ARTICLE

THE KNOWLEDGE OF NURSES ON THE MANAGEMENT OF MULTIDRUG RESISTANT TUBERCULOSIS AT PRIMARY HEALTHCARE FACILITIES: A PILOT STUDY

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ABSTRACT

The decentralisation of the multidrug-resistant tuberculosis (MDR TB) programme to primary healthcare (PH) facilities in an Eastern Cape health district was implemented to improve the effectiveness of MDR TB services. Nurses working in TB units play a key role in M DR TB management; therefore, they should be equipped with updated knowledge. This study assessed the knowledge of PH nurses working in TB units regarding MDR TB management. A quantitative, cross-sectional descriptive study was conducted: data were collected using a structured questionnaire. Non-probability sampling was applied in this study. A convenience sampling technique was used and 25 of the 42 facilities were selected. Two nurses from each facility were recruited, resulting in 50 questionnaires being distributed. A total of 32 respondents completed the questionnaires. Descriptive statistics were used to describe the data. The overall scores were high with a mean knowledge score of 61%. Thirty eight percent of the nurses had been trained in MDR TB and only 28% did not know how to use an N95 mask. However, knowledge gaps were identified in respect of the management of side effects of MDR TB medication. Although

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most respondents demonstrated an efficient level of knowledge of MDR TB management, knowledge gaps were identified and recommendations were offered to address these gaps.

Key Words: knowledge; multidrug resistant tuberculosis; nurses; primary healthcare; primary healthcare facilities

INTRODUCTION AND BACKGROUND

The incidence of Multidrug-Resistant Tuberculosis (MDR TB) is increasing globally (WHO 2012, 41) with South Africa ranking as having the fifth highest MDR TB burden in the world (Department of Health 2011). Despite the increase in the global MDR TB burden, especially relating to the management of MDR TB by nurses working in TB units in PH facilities, there are limited studies of their knowledge and training needs.

A study done in India by Kansal, Mahal, Behera and Sarin (2014, 33) indicated that the mean knowledge score for nurses on MDR TB was 31.54 out of 50 marks. Low scores were linked to aspects related to MDR TB. The study in Delhi indicated a knowledge score for nurses on MDR TB of 21.60 for 50 questions (Kansal et al. 2014, 279). These findings correlate with findings from a study done in Peru where knowledge gaps existed among healthcare workers on the consequences of inadequate treatment and MDR TB and frequency of follow-up procedures (Minnery et al. 2013, 3). Nurses in South Africa working in Tuberculosis (TB) units at Primary Healthcare (PH) facilities play a crucial role in providing treatment to communities. They are often the first or only contact for medical interventions. Due to skill shortages they are expected to manage MDR TB effectively in the absence of a medical doctor. According to Loveday et al. (2014, 4) staff rotation can influence the knowledge of nurses in TB units. This article focuses on assessing knowledge levels of nurses on MDR TB working at TB units in PH clinics in an Eastern Cape district.

The total number of laboratory diagnosed Multidrug-Resistant Tuberculosis (MDR TB) cases across all nine provinces in South Africa for 2012 was 14 161 (Ndjeko 2014). The second highest number (2 205) of laboratory diagnosed MDR TB were reported in the Eastern Cape, which is the context of this study. A third of all MDR TB patients diagnosed in 2011 did not receive treatment (Ndjeko 2014). The South African government is moving towards decentralised management of MDR TB from hospitals to Primary Healthcare (PH) facilities (Ndjeko 2014).

The number of patients visiting PH facilities have doubled and during 2012–2013, the total number of patients receiving care at the PH facilities amounted to over 3 million (Health Systems Trust 2013). Some of the existing challenges at national level for PH facilities include limited staff complements and the number of facilities has not increased significantly. Moreover, the increasing burden of disease caused

by HIV/AIDS and TB has fuelled the increase in patients seeking care. Studies conducted at other PH facilities in South Africa also indicate a shortage of nurses (Daviaud and Chopra 2008; Nyasulu et al. 2013, 235) and that expanding services without the needed increase in the available human resources and functional space, results in an increased workload at PH levels (Nyasulu et al 2013, 235). Furthermore, Nkosi et al. (2009, 412) illustrated that the scope of practice of nurses has broadened in recent years.

