

Knowledge and practice of the prevention of mother-to-child transmission of HIV guidelines amongst doctors and nurses at Odi Hospital, Tshwane District

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Background: Almost 60 million people are infected with and 25 million people have already died from HIV/AIDS. Sub-Saharan Africa is the region most affected, with 67% of all people living with HIV and 91% of all new infections amongst children and 14 million children orphaned by HIV-related deaths. HIV can be transmitted from a pregnant mother to her child during pregnancy, birth or breastfeeding. In South Africa (SA) the mother-to-child HIV transmission (MTCT) rate is under 4% at 4 to 8 weeks after birth since implementation of the most recent national prevention of MTCT (PMTCT) programme.

Aim: This study sought to investigate the level of knowledge of nurses and doctors working at Odi Hospital in Tshwane, and whether they were putting the current PMTCT programme into practice.

Methods: A descriptive cross-sectional survey was undertaken using self-administered questionnaires developed from the current PMTCT guidelines.

Results: Of the 102 participants, 12 (12%) were doctors and 90 (88%) nurses, of whom 9 (9%) were male and 93 (91%) female. Mean knowledge percentage was 60.8% and mean practice percentage was 77%. Regarding knowledge, the question on HIV counselling and testing scored an average 93.1%, while that on doses of drugs used in the PMTCT guidelines scored 17.7%. For practice questions scores ranged from 71% to 82%.

Conclusion: Nurses and doctors working at Odi Hospital knew that HIV counselling and testing is important and must be done for all mothers; however, they were unsure of the dosages of drugs used for PMTCT. More than two-thirds of the doctors and nurses reported practising the PMTCT guidelines, but as their knowledge was inadequate their practice may not be appropriate.

Keywords: AIDS, Anti retroviral drugs, doctors and nurses, HIV, prevention of mother to child transmission

Introduction

Human immune deficiency virus (HIV)/acquired immune deficiency syndrome (AIDS) is a major public health problem globally, with more than 36.7 million people estimated to be living with HIV in 2015 — an increase from 33.6 million in 2013.¹ The sub-Saharan region of Africa has a disproportionately high number of persons infected with HIV.² The high infection rates are prevalent in both adults and children. In sub-Saharan Africa 260 000 children contracted HIV in 2013, with more than 90% of cases occurring through mother-to-child transmission (MTCT).

The trend of new childhood HIV infections has been declining worldwide, with 150 000 children newly infected with HIV in 2015, a marked drop from 290 000 in 2010.¹ Rates of MTCT have in the past been reported to be as high as 8–9%, mainly in the underdeveloped countries.¹ Concerted efforts at reducing MTCT have resulted in rates below 1% in resource-rich countries. However, this has not been realised in many resource-limited countries due to multiple challenges, which include competing health priorities and limited human and financial resources.³ It is also evident that many countries failed to achieve the two important related Millennium Development Goals (MDGs), namely to reduce child mortality and to combat HIV/AIDS, malaria and other diseases by 2015.⁴ These priorities have been included in the Sustainable Development Goals (SDGs), with similar targets to be achieved by 2030.⁵

There have been changes in the prevention of mother-to-child transmission (PMTCT) guidelines in South Africa (SA) in order to ensure the attainment of these SDG goals. The PMTCT guidelines published by the National Department of Health and South African National AIDS Council in 2010 address the key modalities of HIV

transmission from mother to child during pregnancy, the birth process, or through breastfeeding.⁶ According to the guidelines, prevention of transmission of HIV from mother to child has four elements: primary prevention of HIV amongst women of child-bearing age; preventing unintended pregnancies amongst women living with HIV; preventing HIV transmission from a woman living with HIV to her infant; and providing appropriate treatment, care and support to women living with HIV, their children and families.

