

Pharmaceutical care integration in rural public health districts

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Background: South Africa's healthcare system is in transition, which presents an opportunity for public sector pharmaceutical service development. Focus on primary healthcare (PHC) re-engineering and the National Health Insurance (NHI) mandate reinforce the importance of many healthcare professionals and processes, thus highlighting the need to explore the pivotal role pharmacists can play in a collaborative approach to primary healthcare.

Setting: This study was conducted in uMzinyathi and Ugu, two rural districts in KwaZulu-Natal, South Africa.

Methods: A mixed method research methodology was adopted in four phases. Key informants as well as PHC authorised prescribers, visiting doctors and pharmacists who support the "ideal" clinics participated in the study. Data were collected through specifically designed questionnaires and focus group interviews. The PHC facilities were also inspected for legal compliance using the South African Pharmacy Council's primary health care clinics inspection questionnaire. Data were interpreted thematically and using factor analysis.

Results: This study found that pharmacists can improve primary care at public clinics. Public health, primary care and clinical patient outcomes were also highlighted. Continuing nursing and pharmacy education, patient safety and quality of care were also significant collaborative intervention criteria. This study demonstrated statistically significant differences between doctors and authorised nurse prescribers in four medication processes: diagnosis and prescribing; administration and documentation; education and training; and medication review. Pharmacists focussed more on pharmaceutical care – monitoring patient compliance, educating patients about chronic medication, providing drug information to prescribers, and identifying prescribing errors rather than prescribing rights.

Conclusion: The role of pharmacists in rural public healthcare was unexploited. Therefore, to ensure optimal patient outcomes and safety, pharmacist advocacy in these underserved rural communities could drive pharmacovigilance through adverse drug reporting, antibiotic stewardship, medicine supply management, clinical governance with ongoing prescription audits, structured training for PHC authorised nurse prescribers, patient engagement, and interaction. This study identifies barriers such as unclear roles, lack of transportation for outreach services, language difficulties, a lack of resources and devices, and a lack of doctors as well as authorised nurse prescribers. As the NHI is expanded, the pharmacist's role and collaboration with doctors and authorised nurse prescribers could improve patient health outcomes and rural public healthcare delivery.

Keywords: health, knowledge, medicine, pharmacists, practices, pharmaceutical care

Introduction

South Africa's healthcare system finds itself in a stage of profound revolution where changes in global health and human development as well as political and economic challenges, call for solidarity among healthcare workers to realise the 17 sustainable development goals (SDG) that were set in 2015.¹ Additionally, citizens' right to healthcare access is embedded in South Africa's post-apartheid Constitution.² Furthermore, efforts regarding universal health coverage (UHC) are structured around a unified health system that strives for equitable access to medicines for the entire population.^{3,4} The caveat was that "critical socioeconomic right" is to be realised gradually within the scarcity of accessible resources.⁴ However, equity and access for all can be achieved through a shift to a primary healthcare delivery approach. According to Chopra et al.,⁵ accessibility to healthcare for all South Africans rests in addressing the rural

and underserved communities through the strategic vehicle of building new primary healthcare (PHC) clinics.

Over the last decade, South Africa began widespread transformation of its health system to one that achieves an equitable, efficient and effective service based on the principles of the PHC model.⁶ The South African public PHC system supports over 50 million people in nine provinces and 52 districts at approximately 3 500 clinics and health centres.⁷ According to a recent survey, 70.5% of households in need of healthcare, primarily access public clinics and hospitals.⁸ It also stated that 19.8% of South Africa's total population and 24% of the KwaZulu-Natal population endure chronic diseases.⁸ Hence, the access and delivery of healthcare at the public clinic facilities (or PHC clinics) are the first point of a patient's health call and forms the fundamental focus within which PHC in South Africa can be realised. Given that one of the National Health policy resolutions of 1994 saw a fundamental shift towards a nurse-driven PHC approach with the Health District System (DHS)

as the main locus of implementation, its monitoring is guided by the National Health Act 61 of 2003 (sections 29, 30 and 31). Significant strides in recent years to improve the public health system echoes the introduction of National Health Insurance (NHI)⁸ towards entrenching the constitutional right to health.² Concerted efforts also realised several ongoing activities to derive equitable access to medicines and to improve patient care.⁹ Initiatives further included the acknowledgement of the increasing weight of non-communicable diseases; attempts at reducing medicine costs within the public healthcare, mainly for antiretroviral therapy; programmes to improve patients' access to chronic medicines; and activities to improve care in hospitals, including pharmacovigilance.¹⁰

