia in Dar es Salaam public health facilities: A focus on equipment, supplies, drugs and knowledge of healthcare workers

Luzango E. Maembe[1], Andrea B. Pembe [2]

[1]Department of obstetrics and Gynaecology, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

Correspondence to
Prof. Andrea B. Pembe
Department of obstetrics and Gynaecology
Muhimbili University of Health and Allied Sciences
P.O. Box 65001
Dar es salaam, Tanzania
andreapembe@yahoo.co.uk

Abstract

Introduction
Severe pre–eclampsia and eclampsia (PE/E) is associated with high maternal and neonatal morbidity and mortality. Early detection and treatment of pre–eclampsia may prevent progression to severe PE/E. When severe PE/E occurs, timely use of anticonvulsants and antihypertensives (as part of emergency obstetric and neonatal care) are needed to reduce morbidity and mortality. This study is aimed at assessing the capacity in managing PE/E in public health facilities in Dar–es–Salaam, Tanzania.

Methods
A descriptive cross–sectional study was conducted in selected public health facilities in Dar–es–Salaam city that offer reproductive and child services. The health facilities included four hospitals, three health centres and 23 dispensaries. A checklist was used to assess availability of equipment, supplies and drugs, and a structured questionnaire administered by an interviewer was used to assess healthcare workers' knowledge on risks, symptoms, and drugs used to manage for PE/E. The results are presented as proportions.

Results
Guidelines for management of PE/E were available in all hospitals and health centres while 39% of the dispensaries had no the guidelines. Functioning blood pressure machines and stethoscopes were available in all facilities but urine test strips for detecting protein in the urine were available in only one hospital (25%) and 9 (39%) dispensaries. Anticonvulsant drugs were available in all health facilities. Magnesium sulphate, the first–line recommended anticonvulsant, was available in only a quarter of the dispensaries. A quarter of the dispensaries had nifedipine or methyldopa available as antihypertensives, with availability for both drugs being 75% and 100% in the hospitals and health centres respectively. The antihypertensive hydralazine was available in 50%, 33% and 8% of the hospitals, health centres and dispensaries respectively. Calcium gluconate was available in one hospital and one health centre only.

Healthcare workers were knowledgeable regarding most risk factors, symptoms and drugs for treatment of hypertension and convulsions in PE/E. A higher proportion of doctors were knowledgeable of the risk factors, symptoms and drugs than the nurses and clinical officers. The majority of the healthcare workers mentioned magnesium sulphate as the drug for treatment of convulsions in PE/E.

Conclusions

There is insufficient screening and management of PE/E due to lack of equipment, supplies and drugs. Healthcare workers are relatively knowledgeable regarding risk factors, symptoms and drugs for managing PE/E. This calls for an increase in availability of equipment, supplies and drugs for managing women with PE/E. Healthcare workers need to receive ongoing education to sustain quality care for women with PE/E.

Key words: Pre-eclampsia; Eclampsia; Equipment and supplies; Drugs; Knowledge

Introduction

Pre-eclampsia clinically presents as hypertension and proteinuria during the second half of pregnancy. When seizures occur it is known as eclampsia. Some pregnant women do develop eclampsia without having high blood pressure or proteinuria or may develop it after delivery[1]. It has been reported that women in the extremes of reproductive age (<20 years and >35 years, primigravidas, twin pregnancy, obesity and those who have experienced pre-eclampsia in previous pregnancies have a higher chance of developing pre-eclampsia[2, 3]. Other risk factors are chronic hypertension, diabetes mellitus and renal disease[4].

Severe pre-eclampsia and eclampsia (PE/E) has high morbidity and mortality to the foetus and the mother [5, 6]. In the year 2002, over four million cases of PE/E were reported worldwide, of which 63,000 (1.6%) women died [6]. It is estimated that globally one out of seven maternal deaths is due to PE/E[5]. The risk of dying from eclampsia in low resource countries is higher compared to developed countries[6], the difference is accounted by timing and provision of appropriate treatment when an eclamptic fit occurs.