Several studies have shown that the use of antiretrovirals (ARVs) for PMTCT have significantly reduced perinatal HIV transmission if well implemented.^{7,8} In SA between 2008 and 2011 the estimated proportion of HIV-exposed infants younger than 2 months who underwent routine tests to detect early HIV transmission increased from 36.6% to 70.4%.⁹ The estimated HIV transmission rate decreased from 9.6% to 2.8%.⁹

To implement the PMTCT programme effectively and combat MTCT it is necessary for healthcare professionals to have adequate knowledge of and comply with the implementation of the guidelines. The practice and attitude of these health workers will depend on how much of this knowledge they have and how often they update their knowledge. Reports from rural India indicate that there is willingness by healthcare providers to care for patients with HIV, but this is hampered by concerns regarding ability to provide such care due to resource constraints.¹⁰

It has also been demonstrated that health education interventions and social systems have positively influenced the behaviour of HIV-infected pregnant women towards PMTCT, and implementation of the PMTCT programme, and the comprehensive

HIV/AIDS management and treatment plan has made some progress towards alleviating the burden of paediatric HIV in SA.^{11,12}

Odi Hospital is a 197-bed district hospital situated north of Tshwane in Gauteng Province and serves a population of 524 000 people. The hospital provides comprehensive obstetric and child health services on an outpatient and inpatient basis. The prevalence of HIV amongst antenatal women in the region has been reported to be 24.4%.¹³ The MTCT rate amongst users of Odi Hospital is reported to be 1.84%,¹⁴ and the reasons for this high rate of MTCT have not been established.

The aim of our study was to assess the knowledge and practice of doctors and nurses in Odi Hospital regarding the PMTCT programme, with a view to improving performance through targeted interventions.

Research methods and design

A descriptive cross-sectional study was conducted amongst doctors and nurses working at Odi Hospital. All 31 doctors and 180 professional nurses working in the hospital were included in the study, as they all work in the obstetric unit on a rotational basis.

Data were collected using a self-administered questionnaire written in English. The questionnaire was developed from the South African PMTCT guidelines and piloted in another district hospital in the same region. The questions covered pre-test counselling, HIV testing, the various regimens recommended in the national PMTCT guidelines, the doses of the medications, and the indications for initiating ARVs. A biostatistician and an expert in HIV medicine were consulted in drawing up the questionnaire. Informed consent was obtained from each participant. Anonymity and confidentiality were maintained by ensuring that participants' names, addresses or duty posts were not reflected on the questionnaires.

Data were captured by a trained data clerk onto an Excel® spreadsheet (Microsoft Corp, Redmond, WA, USA) and verification was carried out by the statistician. Descriptive data analysis was done by the statistician using the statistical package program SAS®, release 9.2 (SAS Institute, Cary, NC, USA). The demographic profiles of the doctors and nurses were summarised descriptively. Knowledge and practice of the PMTCT programme was assessed per respondent by counting the number of correct answers to the questions regarding knowledge and practices separately and expressing these as a percentage of the total number of questions. A regression analysis was performed with gender, profession, additional qualifications, and years of practice as predictor variables for knowledge of PMTCT.

Permission to conduct the study was obtained from the Chief Executive Officer of Odi Hospital, Tshwane. Ethical clearance was obtained from the MEDUNSA research and ethics committee (MREC), project number MREC/M/162/2013: PG.

Results

Of the 211 questionnaires sent out, 124 were completed and returned (58.8% response rate) (Table 1).

The majority of participants (80.6%) were nurses, and 41% of these were recorded as professional nurses. There were more female (86.3%) than male respondents, while 32% of the respondents had post-basic qualifications (master's degree, diploma and certificates in various fields). The mean duration of practice for all participants was 12.7 (± 7.21) years (Table 2).