Considering an era of rapid change in delivering health care, the pharmacy profession, like others, finds itself in transition of significant growth and development, positioning itself with an array of possibilities. This embodies comprehensive pharmaceutical services, which is defined as a "set of actions in the healthcare system that seeks to guarantee comprehensive, integrated and continuous care for responding to the health needs and problems of the population, both individual and collective, having medicines as one of the essential elements, contributing to their equitable access and rational use at health facilities. These actions, developed by the pharmacist or under his/her coordination, as part of a healthcare team, with community participation, aim to achieve defined health outcomes leading to improvement of the quality of life of the population".⁶ There are several reasons why a study of the pharmacist's role in PHC facilities is necessary. Firstly, the sub-district approach to healthcare necessitates the expansion of several pharmaceutical processes from the public sector into PHC, which is currently limited. Secondly, the increasing prevalence of communicable and non-communicable diseases (NCDs) because of a lack of clinical governance calls into question the quality of patient-centred care and outcomes. Finally, the lack of antibiotics and

antiretroviral clinical stewardship, as well as the World Health Organization's (WHO) call for professional collaboration in the management of NCDs that highlight the need for pharmaceutical care (PhC) integration at the PHC level. Following this feature, the present study aims to investigate factors influencing pharmaceutical care services and their relation to the delivery of quality patient care in rural public PHC clinics in Ugu and uMzinyathi districts (Figure 1) in KwaZulu-Natal, South Africa. This research focussed on identifying the gap in the provision of healthcare services, more importantly, pharmaceutical care services within the rural public context.

Methods

Study design

A mixed method research approach was identified as the best framework within which to structure the role of the pharmacist in rural public PHC clinics. The research was conducted from October 2017 to February 2018. The entire study design consisted of four phases. First, the informants, specialists in the field of pharmacy policy and practice, were contacted telephonically to obtain their perceptions and expertise on the integration of the PCDT pharmacist. With the aid of an interview schedule consisting of semi-structured open-ended questions, the informant's perspective on challenges and opportunities as well as the associated roles and responsibilities for collaborative pharmaceutical care in rural PHC and community healthcare (CHC) clinics were explored. Second, structured survey questions were used to evaluate the perceptions of prescribing nurses, visiting doctors and public pharmacists, on defining the roles and responsibilities to ensure inter-professional collaboration of the PCDT pharmacist at rural clinics. The authorised nurse practitioner group also completed a second self-administered questionnaire about their perceptions of the PCDT pharmacists integrating with them at the PHC clinic for the collaborative management of patients. This questionnaire was intended to inform the

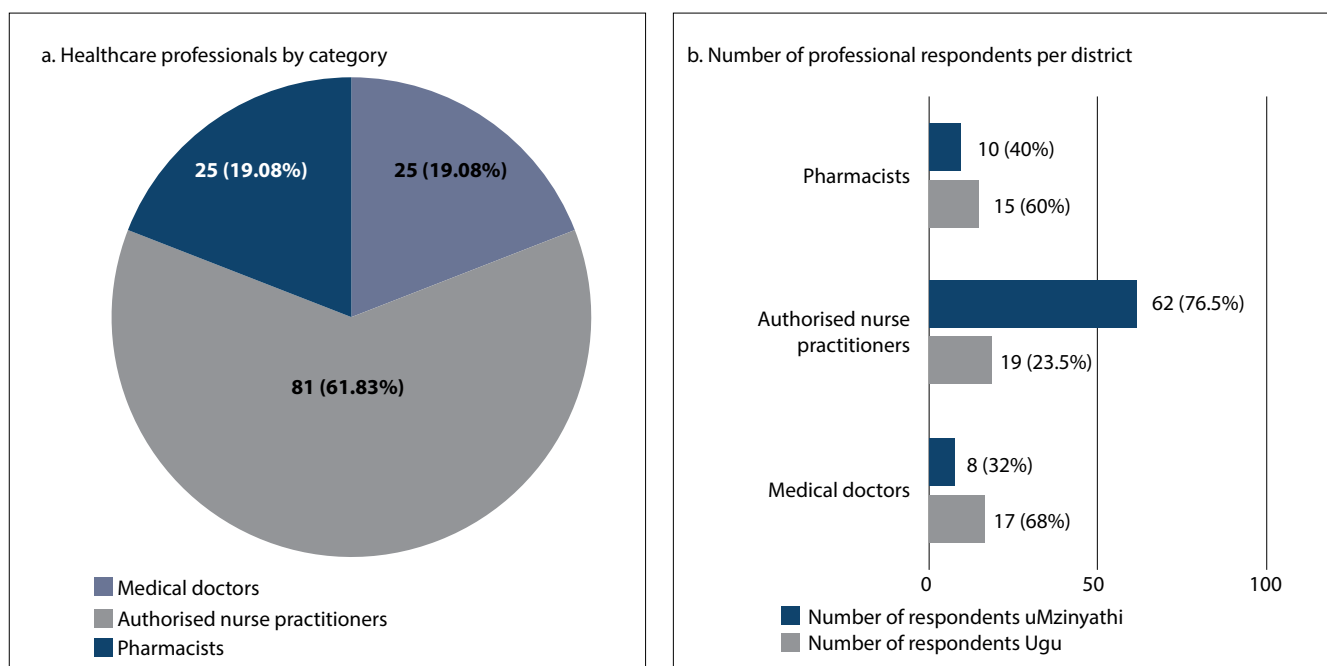


Figure 1: Professional information of participants

Table I: List of various professional occupations

| Category of professional participant | Research tool |
|---|---|
| 15 "ideal" clinics | SAPC inspection questionnaire |
| Key informants – experts in the pharmacy field | Semi-structured interview |
| Doctors, nurses – authorised prescribers, pharmacists | Survey questionnaire |
| Doctors | Focus group semi-structured interview |
| Nurses – authorised prescribers | Focus group semi-structured interview and second survey questionnaire |

