Assessing Eye Health Knowledge and Practices Amongst Primary Health Care Nurses in The Alfred Nzo District (Eastern Cape Province), South Africa.

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Abstract

Visual impairment is a public health problem, globally. Effective management lies in adequate health policies and adequately nurses at primary health care (PHC) level. Eye health knowledge and practices were assessed amongst PHC workers in the Alfred Nzo district (Eastern Cape Province), South Africa. A cross-sectional study was done, where participants were selected using stratified random sampling, from various PHC facilities in the province. Quantitative data were collected using a PI assisted Likert scale tool from 200 anonymous respondents. A majority of 187 (93.5%) reported that they had never had any eye care training and did not know any eye health policies to refer to for triage. Poor scores were obtained for identifying common eye care conditions. Only 28% were able to identify a mature cataract, the leading cause of preventable blindness in SSA. PHC nurses showed poor knowledge and practices of eye health, due to inadequate eye health policies.

Keywords

Primary health care, Primary eye care, Nurses, Eye health, Primary health clinics.

Introduction

Visual Impairment (VI) remains a major public health concern that continues to rise (1). Globally, an estimated 596 million people have reduced vision at a distance, while more than 500 million suffer from uncorrected near vision (2). According to the World Health Organisation, 80% of all VI are preventable, while 90% are found in low-to-middle income countries (LMIC) (3). It is further estimated that 76% of moderate and severe VI cases in southern Sub-Saharan Africa (SSA) are caused by cataract and uncorrected refractive error (URE) (3, 4). Of further concern are the dire socio-economic consequences of VI suffered by the affected individuals (5).

Primary eye care (PEC) is one of the pillars of primary health care (PHC) as recommended by the WHO (6). PEC involves eye health promotion, treatment of simple eye diseases, and identification and prompt treatment of persons needing eye care (6); all areas that are pivotal in preventing blindness and VI. Poor and rural populations bear the burden of VI and its consequences as resources are skewed against these communities (4). Amongst other challenges, poor access to clinics with eye health services, weak infrastructure, and a shortage of human resources amplify the burden of VI in LMIC (7-10). Blanchet *et al* emphasise that poor integration of eye health services into the health systems and scarcity of eye health policies in LMICs have a negative contribution towards achieving the Vision2020 goals (11).

In South Africa's district health system (DHS), the majority of patients needing PEC initially present themselves at PHC centres (12). The level of care provided has been described as inadequate in relation to community needs, and inferior to the standard prescribed by the National Department of Health (NDoH) (13), (14). As PHC workers are the first point of contact with patients, they are tasked with providing PEC to the communities in which they are based. To adequately deliver PEC services, PHC providers are tasked with the responsibility of identifying, managing and referring patients accordingly and timeously (6). There is a dearth of evidence evaluating their knowledge and practices in basic eye care services in the rural areas of SSA countries such as South Africa (15). This study aimed to assess PHC nurses' knowledge and practices in PEC in order to evaluate how eye patients are being managed in PHCC within the district.

Methods

Following ethical clearance by the Biomedical Research Ethics Committee (BREC/00000663/2019) at the University of KwaZulu-Natal in May 2020, and gatekeeper permission by the Eastern Cape Department of Health (DoH), data collection was delayed by the national lockdown imposed by the COVID-19 pandemic. When restrictions were lifted, re-certification was obtained, and data collected from February to June 2021.

Alfred Nzo District Municipality (AND) is the smallest of eight districts in the Eastern Cape province of South Africa. With 867 864 inhabitants (12.2% of the province's population) (16), AND is one of the most densely populated districts in the province, with a density of 81 people/ km² (16). AND is also the most impoverished, rural, and underdeveloped district in the province, with a high unemployment rate (17). The district has four local municipalities, with 74 PHC clinics. To contrast, this is a higher density than the neighbouring Umkhanyakude District, which is also rural and comparable to AND, with 625 846 inhabitants, and a density of 49 people/ km² (18).