At the PH facilities, sessional doctors work at some of the facilities for a few hours a day once or twice a week. However, these doctors are usually booked for patients requiring chronic disease evaluation, not TB or MDR TB services. This doctor shortage was revealed by Nkosi et al. (2009, 412) that doctors work at more than one facility per day, seeing mostly patients with chronic diseases. Therefore, the nurses play a crucial role in the management of MDR TB, as the doctors are not always available to assist.

South Africa moved to nurse-initiated antiretroviral treatment at PH facilities in April 2010 due to the shortage of doctors (Health Systems Trust, 2012). As a result of the success of the nurse-initiated antiretroviral treatment, part of the decentralised management of MDR TB entails nurse-initiated MDR TB programmes. The ideal situation is to have nurses trained in the initiation and management of MDR TB programmes to assist communities. However, in practice, while awaiting the implementation of the nurse-initiated MDR TB programmes, nurses working in TB units in PH facilities are faced with the management of MDR TB patients in the absence of doctors. This study aims to explore the knowledge of these nurses who are expected to manage patients on MDR TB treatment in order to provide recommendations to improve the management of MDR TB in the PH setting.

STATEMENT OF THE RESEARCH PROBLEM

In 2012, the researcher, had received numerous queries from the nurses involved with the management of MDR TB patients at the PH facilities regarding the MDR TB medication regimes, management of side effects and counselling patients on adherence, as this was previously a hospital managed disease. Prior to the decentralisation of MDR TB, nurses only had to identify patients with MDR TB and refer them to an MDR TB hospital for care overseen by doctors (National Department of Health South Africa 2009). However, due to the growing threat of drug resistant TB and the insufficient number of hospitals and doctors to manage MDR TB patients, nurses working in TB units at PH facilities now have to provide care and medication to MDR TB patients. In addition, most of the PH facilities did not have a full time doctor available, resulting in nurses working in TB units, with limited MDR TB training, in the absence of support from a doctor.

As yet, no studies have been conducted with regard to nurses' levels of knowledge on MDR TB management at TB units in PH facilities. As the South

African government moves towards nurse-initiated treatment of MDR TB (National Department of Health South Africa 2011) it is imperative that existing knowledge gaps of these nurses about MDR TB be ascertained so that further training can be planned for nurses providing care in the PH setting. Capacitating nurses is essential if global initiatives such as the Sustainable Development Goals to halt and reverse incidence of TB by 2015 (WHO 2013; 2015) are to be successful.

AIM

The aim of this study was to assess knowledge levels of nurses working in TB units at PH facilities, on the management of MDR TB in an Eastern Cape health district, South Africa, and to enhance the management of MDR TB at PH facilities.

OBJECTIVES

The objectives of the study were to assess the knowledge of PH nurses working in TB units on MDR TB management in an Eastern Cape health district and to make recommendations for these PH nurses to enhance MDR TB management at PH facilities.

RESEARCH METHODOLOGY

A quantitative, cross-sectional descriptive design was used to give a detailed description of nurses' knowledge on the management of MDR TB in TB units of PH facilities. Employing the cross-sectional design allowed the researcher to collect data at a point in time with different study respondents (Brink, Van der Walt, and Van Rensburg 2012, 10) hence the data obtained from a sample of the nursing population was considered representative of what was happening at a specific point in time.

This study was conducted in TB units in urban PH facilities in an Eastern Cape health district in South Africa. The district is one of the most densely populated in the Eastern Cape province (Health Systems Trust 2013).

Population and sampling

The researcher obtained a list from the Department of Health of all the PH facilities with TB units in the specific district. There are 42 facilities in the district (N = 42). As the distances between these facilities are considerable, the researcher selected 25 accessible facilities (n = 25) to include in the study. Convenience sampling is also known as "accidental sampling" and respondents are usually those that are nearest and most easily available (De Vos et al, 2011, 232) and is also used with limited resources (Cottrell and McKenzie, 2011, 132). In this study convenience sampling was used due to the researcher's lack of resources, budget constraints and limited

scope of the study and so chose facilities that were easy to access and focused on those which were nearest, most easily accessible and approachable for the researcher.