The incidence of severe PE/E in Tanzania is not known, but like many low resource countries PE/E contributes significantly to the maternal deaths. A small hospital-based study in Dar-es-Salaam indicated the incidence of eclampsia to be seven in every 1,000 deliveries[7], In Dar-es-Salaam, it has been reported that PE/E is among the top five causes of maternal deaths[8, 9]. Severe PE/E is associated with infarction and/or abruption of the placenta, which predisposes to preterm delivery, intrauterine growth restriction and intrauterine death[10]. Women with severe PE/E may develop cerebral vascular accidents and multiple organ failure leading to morbidity and mortality. The maternal case fatality rates of eclampsia in tertiary hospitals in Tanzania range from 5% to 8%[7, 11, 12]. The perinatal case fatality rate has been reported to be high[7].

Morbidity and mortality due to PE/E can be prevented by screening and treatment of women identified to have pre-eclampsia during antenatal care. The screening involves use of simple tools including blood pressure machines and stethoscopes to detect increasing blood pressure, and checking for protein in urine. Previous studies in Tanzania showed that there is inadequate screening for high blood pressure and protein in urine among pregnant mothers attending antenatal care[7, 13, 14] and some facilities lacked blood pressure machines and urine test strips[14, 15]. Lack of availability of blood pressure machines and urine test strips contributes to inadequate screening of women during antenatal care for pre-eclampsia.

Availability and utilization of anticonvulsant and antihypertensive drugs as part of emergency obstetric and neonatal care (EmONC) can reduce severe morbidity and mortality due to severe pre-eclampsia or eclampsia when they occur. Magnesium sulphate is an anticonvulsant recommended for preventing and controlling seizures in cases of severe PE/E; when not available, diazepam can be used[16]. It has been reported that receiving a loading dose of magnesium sulphate soon after the eclamptic convulsions reduces the incidence of recurrent fits[17]. High blood pressure is controlled by methyldopa and when it is very high (diastolic of ≥110 mmHg) then nifedipine or hydralazine can be used.

This study aimed at assessing the capacity in managing severe PE/E in public health facilities in Dar-es-Salaam, Tanzania. The study specifically assessed availability of guidelines, equipment, supplies, drugs and healthcare workers' knowledge of risks, symptoms and drugs for managing PE/E. This information is essential for policy makers and health planners to help improve the quality of maternal and neonatal health care.

Materials and methods

Study setting and design
Dar-es-Salaam is the largest business city in Tanzania. It has three municipals namely Kinondoni, Ilala and Temeke. The city has a total of 31 hospitals of which six are public; 27 health centres of which five are public; and 351 dispensaries out of which 96 are public. Out of the public health facilities, four hospitals, four health centres and 68 dispensaries offer reproductive and child health services. According to the Tanzanian Ministry of Health and Social Welfare (MoHSW) all facilities offering reproductive and child health services are supposed to screen for pre-eclampsia[18]. Women detected with pre-eclampsia in the dispensaries and health centres are given initial treatment and then referred to hospitals for further investigations and management. Those with severe PE/E are referred urgently to a hospital after receiving emergency treatment with anticonvulsants, preferably magnesium sulphate and a selected antihypertensive [18, 19]. However, some women may not be able to follow

emergency referral, therefore have to continue receiving treatment at the facility until are able to go[19].

A random sample of 25-30% of the health facilities in a district of an average size is adequate and feasible to represent a district health service situation[20, 21]. Out of 76 public health facilities offering reproductive and child health services, all four hospitals (100%), three health centres (75%) as well as 23 (34%) randomly selected dispensaries were included in the study.

Data collection

Data collection was conducted between September and December 2011. Delivery and record books were reviewed to determine the total number of deliveries, as well as women diagnosed with pre-eclampsia and eclampsia, in the past year. A checklist was used to assess the availability of guidelines, equipment and supplies for screening and treating PE/E in the health facilities. The guidelines were any edition of the emergency obstetric job aid, basic emergency obstetric and neonatal care or the national standard treatment guideline. Equipment included blood pressure (BP) machines, stethoscopes, urine test strips, urinary catheters, urinary bags and patellar hammer. Anticonvulsants included magnesium sulphate and diazepam. Antihypertensives included methyldopa, nifedipine and hydralazine. Calcium gluconate (an antidote for magnesium sulphate toxicity) was also included in the checklist. Expired drugs and non-functional equipment were recorded as unavailable on the day of the visit. A structured questionnaire was used to interview the healthcare workers on their knowledge on PE/E. Information collected included risk factors, symptoms of severe preeclampsia, drugs for treating high blood pressure and drugs for controlling and preventing fits.