A cross-sectional study was conducted in 28 randomly selected PHCCs within the AND. A sample size was calculated using the single population proportion formula (19), where significance was at the 95% confidence level and 5% degree of precision. A figure of 50% was used for the expected knowledge base. District office registers, reporting on staff numbers and clinic contact details, were obtained from the AND office to ascertain a population size. These were approximately ten years old and confirmed a nursing workforce of 935 nurses in the PHCC within the district. There was no available updated version that accounted for deaths, retirements, and resignations from the department. To establish a more accurate sample size, the Principal Investigator (PI) telephonically communicated with the heads of each clinic, making appointments in advance to visit them for stakeholder engagement in preparation for data collection. On arrival at the clinics, it was apparent that the actual staffing was approximately 50% of that which had been anticipated according to the registers. As such, the population (N) was adjusted to 50% of 935 where N = 466.

Using the single population proportion formula, the minimum sample size calculation used was:

$$n = \frac{\frac{Z^2 p(1-p)}{d^2}}{1 + \frac{Z^2 p(1-p)}{Nd^2}}$$

$$n = 211$$

z (for a confidence level of 95%, standard normal distribution) = 1,96

d (acceptable/ tolerated margin of error of 5%) = 0,05

p (if no prevalence/prior study the proportion is set at 50%) = 0,50

N (population size) = 466

The recommended sample size was calculated, and a 5% error margin was further added to the sample size to produce a required minimum sample size (n) of 211.

Stratified random sampling was applied across the district to ensure even representation of the various municipalities. Proportioning of participants was applied to match the distribution of clinics in the various municipalities. Participant numbers were 35% from Mbizana, 15% from Ntabankulu, 35% from Mzimvubu and the remaining 15% from Matatiele (15%).

The Principal Investigator (PI) telephonically communicated with the heads of each clinic, making appointments in advance to visit them for data collection purposes. Only the consenting PHC staff were enrolled in the study. Factors such as absenteeism, leave, illness, retirement, deceased employees, transfers away from the district, promotions, unfilled vacant posts, and the like were reasons given by clinic supervisors for actual staffing numbers being approximately 60% of that which had been anticipated according to the registers. Furthermore, some PHC did not participate citing the high number of patients that were still waiting for their services. The final number of participants who were enrolled in the study was 200.

A comprehensive questionnaire was designed and piloted in another province where input for improvement was given. After modification, the PI finalised the tool for use in the study. Due to poor internet connectivity issues, hard copies of the researcher-administered data collection tool were used. The tool was divided into three sections: Part 1 - demographic data; Parts 2 & 3 - knowledge of different eye health professions and identification of common eye conditions using coloured pictures and brief descriptions of defining symptoms, and Part 4 focused on practices and task observation of the participants by the PI. Here the PI scored

the participants on their ability to perform basic clinical techniques such as detailed visual acuity measurement and accurate recording thereof.

Prior to participation the PHC workers were invited into their respective common rooms, where the aims and objectives of the study were explained. Thereafter, those who were willing to participate stayed behind and completed consent forms and were enrolled. Participants were advised that they could withdraw at any point with no consequences or penalties. Following submission of these, the PI sat with one participant at a time, and completed the questionnaire with them. Thereafter, the PI randomly selected participants for clinical technique evaluation in a separate room, away from other staff members. Data was collected manually from all participants, captured onto Microsoft Excel, cleaned, coded, stored, and transferred to the R software for storage and analysis.

Results

Demographic and training information

A 95% response rate (n = 200) was achieved, and participants were from 28 PHC facilities across AND. The majority of 172 (86.4%) were female. All participants were from the African race, where 96% spoke the IsiXhosa language, and the rest IsiZulu. The most common group of participants were 76.5% (n = 153) professional nurses, as well as 1% (n = 2) ophthalmic nurses who were working as professional nurses as there were no funded posts for this specialisation in PHC clinics. The rest were enrolled nurses and assistants (Table 1). Duration of service within the Department of Health (DoH) was 5 years and less for 79 (40%) of the respondents.

Regarding basic equipment, none of the visited PHC facilities (PHCF) had a VA chart, occluder or penlight torch. The PI took his own equipment to the sites for assessment purposes. Additionally, none of the surveyed facilities across the district had a staff member responsible for ophthalmic care, and none of the facilities had a designated ophthalmic consulting room. Only 35.5 % of the participants reported to understand the management and treatment protocols for eye health.

Of further concern, as shown in Table 1, is the fact that the majority (93.5 %) have never been trained in eye care, and that only 10% of the participants were providing eye care services in their institutions.