The focus of this study was on registered nurses as they are involved in the management of conditions at PH level especially the management of TB and/or MDR TB in TB units with no TB trained nurse and/or doctor. The inclusion criteria included a minimum of 1-year experience working in a TB unit at a PH facility. As there are typically two professional nurses in the TB unit at a PH facility, 50 respondents made up the accessible sample. All the nurses working at the selected TB units at the PH facilities, who were available and willing to participate in the research, were included in the sample. Ultimately, 32 respondents completed the questionnaire and were included in this study. The researcher continued with the study despite the small sample as it is a reflection of the nurse shortages in TB units in the PH context. The intention was to address the need nurses voiced for guidance in the management of MDR TB.

Data gathering

A self-designed, structured questionnaire based on an intensive literature review was used for data collection. The questionnaire consisted of three sections. Section 1 obtained biographical data from the respondents. Section 2 consisted of information regarding training that the respondents had received. Section 3 consisted of scale questions to obtain information regarding the knowledge of the respondents.

Validity

A pre-test of the questionnaire ensured validity and reliability of the research instrument. The pre-test was conducted with four nurses, involved with MDR TB treatment, at two TB units of PH facilities prior to data collection. The PH facilities selected for the pre-test were not included in the final study. Most of the recommended changes were related to minor grammatical aspects. The open-ended question “Do you think the training has prepared you for your job?” was found to be vague and was changed to be more specific and closed-ended. The pre-test enabled the researcher to make the necessary changes to the questionnaire as well as determine the amount of time required to complete it. The data were collected between August and October 2013 by means of a respondent administered structured questionnaire.

In addition, field experts and the supervisor reviewed the instrument for content validity as well as to determine the minimum score which respondents should obtain. This was termed the competency indicator and was set at 50%. Feedback received from the field experts and the pre-test assisted the researcher in finalising the instrument to ensure it was relevant to the objectives and understandable by respondents.

Respondents were informed by the researcher about the study and given the option to voluntarily decide if they wanted to participate. They were made aware that they will give informed consent by completing the questionnaire.

Ethical aspects

The study received ethical clearance from the Higher Degrees Committee of the Department of Health Studies, University of South Africa (HSHDC/192/2013) as well as the Eastern Cape Department of Health and the District Manager of the district. The ethical principles of respect for autonomy, justice, beneficence and non-maleficence were applied to this study. To ensure confidentiality and anonymity, no name or any form of identity was required on the questionnaire. All respondents received full disclosure of information regarding the nature of the study and its purpose. The voluntary completion of the questionnaires implied that informed consent was obtained from respondents. The potential benefits involved recommendations to enhance the knowledge on MDR TB of nurses working in TB units of PH facilities. The data were protected by the researcher who will keep it under lock and key at a predetermined location for five years after the study was completed.

DATA ANALYSIS

The questionnaire was pre-coded with codes designated before data were collected. The coded data were then entered onto an Excel spread sheet to create a data set; the researcher verified the data by checking for wild codes. Polit and Beck (2012, 463–473) describe wild codes as codes that are not possible and not part of the coding system. This were exported for analysis to a statistical package; the SPSS version 23.0 software, and analysed by a statistician. Descriptive statistics were used to analyse the data.

FINDINGS

The findings will be discussed in terms of response rate; biographic data; training received; perception of knowledge; comparison of years of experience in TB units with perceived knowledge of managing patients; knowledge of MDR-TB.

Response rate

Fifty questionnaires were handed out to the nurses at the TB units in the participating facilities and 32 questionnaires were completed and returned, giving a response rate of 64%.

Demographics

There were more female (n = 30; 93.8%) than male respondents and all the respondents were professional nurses. Half of the respondents (n = 16; 50%) were qualified within the last 10 years. However, the majority of the respondents had less than three years' experience in the TB unit (n = 23; 71.9%).