Data analysis

Data entry was done using the EpiData version 3.1 then transferred to SPSS version 13 for analysis. Data cleaning was done by running frequencies and cross tabulations. The age of health workers and their working experience are presented as medians with a range while all other results are presented as proportions.

Ethical consideration

The study obtained ethical clearance from the Senate Research and Publication committee of Muhimbili University of Health and Allied Sciences. Permission to conduct the study was obtained from the Offices of the Executive Director of Muhimbili National Hospital, Regional and Municipal Medical Officer of Health, and the directors of the health facilities. Healthcare workers in the health facilities were consented prior to structured interviews being conducted in the study.

Results

During the preceding year, 90,054 deliveries took place in the selected study facilities; more than three-quarters (81%) of them occurred within the hospitals. The hospitals

had a higher proportion of deliveries with pre-eclampsia (3%) and eclampsia (0.01%) compared to the health centres and dispensaries, which had less than 1.3% and 0.001% for pre-eclampsia and eclampsia respectively (Table 1).

Table 1. Deliveries and cases of pre-eclampsia and eclampsia in the health facilities in a preceding year

Deliveries	Total	Level of facility					
		Hospitals		Health centres		Dispensaries	
		N	%	N	%	N	%
All deliveries	90,054	73,406		6,762		9,886	
Deliveries with preeclampsia	2,578	2,267	3	89	1.3	222	0.02
Deliveries with Eclampsia	758	748	0.01	0	0	10	0.001

Guidelines for management of PE/E were present in all hospitals and health centres, and were only available in two-thirds of the dispensaries. All the health facilities involved in the study had working BP machines and stethoscopes. Urine test strips for detecting proteinuria were available in one hospital (25%) and 9 (39%) dispensaries. A patellar hammer was available in one hospital only.

All health facilities had anticonvulsant drugs but magnesium sulphate was available in only a quarter of the dispensaries. Health centres had roughly the same availability of antihypertensive drugs as the hospitals, while the dispensaries lacked most of these drugs. Calcium gluconate was only available in one hospital and one health centre (Table 2).

Discussion
The health facilities possess adequate equipment for detection of high blood pressure but lack urine test strips for detection of proteinuria. Detecting high blood pressure is crucial but this must go hand by hand with detecting protein in the urine to confirm the presence of pre-eclampsia. Urine test

strips were not available in some health facilities. Lack of equipment for screening of PE/E has been reported in rural and urban Tanzania[13, 14, 22]. This calls for improvement in the availability of equipment and supplies for screening and managing women with PE/E in the country.

Table 2. Availability of equipments, supplies and drugs for management of preeclampsia/eclampsia in the health facilities

Items available	Hospitals (N=4)		H/C (N=3)		Dispensaries (N=23)		Total (N=30)	
	N	%	N	%	N	%	N	%
Equipment								
Guideline	4	100	3	100	14	61	21	70
BP machine	4	100	3	100	23	100	30	100
Stethoscope	4	100	3	100	23	100	30	100
Patellar hammer	1	25	0	0	0	0	1	3
Supplies								
Urine test strips	1	25	3	100	9	39	13	43
Urinary catheters	4	100	3	100	15	65	22	73
Urinary bags	4	100	3	100	23	100	30	100
Drugs								
Antihypertensives								
Methyldopa	3	75	3	100	6	26	12	40
Nifedipine	3	75	3	100	5	22	11	37
Hydralazine	2	50	1	33	2	9	5	17
Anticonvulsants								
$MgSO_4$	4	100	3	100	6	26	13	43
Diazepam	3	75	3	100	22	96	28	93
$MgSO_4$ Antidote								
Calcium gluconate	1	25	1	33	0	0	2	7

BP=Blood pressure   H/C=Health centre $MgSO_4$=Magnesium sulphate

Every health facility had at least one anticonvulsant (Magnesium sulphate or diazepam). Magnesium sulphate is the first line drug and is very effective[16], but it was available in only a quarter of the dispensaries. Lack of access to magnesium sulphate in dispensaries means women with severe PE/E cannot get the first dose until they reach a hospital. The delay in receiving magnesium sulphate can contribute to the poor outcome among these women. However, Lumbiganon, et al. [23] reported that despite the availability of magnesium sulphate, some women in Mexico and Thailand did not receive it because health workers had fears surrounding toxicity of the drug. Toxicity of magnesium sulphate is rare when used in normal doses. Detection of toxicity can be done by monitoring respiratory rate and by checking the deep tendon reflexes.