prescribing nurse's perceptions of the activities pertaining to either the nurse or PCDT pharmacist. It was an essential aspect to include, as the nurse practitioner at present drives prescription activities at PHC level within the rural public context. Third, a semi-structured in-depth focus group interview comprised of open-ended questions was conducted with a convenience sample of doctors and nurse prescribers. Fourth, the South African Pharmacy Council (SAPC) inspection questionnaire of "ideal" public PHC and CHC clinics, which measures adherence to legislative pharmaceutical standards of practice and functionality within which a pharmacist and assistant is authorised to practice, was conducted in each of the "ideal" clinics. The overall outcome aimed to capture the theoretical background of role clarity and collaborative advantage related to roles and responsibilities of the PCDT pharmacist.

Instrument

The research instrument design for this study is shown in Table I. The purposive sampling method was used and consisted of a sampling frame of four strata (i.e. visiting doctors, pharmacists, authorised nurse prescribers and key informants) visiting "ideal" clinics. "Ideal" clinics are those that qualify in terms of meeting the acceptable criteria in all areas of the clinic management to provide ideal healthcare service delivery in compliance to the national regulatory body of the Office of Health Standards Compliance (OHSC). Also, the participant selection was based

on healthcare professionals providing services within the PHC and CHC facilities. Key participants (informants) are attentive, insightful members of the community of significance who are learned about the topic and who display an eagerness to share their knowledge. Hence, key informants were also subjectively chosen by virtue of their pharmaceutical and healthcare related knowledge and expertise.

Sampling strategy

Data were collected using a purposive sampling technique that included 15 "ideal" clinics, a population of authorised nurse prescribers, visiting PHC doctors, and pharmacists who support the "ideal" clinics. The research was divided into four phases. The key informants were the unit of analysis in phase 1; they were interviewed telephonically via a process of choice. The authorised nurse prescribers, visiting doctors and public pharmacists supporting the "ideal" clinics were the unit of analysis in phase 2; they were required to complete a structured questionnaire. Phase 3 included data collection through semi-structured focus group interviews with the prescribing nurses and visiting doctors serving as the unit of analysis in separate engagements. Finally, in phase 4, all the "ideal" clinics were inspected using the SAPC questionnaire. The number of clinics for evaluation in each of the districts rested on the "ideal clinic status" (Operation Phakisa).¹¹

Data collection, capture and analysis

The questionnaire was the primary tool that was used to collect data. A total of 131 self-administered questionnaires were distributed within the two districts in KwaZulu-Natal to three categories of healthcare professional participants, namely the doctors (27), the authorised nurse prescribers (82) and the pharmacists (23) supporting PHC clinics. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM, New York, USA). The sample of participants for this study is outlined in Table II. A p -value < 0.05 was considered statistically significant.

Reliability and validity

This study's conception, execution, analysis and interpretation all contributed to its high level of internal validity. Cronbach's

Table II: Participants in study

| District | Ideal clinic | Visiting doctors focus group | Authorised nurse prescriber focus group | Support pharmacist | Key informant | | |
|------------|--------------|------------------------------|---|--------------------|---------------|----|---|
| Ugu | 5 | 19 | 6 | 17 | 5 | 15 | 0 |
| uMzinyathi | 10 | 8 | 4 | 65 | 19 | 8 | 0 |
| Total | 15 | 27 | 10 | 82 | 24 | 23 | 5 |

Table III: Summary of overall Kruskal–Wallis values of the five medication-related processes by different groups*

| Collaboration in tasks | No of items | Kruskal–Wallis p -value ($p < 0.05$) | Percentage (%) |
|-------------------------------|-------------|--|----------------|
| Diagnosis and prescribing | 18 | 10 | 56 |
| Monitoring and patient safety | 12 | 5 | 42 |
| Administrative documentation | 9 | 5 | 56 |
| Education and training | 9 | 7 | 78 |
| Medication review | 12 | 7 | 58 |

*Only statistically different results are presented

Table IV: Response to questions on themes identified by participants

| Theme/question | Participants identifying themes (%) |
|-----------------------------------|-------------------------------------|
| Role clarity | 100 |
| Resources and locations | 100 |
| Drug supply management | 100 |
| Interprofessional collaboration | 97 |
| Clinical governance | 97 |
| Training for nursing staff | 94 |
| Patient safety | 82 |
| Vision and mission | 80 |
| Quality of care | 76 |
| Trust and communication | 76 |
| Pharmacist training | 62 |
| Responsibility and accountability | 50 |

alpha was used to determine the questionnaire's reliability to determine the constructs' consistency and stability.¹²