TABLE 1. Demographic information and professional training characteristics.

CHARACTERISTIC	FREQUENCY (n)	PERCENTAGE (%)
Age (in years)		
1. < 30	27	13.5
2. 30-39	48	24
3. 40-49	**68**	**34**
4. 50-59	24	12
5. > 60	33	16.5
Job Title/ Category		
1. Professional nurse	**154**	**77**
2. Enrolled nurse	15	7.5
3. Enrolled nursing assistant	29	14.5
4. Ophthalmic nurse	2	1.0
Highest qualification		
1. Basic 1 or 2 years nursing training	43	21.5
2. Nursing Diploma / Nursing Degree/ Post basic qualification	**157**	**78.5**
Duration of Service (in years)		
1. 0 – 5	**79**	**40**
2. 6 – 15	78	39
3. 16 – 25	26	13
4. > 25	17	8
Trained in Eye care		
1. No	**187**	**93.5**
2. Yes	13	6.5
Institutions where staff were trained in eye health		
1. Public Tertiary institution	4	2
2. NGO	4	2
3. DoH	5	2.5
4. I was never trained on eye health	**187**	**93.5**
Completed refresher eye care training		
1. No	**195**	**97.5**
2. Yes	5	2.5
Refresher eye care training frequency		
1. Every two years	1	0.5
2. Annually	2	1
3. Other	2	1
3. Never	**195**	**97.5**

Knowledge Analysis

TABLE 2:

Showing participants' basic KNOWLEDGE on the roles of different HReH (Human Resources for eye health)

|	Disagree	Agree
I know the different types of eye health professionals (**p = 0,322**)	46%	54%
Optometrists are mainly trained in cutting lenses (**p < 0,001**)	35%	65%
Ophthalmic Nurses train for a further 2 years (after basic nursing training) to qualify and practice in that role (**p = 0,024**)	42%	58%
Ophthalmic Nurses are best suited to work in PHC settings (**p < 0,001**)	28%	72%
Optometrists are best suited to only work in tertiary settings (**p < 0,001**)	32%	68%
Ophthalmologists are best trained in refraction and low vision services (**p = 0,024**)	42%	58%

Practice Analysis
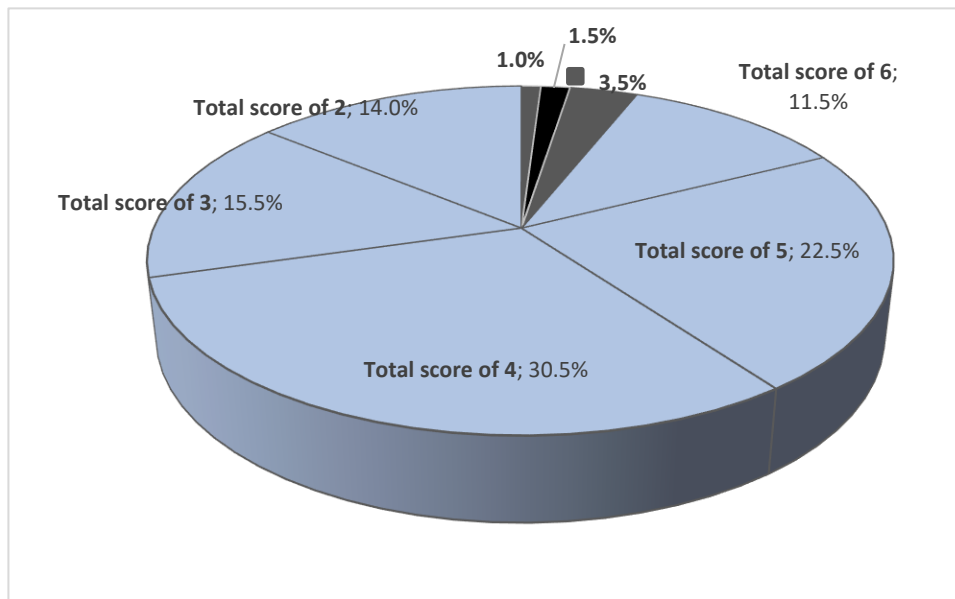
FIGURE 1

Chart showing participants' practice total competency scores rated from a minimum of 1 to a maximum of 10, and frequency percentages highlighting how many staff members achieved each total. Participants were scored on their technique for assessing visual acuity, where the pass mark was 7. Dark segments show that 12 (6%, *p< 0.001*) participants' [scores: 7/10 (3,5%), 8/10 (1,5%) and 9/10 (1,0%)] passed according to the PI rubric and were able to test and measure VA correctly. Only 30.5% (n=61) of respondents used the correct distance (4 or 6 meters) to test visual acuity and only 22% (n=44) knew how to record VA correctly.