Training received

A marginal number of respondents (n = 12; 38%) had been trained on MDR TB in comparison to 91% (n = 29) of respondents who had been trained on HIV/AIDS. Only five respondents (n = 5; 16%) had received information regarding the decentralisation of MDR TB. Attendance at any continuing education programmes was poor with only eight respondents (n = 8; 25%) taking part in such programmes. Only seven (n = 7; 22%) of the respondents had weekly meetings to discuss the MDR TB programme. When asked whether training on MDR TB was offered with regard to current information, updates and guidelines, 78% (n = 25; 78%) of the respondents responded in the negative.

Perception of knowledge

The respondent's responses to whether the training they had received was adequate for managing patients with MDR TB are summarised in Table 1.

Table 1: Respondents' rating of their knowledge to manage patients with MDR TB (n = 32)

KNOWLEDGE	ADEQUATE		NOT ADEQUATE	
	f	%	F	%
1. Providing MDR TB medication	13	41	19	59
2. Monitoring side effects of treatment	8	25	24	75
3. Screening contacts	24	75	8	25
4. Sputum collection	25	78	7	22
5. Infection control	23	72	9	28

The respondents' knowledge rating ranged from 25% (n = 8; 25%) for monitoring of side effects of treatment to 78% (n = 25; 78%) for sputum collection, rating their knowledge as adequate. A large number of respondents (n = 24; 75% and n = 25; 78%) had received adequate training on screening contacts for MDR TB and sputum collection respectively. More than half (n = 23; 72% and n = 21; 66%) of the respondents indicated that they had been given adequate training as regards infection control and educating patients on MDR TB and adherence respectively. Knowledge gaps reflected that 41% (n = 13; 41%) of respondents had limited knowledge on providing MDR TB medication and 25% (n = 8; 25%) of respondents on monitoring side effects of treatment. A high number of respondents did not know the side effect profile of MDR TB drugs that caused depression (n = 26; 81%), psychosis (n = 25; 78%) and hearing loss (n = 16; 50%).

Comparison of years of experience in TB unit with perceived knowledge of managing patients

In order to compare the experience of nurses in the TB unit with their perceived knowledge, chi-square tests were performed. Respondents were categorised into two groups based on their experience: 1 to 3 years and 4 or more years. The results are shown in Table 2. In the table n1 represents the number of respondents with 1-3 years' experience and n2 represents the number of respondents with 4 and more years' experience.

Table 2: Comparison of years' experience in TB unit with perceived adequate knowledge

ADEQUATE KNOWLEDGE	**EXPERIENCE IN TB UNIT**				**CHI SQUARE**	**P (df = 1)**
	1-3 YEARS (n1 = 23)		**4+ YEARS (n2 = 9)**			
Providing MDR TB medication	7	30%	6	67%	2.86	.091
Monitoring side effects of treatment	6	26%	2	22%	0.05	.831
Screening contacts	17	74%	7	78%	0.05	.831
Sputum collection	18	78%	7	78%	0.20	.654
Infection control	15	65%	8	89%	0.56	.455

For all of the questions, there was no statistical difference between the groups 1-3 years and >4 years. Nevertheless, a trend emerges: the more experienced the group the more they rate their knowledge as being adequate. Given the differences between the experiences of the two groups for most of the knowledge items, the reason that there were no statistically significant differences is the small sample size that was used in the study.

Knowledge on Multidrug Resistant Tuberculosis

Almost all the respondents were knowledgeable about the cause of MDR TB correctly attributing it to organisms resistant to Rifampicin and Isoniazid (n = 27; 84%). The study revealed that a large number of the respondents (n = 23; 72%) indicated that they did not have adequate knowledge on how taking Isoniazid Preventative Therapy (IPT) could prevent MDR TB in adults. There was a general agreement with regard to the symptoms of MDR TB with the majority of respondents (n = 25; 78%) correctly identifying the symptoms. The majority of respondents (n = 29, 91%) had knowledge on how to prevent nosocomial infections. More than half of the respondents (n = 22; 69%) did not have adequate knowledge on how to manage symptomatic contacts of MDR TB while half of the respondents (n = 16; 50%) did not have adequate knowledge on how to manage asymptomatic contacts of MDR TB.