Results and discussion

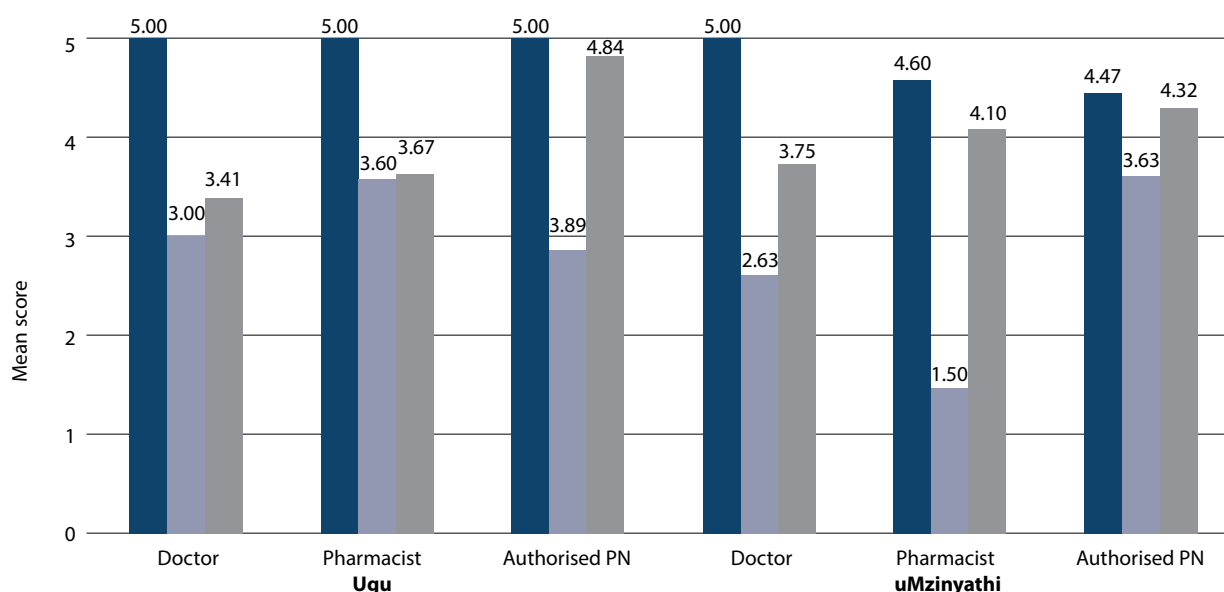
Biographical data

The demographic characteristics of the respondents in this study are shown in Figure 1. The quantitative study involved two self-administered questionnaires. The one questionnaire was distributed to 132 doctors, authorised nurse practitioners and pharmacists. In total, 131 of these were completed and collected, which is a 99.2% response rate, to form the foundation for computing the results and meeting the essential inclusion criteria. The second questionnaire was distributed to the authorised nurses only. In total, 81 of these were returned, giving a response rate of 98.8%. The ratio of respondents was approximately 1:1:3 for doctor:pharmacist:professional nurse which further exemplified that the nurse proportion of the healthcare professionals within the public sector warranted the

need for appropriate task shifting.^{8,13} Purposive sampling was adopted for this case study as deliberated in the methodology section. The ratio of respondents within the two districts (Ugu and uMzinyathi) was approximately 1:1.3, as indicated in Table II. This was attributed to the purposeful sampling approach of these two districts among the most rural within the KwaZulu-Natal region, as previously alluded to. In the uMzinyathi district, all the facilities chosen were purposively organised for the researcher's convenience in terms of distance and access.

Teamwork of doctors, nurse prescribers and PCDT pharmacists

The perception variances among different health professional groups of the contribution of doctors, authorised nurse prescribers and public PHC practice pharmacists to the five medication process groupings, were evaluated. The scoring was reverse coded (from the distributed questionnaire) for the purpose of analysis, with None = 1 and Lead = 5, so that the height of the bars in the graphical outputs would reflect better for interpretation. This scale allowed the researcher to measure individual professional's perceptions of their responsibility contributed to the 'drug use processes'. A Kruskal-Wallis test was used to establish any significant scoring patterns per statement and per profession (Table III). Consequently, the null hypothesis states that there is no difference in the central score by profession. The highlighted significant values (p -values) are less than 0.05 (the level of significance), implying that the distributions did not have the same central values and indicating that the scoring differences among the respondents were significant. Differences among the groups as to how they viewed contributions in response to the practices, were anticipated considering that the proposal of pharmacist integration at the PHC site within the rural public context is an innovative approach. Results that were obtained ranged from demonstrating statistical significance to "trending" toward statistical significance among the different PHC practice team member groups in the perceived contribution



Authorised PN – authorised prescribing nurse

Figure 2: Summary of responses of participants in making a diagnosis in medication-related processes