Table 1: Demographic characteristics of respondents

Characteristic	No.
Sex	
Male	17
Female	107
Total	124
Designation	
Doctor	24
Professional nurse	41
Enrolled nurse	43
Enrolled nursing assistant	16
Total	124
Basic qualification	
Bachelor's degree	26
Diploma	37
Tertiary certificate	48
School certificate	13
Total	124
Post-basic qualification	
Master's degree	2
Diploma	9
Certificate	2
Total	13
Years of clinical practice	
< 5	12
5-9	34
10-14	26
15-19	18
≥ 20	28
Total	118

Respondents had high levels of knowledge (94%) regarding HIV counselling and testing (HCT) as the first step in the PMTCT programme. They equally knew the criteria for initiation of antiretroviral therapy (ART) in all HIV-positive pregnant women and would not hesitate to initiate ART in patients. Conversely, combination and doses of medications were a challenge, as most participants did not have satisfactory knowledge of these (35% and 21% correct responses respectively). Doctors were more knowledgeable about HIV and PMTCT than nurses (mean scores 79% and 58% respectively).

The practices of PMTCT amongst doctors and nurses were noted to be satisfactory. When dealing with a pregnant woman who presents late, respondents exhibited a high level of awareness and willingness to offer them HCT/voluntary counselling and testing (VCT), as well as to treat those known to be HIV-positive as they progressed in their pregnancy. The approach to the newborn of an HIV-positive pregnant woman was fair amongst participants, as 71% took the correct steps (Table 3).

Profession and the mean years of practice (experience) amongst doctors and nurses were found to have a statistically significant ($p < 0.05$) association with knowledge about PMTCT. The mean knowledge of doctors (79.2%) was significantly higher than that of nurses (58.4%) ($p < 0.001$).

Table 2: Respondents' knowledge and practice of PMTCT programme

Attribute	Variable	Response	Number (n = 124)	Proportion (%)
Knowledge	Procedure	Correct initial procedural step	117	94.4
	Procedure	Correct subsequent procedural step	107	86.3
	Medication	Correct combination of medicines for PMTCT	43	34.7
	Medication	Correct dosages of medicine	26	21
	Medication	Correct indication for ARVs	102	82.3
Practice	Screening	Correctly performs HIV test	100	80.6
	Intervention	Correctly cares for pregnant woman presenting late	102	82.3
	Intervention	Correctly cares for HIV- negative pregnant woman	93	75
	Intervention	Correctly cares for HIV- exposed newborn	88	71

Table 3: Association between respondents' demographic characteristics and knowledge and practice of PMTCT

Factor	n (%)	Mean (±SD) of correct answers	t-test	p-value
Practice				
Males	17 (14%)	76.5 (±27.20)	0.027	0.979
Females	107 (86%)	76.6 (±24.10)		
Doctors	24 (19%)	75.0 (±30.40)	0.359	0.720
Nurses	100 (81%)	77.0 (±22.94)		
Knowledge				
Males	17 (14%)	63.5 (±19.02)	0.216	0.829
Females	107 (86%)	62.3 (±23.36)		
Doctors	24 (19%)	79.2 (±23.20)	0.001*	
Nurses	100 (81%)	58.4 (±22.83)		
Years of practice				
Males	15 (13%)	13.9 (±9.11)	0.701	0.484
Females	103 (87%)	12.5 (±6.91)		
Doctors	22 (19%)	9.7 (±8.79)	2.22	0.028*
Nurses	96 (81%)	13.41 (±6.66)		

A regression analysis was also performed with profession, additional qualifications and years of experience as predictor variables for practice of PMTCT. No other significant predictors

were found. The mean percentages of doctors and nurses who practised the PMTCT guidelines correctly (75.0% and 77.0% respectively) did not differ significantly ($p = 0.72$).

Discussion

There were 17 (14%) male and 107 (86%) female participants, amongst whom there were 24 (19%) doctors and 100 (81%) nurses. This is similar to the findings of a report on demographic characteristics of health professionals in the United States of America, which showed that about 95% of professional nurses were females.¹⁵ Some 32% of the study sample had an additional qualification, and the mean years of practice for all participants was 12.7 (±7.21).