Knowledge and Practical analysis

TABLE 3 Clinical competency in eye disease was generally poor. Coloured pictures were presented to participants with multiple-choice options for identification of conditions. Management options were also presented as multiple-choice options which looked at urgency and triage options for patients with conditions presented. Percentage of correct responses and statistical significance on good knowledge (K) and practices (P) are shown below.

Agreement responses by participants are recorded below.	KNOWLEDGE (CORRECTLY IDENTIFIED)		PRACTICE (CORRECT MANAGEMENT)	
	%	P-VALUE	%	P-VALUE
CATARACT				
K: Accurate identification of mature cataract from coloured picture.	28	**<0,001**		
P: A patient with (a mature cataract) must be transferred to hospital urgently.			26	**<0,001**
UVEITIS				
K: Accurate identification of uveitis from coloured picture and symptom description.	16	**<0,001**		
P: A patient with (uveitis) needs an urgent referral.			32	**<0,001**
VERNAL KERATOCONJUNCTIVITIS (VKC)				
K: Accurate identification of VKC picture and case history.	20	**<0,001**		
P: A patient with (VKC) cannot be managed in the clinic and should be referred urgently to a hospital.			24	**<0,001**
PRIMARY OPEN ANGLE GLAUCOMA				
K: Accurate identification of glaucoma from description of throbbing eye pain, family history and visual field loss.	28	**<0,001**		
P: This patient (with glaucoma) does not need any referral; they need to be monitored yearly.			40	0,016
PRESBYOPIA				
K: Accurate identification from symptoms and case history.	60	0,007		
P: Accurate management based on case history and symptoms.			42	**<0,001**
CORNEAL FOREIGN BODY				
K: Accurate identification based on coloured picture and case history.	25	0,007		
P: Good management and urgent referral based on case history and symptoms.			25	**<0,001**

Key: K - Knowledge, P – Practices

Discussion

This study sought to evaluate PEC knowledge amongst the PHC nurses in AND, and further assess the current practices and protocols that are used in managing eye care cases. As most patients initially present at PHCC for their health concerns, including eye health, it is critical to assess the knowledge and practices of nurses that manage the larger population at those health facilities.

In our study the most common cadre of staff that participated were professional nurses of the female gender aged within the 41- to 50-year-old age range. This finding is similar to studies in Nigeria and other parts of South Africa, where most participants were females in the same age grouping (6, 20). The female bias is to be expected as the nursing profession was a predominantly female career option, and viewed as an extension of the domestic role played by women in homes and other sectors of society (21, 22). Additionally, its common traits of caregiving and nurturing also align nursing more with female social gender roles than male gender roles. Similarly, the age range of most participants is within the most common labour force in South Africa, as evidenced by Statistics South Africa in their reports (23). An overwhelming majority of the participants had a service record of 15 years or less, meaning that they had a fairly good idea of the PHC environment, and more than two decades of service prior to their retirement. As such, they were within their earlier years of service and were still amenable to learning and skill development for the betterment of their careers.

It is satisfactory to learn that the majority of the participants were trained and qualified as professional nurses. The AND fares well in this regard as the South African Nursing Council (SANC) distribution report shows that the Eastern Cape province has an average of 61 % of the nursing staff being professional nurses (24), one of the higher prevalences in the country. This could be attributed to the many nurse training facilities that exist in the Eastern Cape Province and is a positive case for general public health in the communities they serve.