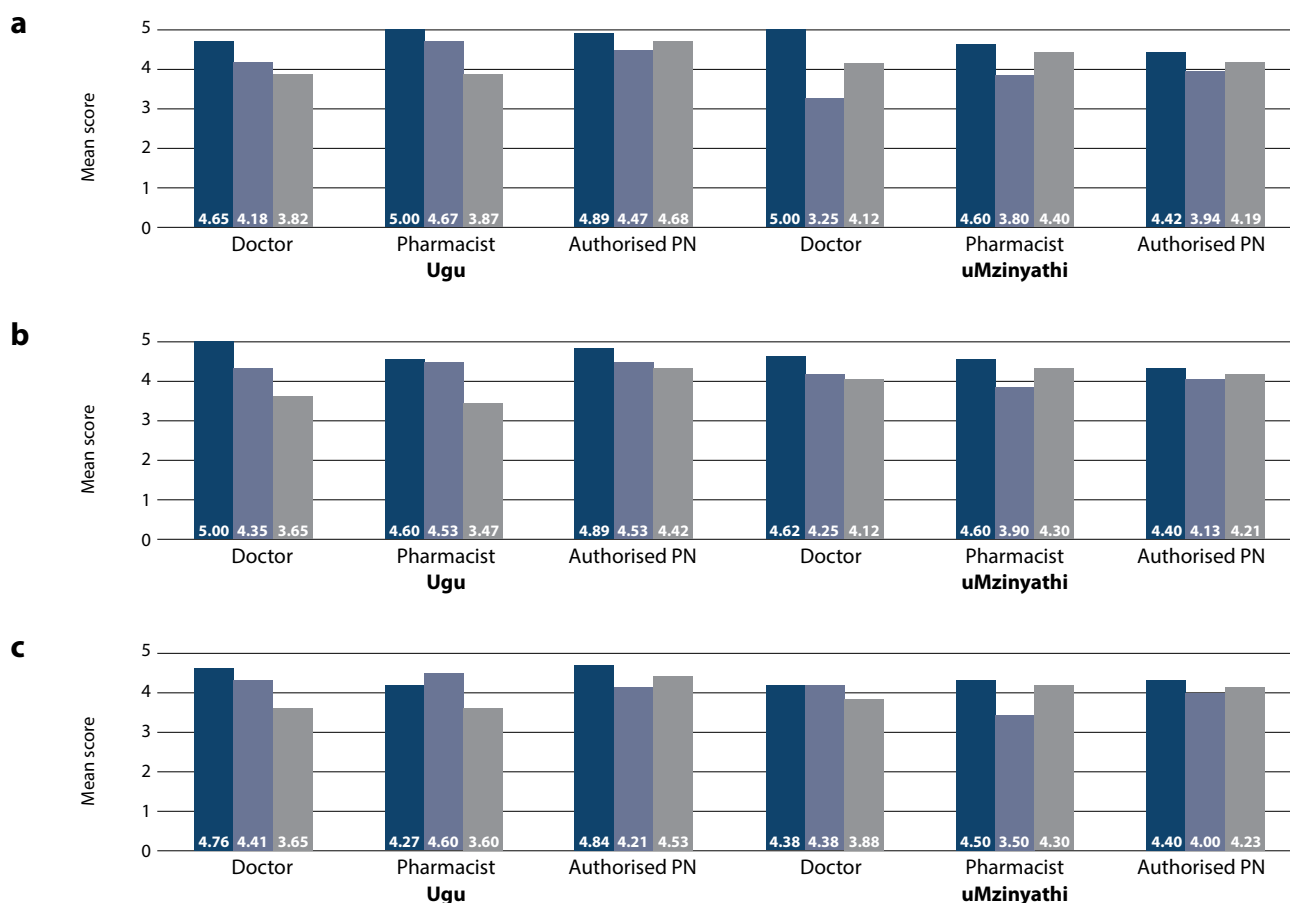


Figure 3: Summary of responses to three steps of “drug use practice” in medication-related processes

a) Determining if drug therapy is needed in medication-related processes, b) Selecting the best drug for patient in medication-related processes, c) Selecting the best regimen in medication-related processes

Authorised PN – authorised prescribing nurse

of each other in executing medicine-related processes occurring in PHC.

Statistically significant differences were found with all three professional groups in their ratings regarding the three medication-related processes: making a diagnosis (Figure 2), diagnosis and prescribing drugs (Figure 3), and education and training, medication review process (Figure 4), respectively. The results further displayed higher scores for their own roles in diagnosis and prescribing and medication review. The scoring for analysis was as follows: No role = 1, Minor role = 2; Supportive role = 3; Shared role = 4 and Lead role = 5.

The following is a brief summary of each group’s perceptions on the roles and responsibilities:

1. The doctors in both districts identified a lead role for doctors, a shared role for the PCDT pharmacist and a supportive role for the authorised nurse in determining if drug therapy is needed (Figure 3a) and then selecting the appropriate drug (Figure 3b) and regimen (Figure 3c) for the patient. In addition, collaboration of these tasks was distinguished. These conclusions are consistent with the principles of pharmaceutical care¹⁴ and collaborative practice.^{15,16}
2. The authorised nurse prescribers overall showed a marginally significant difference in their ratings to their counterparts in respect of selecting the best drug ($p = 0.029$) and the best regimen ($p = 0.009$) for the patient. The uMzinyathi district favoured a more collaborative role for the same. This is in keeping with the current public context (wherein they conduct