Table 3. Proportion of healthcare workers knowledgeable on risk factors, symptoms, and drugs for hypertension and convulsions

Characteristic	Nurses (N=84)		Clinical Officers (N=17)		Doctors (N=37)		Total (N=138)	
	N	%	N	%	N	%	N	%
Risk factors								
Primigravidity	72	86	12	70	34	91	118	86
Young age (<20 years)	32	38	6	35	23	62	61	44
Advanced age (≥35 years)	16	19	2	12	14	38	32	23
History of pre-/eclampsia	36	43	3	18	35	95	74	54
Multiple pregnancy	51	61	13	76	32	86	96	70
Other[a]	41	49	6	35	18	49	65	47
Symptoms								
Severe headache	75	89	14	82	36	97	125	91
Epigastric pain	48	57	7	41	34	92	89	64
Blurring of vision	64	76	10	59	35	95	109	79
Nausea/vomiting	4	4.7	0	0	13	35	17	12
Hypertensive drugs								
Methyldopa	84	100	15	88	37	100	136	99
Nifedipine	66	79	10	59	35	95	111	80
Hydralazine	18	21	1	5.8	21	57	40	29
Drugs for convulsions								
Magnesium sulphate	82	98	12	71	37	100	131	95
Diazepam	49	58	12	71	26	70	87	63

[a]Include chronic hypertension, change of partner and obesity

Monitoring urine output helps to identify women who are likely to get magnesium toxicity. In this study some health facilities had no urethral catheters or patellar hammers available on the day of the visit. This makes monitoring more difficult when magnesium sulphate is given for at least 24 hours in a facility (i.e. in hospitals, as well as some health centres and dispensaries when immediate referral is not possible). The situation is worse as only two facilities (one hospital and one health centre) had calcium gluconate which is the antidote for magnesium sulphate.

Methyldopa is an antihypertensive drug which is supposed to be available in all levels of care. In this study a quarter of the dispensary and one hospital had no methyldopa available. Nifedipine and hydralazine are fast acting antihypertensives and are category C drugs, hence are supposed to be available in the hospitals[24], yet were not available in some of the hospitals. Shortages of antihypertensives in health facilities in Tanzania have been reported previously[13, 14]. Lack of antihypertensive treatment to women with pre-eclampsia may impede early prevention of eclampsia and its complications. There is a need to underpin the importance of having the drugs available in all facilities to save the lives of women with PE/E.

High proportions of healthcare workers were knowledgeable of risks, symptoms and drugs for the treatment of hypertension and eclampsia. Overall doctors were more knowledgeable than nurses and clinical officers. Knowledge of symptoms and drugs for treatment is essential as most healthcare workers are able to identify women with PE/E and offer appropriate treatment. This reflects that healthcare workers can identify women with preeclampsia and also follow up those at risk. Okonofua, et al. [25] demonstrated that with training of the health care workers in Nigeria, the case fatality rate due to eclampsia can be reduced. Training of health workers can be employed in our set up to continually improve their decision-making when attending women with PE/E.

This study has some limitations. First, we focused mainly on the presence or absence of functional equipment and supplies for screening and managing PE/E, however we did not explore procurement, stock-outs and the causes of poor availability for equipment and supplies. Secondly, there is no validity study which has been conducted on the use of the

questionnaire to assess knowledge, although the questionnaire was based on the recommendations of the best practices. Lastly, the study did not look into the association between the outcome of severe PE/E and knowledge of health care providers or availability of equipment and supplies. Further studies are required to explore these issues in the setting.

Conclusion
There is insufficient screening and management of PE/E in the public health facilities in Dar-es-Salaam due to lack of certain equipment, supplies and drugs. The situation is more evident in health centres and dispensaries. Healthcare workers have relatively good knowledge to screen and manage women with PE/E. There is a need to improve availability of missing equipment, supplies and drugs to ensure smooth screening and treatment of women with PE/E. Reinforcing healthcare workers' knowledge through continuing education is crucial to ensure quality care of women with PE/E.

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