Of significant concern, however, is the marked shortage of Human Resource Eye Health (HReH) in the PHCC that was noted and confirmed by the lower-than-expected number of the study participants on arrival at the clinics. Staffing numbers at PHCCs were less than half of that which was anticipated, and some clinics had a single nursing professional on duty for the day, tasked with seeing to the general and eye care of the entire community. Health professional shortages are a serious concern in Africa, and they are said to be worsened by the *"brain drain"*, or exodus of experienced HReH from poorer countries to economically affluent first world countries, further exacerbating health system challenges and worsening the burden of disease in poorly resourced and underdeveloped African countries. Professional nurses are amongst the highest numbers of trained health professionals that are known to have left South Africa in search of improved working conditions, better staffing and financial rewards offered by first world economies (25). In communities such as the AND, this shortage is a reality that further marginalises the population from receiving basic eye care in their clinics.

Further exacerbating the shortage is the fact that almost none of the staff at the PHCCs had received training in eye health. The number of participants was lessened by the fact that the original sample size was incorrect, owing to poor record keeping. These issues are dire and prove to be a barrier to the delivery of adequate eye care to communities in the AND. Consequently, this worsens the burden of diseases, increases visual impairment and the prevalence of avoidable blindness, and negates universal health coverage as service delivery cannot be realised due to staffing shortages. The district needs to improve its staffing of eye clinics and its record keeping to ensure accessibility of sufficient eye care. Better access to eye care will further ensure improved learning opportunities for children through the school

health system, improved employability opportunities for young adults, and subsequently reduced levels of poverty in this region.

Eye health knowledge

PHC workers are the first point of care for many South African communities and the first point of contact for health conditions in developing countries (26). There is an expected level of knowledge and skill that is required in order to provide effective management of eye conditions, and ensure that preventable blindness is addressed timeously (27).

The graph in Figure 1 shows that almost half (46%) of the respondents did not know the basic roles and competencies of the different HReH, which indirectly affects their referral practices, as good knowledge of these would enable them to adequately triage ocular cases to the correct HReH.

Similar results were found in Pakistan and Ethiopia, where poor knowledge of basic ocular conditions was noted amongst general practitioners and paediatricians (14). Reasons expressed for this poor knowledge was the fact that in their training, general practitioners spend a maximum of four weeks only in the ophthalmology rotation, which is a very short training period for one to gain sufficient knowledge and information on this area of healthcare (28). Similarly, with nurse training in South Africa, there is no clinical component in ophthalmology or optometry, which is probably why the knowledge levels in this study were very poor. Additionally, the clinical knowledge of basic ocular conditions, and leading causes of blindness and visual impairment (Table 3) were poorly identified and managed by the respondents in the AND. Cataract is the leading cause of preventable blindness in SSA and the world, and an easily identifiable condition; however, approximately one quarter of the respondents identified it correctly. Worse still, the management of this condition was seen as urgent and immediate, which is inaccurate, and the cause of unnecessarily overloading referral transport and overloading an already strained system that could have given the ambulance space to a more deserving patient. This prevalence is significantly lower than that found in a similar study in Nepal where most PHC workers were able to identify a cataract accurately (29). Similarly in other studies within African countries: Tanzania, Malawi, Kenya and Nigeria, PHC nurses were more knowledgeable in identifying and managing patients with cataract, VKC and glaucoma (30, 31). Foreign body sensations were the only condition that although not accurately identified, was managed adequately in this study. This was probably due to the discomfort, pain, and urgency that patients present with. In KwaZulu Natal Province, South Africa, knowledge regarding primary eye care was found to be very good amongst participants in PHCs within hospitals (14). This was probably due to the fact that hospitals employ ophthalmic nurses and optometrists in their primary care and outpatient departments. Most of the respondents in this study were probably HReH trained in eye health.

Poor knowledge and management of patients by PHC nurses are concerning factors as they marginalise patients in poor, rural communities, deter universal eye health access, and exacerbate the burden of disease. These are all directly linked to visual impairment (32). This should be addressed by health service managers as it has far-reaching effects on community wellbeing and general health.

Training in eye care

Most of the participants in our study reported to have never had any eye health training. The very few who have received proper training had not had a refresher course. As a result, the majority of eye care cases were then referred, even those that could have been managed timeously and locally. There were poor management guidelines in place and no set referral criteria used. In agreement, previous studies reported inappropriate referral pathways in northern Nigeria (31) while, to the contrary, evidence reported a clear and precise referral pathway in India (33).