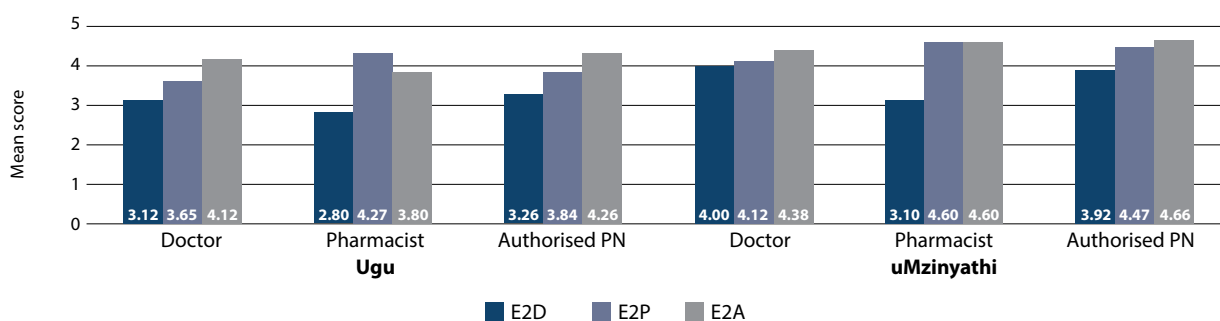


Figure 4: Perceptions of participants on education and training in medication-related processes

Authorised PN – authorised prescribing nurse

their activities) where task shifting affords them their place in this role.¹⁷

- In both districts, the authorised professional nurses believed that they were more adept at making a diagnosis ($p < 0.001$), and saw themselves more as leaders compared to how they saw the pharmacists' role. This is in keeping with the task shifting responsibility within our present public context.⁸
- The doctors and authorised nurses in both districts considered the PCDT pharmacist to have a supportive to shared function. However, the pharmacists in both districts shared different

views with regards to the PCDT pharmacists' role in diagnosis. Statistically the uMzinyathi pharmacists identified this as a no to minor role for the pharmacist within the proposed model. Collectively, pharmacists perceived the role of making a diagnosis ($p = 0.021$, a statistical significant result) as a shared responsibility with both the doctors and the authorised nurses. The inference made here is twofold, one that supports a collaborative focus¹⁸ and, moreover, that pharmacists foresee the PCDT pharmacist's dominant role as not diagnosing and prescribing.