In this study the mean knowledge scores for doctors and nurses were 79% and 58% respectively, which is in keeping with a study by Umeh *et al.* (2008), which concluded that healthcare workers (HCWs) knew PMTCT fairly well, with doctors having the highest mean knowledge score of 18.43 compared with nurses and laboratory scientists at 13.9 and 11.01 respectively.¹⁶

Respondents reported correct practices in the care of newborns of HIV-positive pregnant women, with 71% taking the correct steps. This agrees with Amoran *et al.* (2012), who studied home-based care practices of HCWs concerning HIV/AIDS patients and found that 70% practised the relevant aspects of home-based care for those with HIV/AIDS correctly.¹⁷

No significant differences were found between male and female respondents or doctors and nurses in terms of practising the PMTCT guidelines ($p = 0.0979$ and 0.0720 respectively). There was, however, a significant difference between the knowledge level of doctors and nurses ($p = 0.001$), as well as in the years of practice of doctors and nurses ($p = 0.028$). This corresponds with the findings of Nneka and Donna (2007) and Hentgen *et al.* (2002), who showed that doctors demonstrated a better knowledge of HIV/AIDS-related issues than nurses.^{18,19}

There was a significant difference in knowledge between the professions in terms of years of practice ($p = 0.028$). This is in agreement with Ndikom and Onibokin (2007), who showed a direct relationship between previous care of HIV-infected patients and better knowledge.²⁰ In total, 94% of all participants knew the first step of the PMTCT programme correctly to be HCT or VCT. Participants generally performed well on this aspect of knowledge of the PMTCT programme. In a 2006 study carried out on health workers, good knowledge of sexual intercourse amongst others as a route of transmission of HIV was demonstrated by participants.²¹ Similarly, Pokharel, Shrestha and Lama (2011) revealed that about 70% of stakeholders knew that unprotected sexual intercourse with an HIV-infected person could lead to transmission of the virus.²² In that study participants identified awareness of HIV status of pregnant women as an effective way of minimising MTCT, mostly because sexual intercourse as a mode of transmission and determining the HIV status of an individual are vital aspects of and practical steps in VCT. This can be compared with the study of Hentgen *et al.*, in which knowledge of important aspects of VCT was found to be poor.¹⁹

Knowledge of criteria for initiation of ART was good amongst the doctors and nurses in this study. It is important that HCWs know when to start ART for PMTCT purposes. The Drug Resource Enhancement against Malnutrition (DREAM) study showed MTCT of 1.2% amongst breastfed infants and 0.8% in formula-fed

infants when correct knowledge and practices are followed.²³ MTCT rates were 4.1% at six weeks and 5% at six months of age, if PMTCT is properly followed. In the index survey participants' responses were 86% correct. This may be due to the recent PMTCT guidelines, which provided for initiation of ART in all HIV-positive pregnant women, irrespective of their CD4 count. This is in keeping with 83% to 95% overall knowledge of PMTCT amongst HCWs according to Harms *et al.* (2005).²⁴

Miyani and McIntyre (2013), however, revealed otherwise in a study carried out in Soweto, in which HCWs had poor knowledge as well as practice of PMTCT.²⁵ A mean score of 5.15 (SD ± 1.85) was obtained for PMTCT knowledge amongst HCWs. Poor remuneration, increased workload and poor staffing were adverse factors challenging their work. Among stakeholders (health personnel and female health volunteers), 61% had poor knowledge of PMTCT, while 8% of the HCWs knew that postpartum administration of ARV medicine to a newborn reduces infection, and only 38% referred patients to a PMTCT facility.²²

Participants showed very poor knowledge of medication combinations and their doses, at 35% and 21% correct responses respectively. This may be due to the frequent changes in the national PMTCT guidelines. A 2007 study by Olges *et al.*²⁶ showed correct practices amongst HCWs in managing HIV-positive pregnant women coming for their first antenatal consultation; this is further seen in this study, in which 81% responded correctly by providing PMTCT intervention to HIV-positive pregnant women at their first antenatal consultation. A three-drug regimen which contains a non-nucleoside reverse transcriptase inhibitor or a protease inhibitor leads to a lower than 5% transmission rate at birth in poor countries and even less in rich countries. Shapiro *et al.* (2010) showed an overall transmission rate of 0.8% at birth amongst three treatment groups.²⁷ These rate reductions occur when the PMTCT guidelines are applied correctly. Arendt *et al.* (2007) revealed an MTCT rate of 1.4% at birth.²⁸