Table 3: Frequency distributions for questions on "Do you have adequate knowledge of the following?" (n = 32)

ADEQUATE KNOWLEDGE	AGREE		DISAGREE		MEAN	SD
	F	%	F	%		
Causes of MDR TB: By an organism resistant to Rifampicin and Isoniazid	27	84	5	16	1.97	0.59
Prevention of MDR TB: Take Isoniazid preventative therapy (IPT) in adults	9	28	23	72	2.97	0.74
Symptoms of MDR TB: Cough, Chest pain, Systemic symptoms (e.g. fever, chills, night sweats)	25	78	7	22	2.06	0.62
How to manage the asymptomatic contacts of MDR-TB patients	16	50	16	50	2.44	0.62
Managing symptomatic contacts of MDR-TB patients	10	31	22	69	2.66	0.55
Measures to prevent nosocomial infection	29	91	3	9	2.06	0.50
How to use an N95 mask	23	72	9	28	2.22	0.55

Respondents met the competency level of 50% to 19 (75%) of questions in the questionnaire. However, there are areas of MDR TB that require training and capacitating, such as side effects of MDR TB treatment.

DISCUSSION

The objectives of this study were to determine the knowledge of nurses working in TB units in PH facilities and who are responsible for MDR TB management, and to enhance the knowledge of these nurses through recommendations based on the findings of the research. The demographic profile of this study indicated that there were more female than male respondents. This is in keeping with the general trend in nursing in which the number of male nurses is approximately one tenth that of female nurses (South African Nursing Council 2013). In this study, the majority of the respondents had worked in the TB unit for less than three years. This could be attributed to numerous factors, including the increase in TB infection rates observed globally and nationally as well as the shortage of healthcare professionals at the PH facilities. As a result, there is a high turnover of nurses who are required to attend to TB services. This shortage of nurses at PH facilities was also reported by Daviaud and Chopra (2008, 48) and Nkosi et al. (2009, 412).

Table 4: Training received on HIV/AIDS, MDR TB and decentralisation programme (n = 35)

	Yes		**No**	
	Frequency	**Per cent**	**Frequency**	**Per cent**
HIV/AIDS	31	89%	4	11%
MDR TB	12	34%	23	66%
Decentralisation of MDR TB	5	14%	30	86%

Table 4 indicates that less than half of the respondents (n = 12; 34%) had received training on MDR TB while even fewer respondents (n = 5; 14%) had received training on the decentralized programme. In comparison, 89% (n = 31; 89%) of respondents had received training on HIV/AIDS. This might be the situation because previously MDR TB was managed only at TB hospitals (Cox and Ford, 2013, 654), while HIV services at PH facilities have rapidly expanded (Nyasula et al., 2013, 235). The effects of a lack of training will result in nurses not receiving current information on the management of MDR TB and the processes involved in the decentralisation of MDR TB patients. There should be a greater emphasis on training the nurses working in TB units at PH facilities about the management of MDR TB and the decentralisation programme. In addition, there should be integration of MDR

TB training into HIV/AIDS training by the district training coordinators and non-governmental organisations (NGOs) supporting HIV/AIDS and TB training in the district. This will ensure greater coverage and distribution of MDR TB material.

This study highlighted the need for training regarding Isoniazid Prophylaxis Therapy (IPT) as 72% (n = 23; 72%) of respondents indicated in Table 3 that they did not have adequate knowledge on IPT and the prevention of MDR TB in adults. The danger of giving IPT to adult patients to prevent MDR TB is that it will not be effective. With MDR TB, there is resistance to Isoniazid and Rifampicin; issuing IPT will increase the possibility of the patient contracting Isoniazid-induced hepatitis as seen in a study conducted by Smieja et al. (2000, e71201).