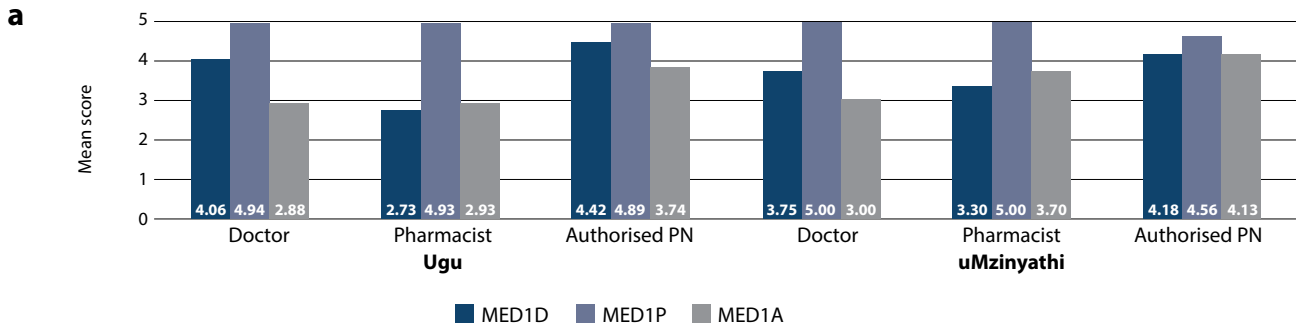


Figure 5a: Identifying prescribing errors in medication-related processes

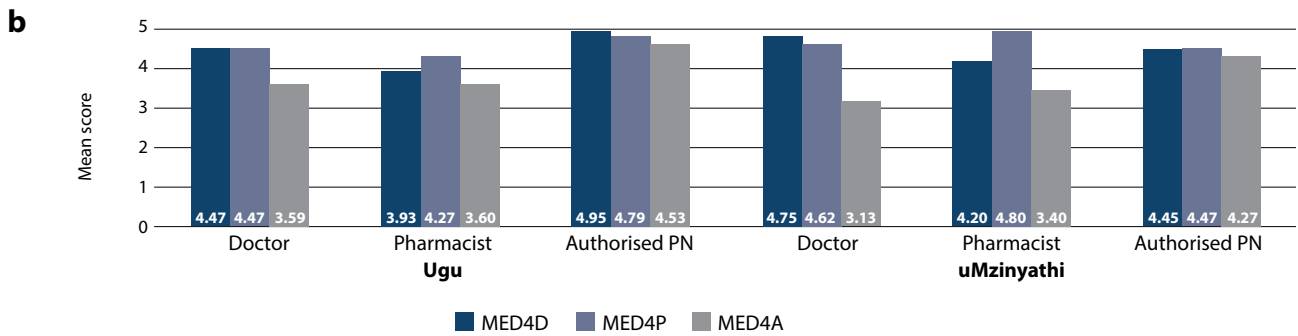


Figure 5b: Identifying adverse drug reactions in medication-related processes

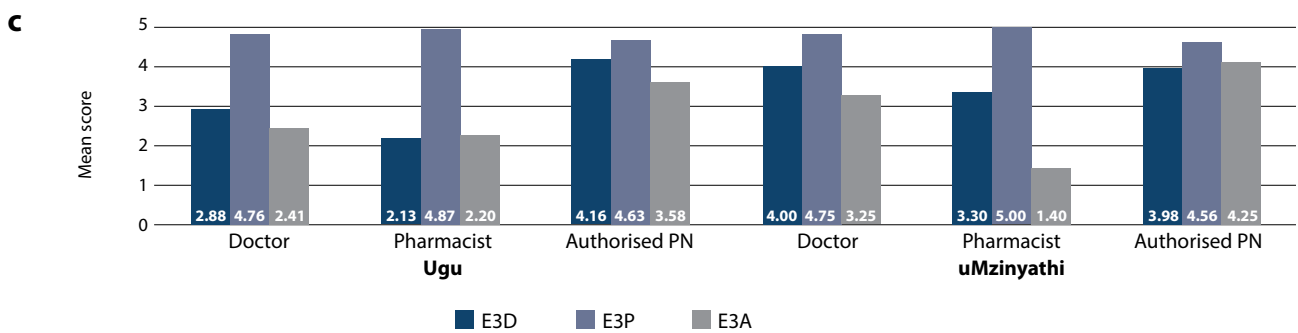


Figure 5c: Providing drug information to prescribers in medication-related processes

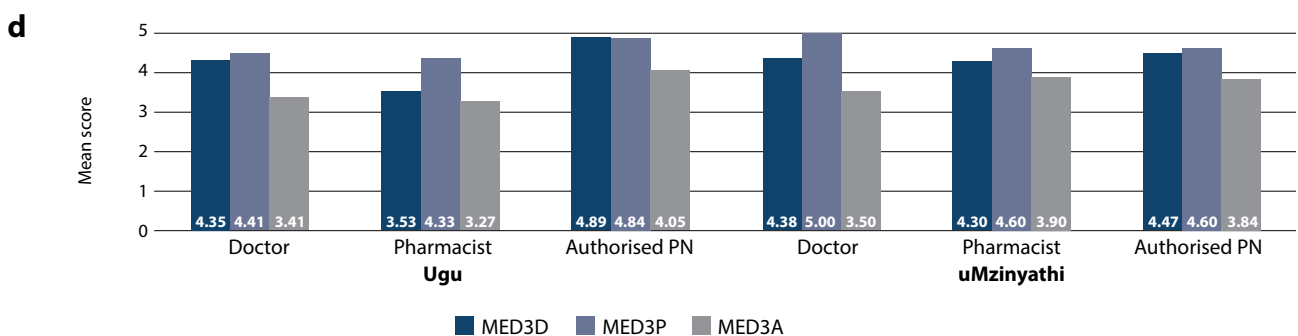


Figure 5d: Providing a complete medication overview in medication-related processes

5. Perceptions of participants varied in the area of providing group education and training regarding medication in medication-related processes, where the pharmacist and the nurse felt they should have the lead role, while the doctor saw both professionals in a shared role with the doctor (Figure 4).
6. Identifying prescribing errors (Figure 5a), adverse drug reactions (Figure 5b), providing drug information to prescribers (Figure 5c) and providing complete medication overview (Figure 5d) in medication-related processes were unanimously agreed that the pharmacist should have a lead role.

Therefore, the results showed that all three groups of professionals ($p > 0.05$) is “trending” toward a statistically significant result, where they perceived administration and documentation as a collaborative role.¹⁹ This highlighted the significance in and focus of healthcare professionals on patient involvement in management of care, instituting self-care towards achievable outcomes.

The pharmacists’ contribution supported towards strong ratings of the PCDT pharmacists in medication-related processes of monitoring patient compliance to their medication, educating patients about their chronic medication, providing drug information to prescribers, and identifying prescribing errors under medication review. This translated into a noteworthy difference in the ratings, statistically observed, among the doctors and authorised nurse prescribers compared to that of the pharmacists ($p < 0.05$). They anticipated the PCDT pharmacists to lead the role in education of chronic patients, with both the doctors and the authorised nurses sharing in this responsibility. All in all, a collaborative approach to chronic patient care is advocated and supported,^{15,20} which relates to literature in terms of knowledge transfer, working processes and the collaborative advantage benefits. However, overall, the results of the pharmacists demonstrated a more collaborative approach to shared tasks in medication-related processes.

Nurse’s perception of PCDT pharmacist role

As shown in Figure 6, the nurses perceive the new role of the pharmacist within the PHC context not as one of prescribing and dispensing medication according to a diagnosis (Figure 6a), but rather as one of providing drug information to other health professionals (Figure 6b) and medicine supply management (Figure 6c). In addition, they viewed the pharmacists as being actively involved in counselling patients about the prescribed drug and monitoring drug therapy of chronic patients.