This low number of trained PHC workers in PEC is in line with a study in Nigeria that found that not even one of the respondents had received training on PEC in their facility (34). On the contrary, in a similar study done in Kenya it was found that a much higher proportion (two thirds) of the participants in PHCC had received PEC training (30). It stood to reason that the Kenyan study reported that almost all PHC workers provided adequate eye care about which they were confident, and this could be cited as an example of competence overreaching as those that were not trained learned from the others and managed patients satisfactorily (30, 35). In this study, the extremely low number of PHC nurses who had received some form of eye health training could be linked to the basic nursing curriculum – which does not mention eye health – and lack of continued professional development in the nursing profession. The majority of those who had received training in eye care had never completed any refresher eye care training. Table 1 shows that a mere two of our respondents were ophthalmic nurses and both were working as professional nurses due to a lack of specialised post funding at clinic level. To further exacerbate the problem is the fact that only three nursing colleges offer ophthalmic nurse specialisation training in the entire country. Some non-governmental organisations (NGO's) like The Fred Hollows Foundation have tried to bridge this gap by offering some kind of eye care training for PHC workers; however, this has not been sustained leading to its eventual failure.

It is clear that nurse training needs to better embrace eye health training so as to effectively manage cases in the PHCC. Poor identification of leading causes of blindness and visual impairment, poor knowledge of HReH and poor management of eye health cases all point to much needed training and refresher training of nurses in eye health. This needs to be addressed with a view to providing eye health training.

Clinical Skill Observation and practice norms

The study results in Table 2 show that the ability to carry out a visual acuity assessment by the PHC workers in the AND is below par. A great majority of the participants did not meet the minimum competency levels of this clinical technique and scored less than 7/10 on assessment. Visual acuity is an important measure of visual function and is necessary for decision making with ophthalmic patients. Visual acuity is the most frequently performed measure of visual function in clinical practice and most people worldwide living with VI are living in low and middle-income countries (36). Visual acuity measurements then ought to be routinely conducted with all patients visiting the PHC clinic (6). Inaccurate execution, as displayed by

those in this study, further marginalises scholars and older patients who could have played a significant role in society had the visual impairment been assessed accurately, and visual assistive devices or treatment initiated for improved vision. Similarly in studies in Nepal and Eastern Africa, only 14% and 12.3% of the PHC workforce respectively could measure visual acuity (6, 29). Furthermore, the poor outcome in our study is also not surprising considering that none of the visited PHC clinics had a Snellen chart to measure patients' visual acuity.

Limitations

The study location was in a deep rural area with an extremely poor roads network, making it difficult to reach the clinics on the extreme periphery of the region. Inclusion of these facilities may have added substantial information to the study. A general shortage in staffing was, however, noted in the clinics where staffing ranged from one PHC worker on duty, and poor co-operation and participation in the study. In PHCCs such as this, we were forced to help where we could and turn back as participation in the study was not possible.

Conclusion

Most of the nurses in this district are females within a suitable working age, who speak the local language spoken by patients in that district. This study showed that the PHC nurses in the Alfred Nzo region had inadequate eye health knowledge on HReH and basic eye conditions that are leading causes of visual impairment and blindness globally. This has a grave impact on the treatment, referral and management of treatable and preventable visual impairment conditions in the region. PHC nurses in this area did not know how to measure visual acuity. Most nurses were never trained in eye health. None of the clinics visited had a Snellen chart for visual acuity measurement. There were no basic guidelines and referral protocols that could be referred to for eye conditions. Eye health is clearly not prioritised in this district. District health management needs to prioritise eye health, specifically PEC, and seek to train nurses in order to provide adequate universal eye health in the communities within the AND in South Africa.

Recommendation

We recommend basic eye health training to be introduced into the nursing curriculum, the aim and objective of the training is to equip PHC workers with the necessary skills to appropriately manage, treat or refer patients who present visual impairment condition. Secondly, there needs to be an establishment of guidelines and funnelling protocols for eye health cases. HReH posts must be created, funded, and filled for effective eye health delivery.

Declarations

Ethics approval: Written ethical clearance was obtained from UKZN BREC/00000663/2019 and gatekeeper permission was obtained from the DoH, Alfred Nzo District, and the DoH, Eastern Cape Province

Consent to participate: Informed consent was obtained from all participants.

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