However, approximately a third of the respondents (n = 9; 28%) did not have adequate knowledge on how to use an N95 mask. One of the dangers of not using an N95 mask correctly is that the nurse may contract TB or MDR TB (Engelbrecht and Van Rensburg 2013, 221; Woith, Volchenkov, and Larson 2010, 1489).

The results yield a good average score for all the knowledge questions (61%). The area that obtained less than 50%, which was the competency indicator level set, was that of "side effects of MDR TB medication" with an average score of 40%. The average score for "diagnosis of MDR TB" was 59%. Multidrug Resistant TB treatment spans 18–24 months and there is a high risk of side effects occurring. Side effects must be detected at the earliest opportunity to prevent non-adherence and default in treatment as this could result in totally drug-resistant strains of TB, increasing patient mortality.

RECOMMENDATIONS

Recommendations of this study are: Nursing practice around MDR TB management could be improved as follows:

- Limited knowledge on the side effects of MDR TB medication. It is recommended that the availability of reference guides on the side effects of MDR TB medication be improved at the TB units of PH facilities and that pharmacists make these reference guides available to facilities on a quarterly basis. The MDR TB guidelines should incorporate the side effects of the medication.
- Improve the sputum collection procedures of nurses through distributing the national policy guidelines for sputum collection at the PH facilities. This may be achieved through posters being placed in the facilities. Nurses can be trained in employing innovative procedures such as drinking of warm water by the patient prior to production of sputum.
- Distribution of the national MDR TB guidelines to all PH facilities and increasing their applicability by provision of posters or pamphlets for nurses to enhance their knowledge and address knowledge gaps.

Training of nurses working in TB units at PH facilities:

- Training can be provided by medical practitioners or TB specialists to improve their knowledge on the management of these patients, contacts and referral pathways.
- Training can be provided by the district TB coordinators on the process of decentralisation of MDR TB in the district to equip these PH nurses with the operational procedures involved.
- Education and training related to MDR TB can be enhanced by:
- conducting regular in-service training on the management of MDR TB once a quarter for nurses working in the TB units of PH facilities; ensuring nurses are kept abreast of the latest recommendations and to enhance their knowledge on MDR TB management. Prioritise the following key areas MDR TB medication and side effects, managing symptomatic and asymptomatic contacts and infection control methods, for example, use of N95 masks. These can be developed and presented by TB experts in the district; TB programmes in the Department of Health might be facilitated twice a year to improve knowledge and skills of MDR TB of nurses working in the PH setting;
- training to improve the knowledge of nurses working in TB units on MDR TB guidelines could be conducted every three months utilising the National Department of Health's guideline on Management of Drug resistant tuberculosis and the National Department of Health's Decentralisation of MDR TB policy guidelines and Infection Control. The training could be conducted by the Department of Health training centre as well as by the NGOs giving support to the district;
- training nurses working in TB units, once every quarter on "GeneXpert" diagnosis by medical practitioners or TB experts.

Recommendations to improve research were as follows:

- Efforts should go towards further research to improve the management of patients with MDR TB by healthcare workers such as doctors, nurses and pharmacists, either by using the same study or designing a similar study but involving other multi-disciplinary team members.
- Further research should also be conducted with patients as the study group to evaluate the patients' understanding of MDR TB, the causes, prevention and treatment.

CONCLUSION

This study showed that the nurses working in the TB unit at primary healthcare facilities in an Eastern Cape district had adequate levels of knowledge regarding areas of MDR TB management. The findings and recommendations could serve to further improve the knowledge of nurses and healthcare providers regarding the management of MDR TB, resulting in improving the management of patients diagnosed with this disease. This may increase the wide implementation of MDR TB management at PH facilities.

LIMITATIONS OF THE STUDY

The study focused on PH facilities in one district in the Eastern Cape, therefore the findings cannot be generalised to other areas. A further limitation was the small sample size. One of the reasons for this small number could be the shortage of nurses at PH facilities and the extra workload experienced by these nurses hindering them from completing the questionnaire. The results were valuable as areas for knowledge improvement were identified and awareness was created for these nurses about their knowledge levels.

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