There have been previous studies that determined overall PMTCT knowledge. In rural India HCWs had poor knowledge of PMTCT and hence practised it incorrectly. Hentgen *et al.* (2002) carried out a study in Madagascar towards introducing a VCT programme, and found that the providers had poor knowledge to sustain it.¹⁹ In that study 73% of the HCWs were unaware of interventions to reduce MTCT of HIV, and therefore thought that transmission to the baby was certain. In our study the mean knowledge for doctors was 79% and for nurses was 58%; this may be due to the deficiency of additional qualifications as reported by participants. This agrees with the findings of Nneka and Hentgen *et al.* (2002), who showed that doctors were more knowledgeable than nurses concerning PMTCT.^{18,19}

The questionnaire addressed the practices amongst participants in an open-ended fashion, and aimed at getting the participants to apply their knowledge as per the national PMTCT guidelines. The aspects covered were scenarios that presented as dilemmas. The risk of MTCT of HIV varies between 15% and 45% with interventions in terms of PMTCT.²⁹ Maternal plasma viral load, breast milk viral load, and immunological and clinical status of the mother play a significant part in PMTCT. Jamieson *et al.* (2003) and Shaffer *et al.* (1999) have shown an association between MTCT and maternal viral load. Hence a good knowledge of this correlation will empower an HCW to take appropriate steps when attending to an HIV-positive woman during her first antenatal visit.^{30,31} Women who had a lower or undetectable viral

load (< 50 copies/ml) close to childbirth had lower transmission rates (0.09%) compared with those with higher viral load ranges (400–999 copies/ml), who had an MTCT rate of 2.6%.³²

In this study the participants scored fairly well (about 70%) in the scenarios involving pregnant women and their babies: 81% were aware of what to do during the first antenatal visit and 82% practised correctly when an unbooked pregnant woman delivers in their facility. They did not hesitate to offer HCT and start ART if the woman was HIV positive. Although this study did not address willingness to provide PMTCT intervention, the respondents demonstrated such willingness. This was not the case in a study by Msiri, Tadesse and Muula (2008), in which 37% of the respondents were not comfortable attending to an HIV-positive pregnant woman in labour.³³ A 2007 study by Olges *et al.*²⁶ showed correct practices amongst HCWs in managing HIV-positive pregnant women coming for their first antenatal consultation. Furthermore, in this study 81% responded correctly by providing PMTCT intervention to HIV-positive pregnant women at their first antenatal consultation.²⁶

This study showed that respondents had 71% correct responses on the management of newborns of HIV-positive women. However, available literature points to the contrary, where 73% of respondents thought that the newborns of HIV-infected women were already infected, and were unaware of risk-reduction measures.¹⁹ Considering the endemicity and public health implications of HIV in SA, every HCW should be knowledgeable regarding all the guidelines involving HIV/AIDS management. Hence in our study the performance should be 100%.

The relatively correct response in terms of the practices of PMTCT may be due to the high median years of practice (12). Even though 63% of the participants did not know the correct drug combinations and 79% did not know the correct doses, the ease of treatment provided by fixed-dose combinations may be one of the reasons for better practice scores amongst participants.

Conclusions

This study demonstrated the value of engaging the nursing fraternity as the front-line implementers of critical public health programmes such as the PMTCT, as their numbers are significantly higher than doctors'. The high levels of knowledge (94%) of the PMTCT programme and generally satisfactory implementation bear witness to the emphasis placed by the health ministry on the reduction of HIV to meet the SDGs. Furthermore, the need for sustained exposure and training of health professionals in HIV management is demonstrated by the findings that profession and the mean years of practice (experience) had a statistically significant ($p < 0.05$) association with the knowledge and practice of PMTCT.

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