Barriers

According to the participants, the following resource constraints are barriers to the implementation of pharmaceutical care:

- Infrastructure: location, organisational space
- Communication issues due to language barriers, as most patients speak Zulu
- Conflicting roles among healthcare professionals and a lack of available pharmacists because of limited human resources
- Transport and equipment deficiencies

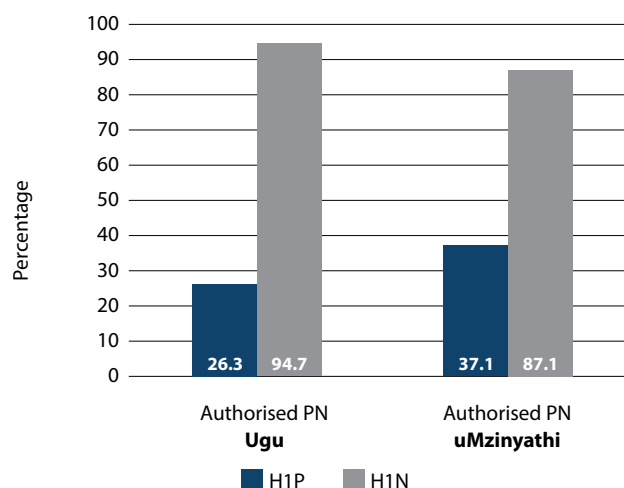


Figure 6a: Prescribe and dispense according to a diagnosis

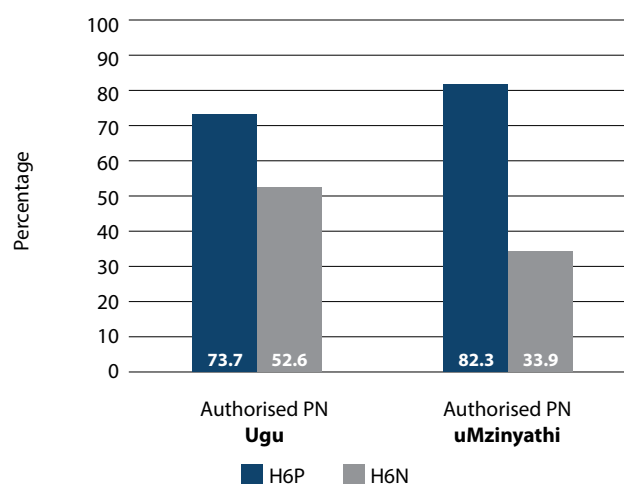


Figure 6b: Provide drug information to other health professionals

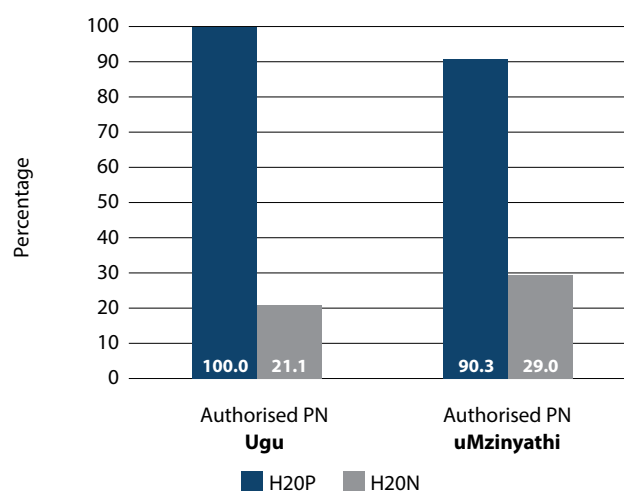


Figure 6c: Manage the pharmacy – medicine supply management
Authorised PN – authorised prescribing nurse

These correlate with the findings of other comparable studies.

Conclusion

The pharmacy fraternity finds itself suitably placed and favourably equipped at the prospect of displaying maturity as a health profession by lessening avoidable medicine-related morbidity and mortality through acknowledging public obligation and

professional conviction. The lack of pharmacist intervention within the rural public health system was appreciated. However, interesting talking points were also discovered. This research identified the need for interprofessional collaboration, patient safety, antibiotic stewardship, and clinical audits by integrating a pharmacist with additional clinical training (not necessarily a PCDT qualified pharmacist) to aid in persuading and shaping the development of a collaborative pharmaceutical care model. In this way the appreciation of pharmacists' knowledge base and the need for quality service delivery from professionals within the PHC and CHC environments can be achieved. Furthermore, it assists to create a point of reference for quality service delivery in the public rural primary and community healthcare facilities by emphasising the principles of *Ubuntu* and care.

Recommendation for future research

This study successfully demonstrated that there is a dire need within the public sector to similarly expand, redefine and re-orientate the pharmacists' role with regards to managing medication therapy in a collaborative approach for safety, effectiveness and adherence to pharmacotherapy. In addition, the application of PHC re-engineering and in the face of NHI, there is a need for an integrated care model (not to reinvent the wheel), and delivering all healthcare professional roles is paramount to the provision of quality outcome based primary healthcare services. This endeavour will obviate the current picture of numerous South Africans being plagued by unnecessary morbidity and premature mortality from treatable conditions and preventable diseases.

Furthermore, the rural healthcare context and providers' needs must be fully appreciated, and challenges addressed in terms of infrastructure, communication, transport, equipment and human resources, to allow for any potential healthcare delivery improvement strategies to be realised.

Conflict of interest

The authors declare no conflict of interest.

Authors' contribution

NP and JKA contributed to the study conception and design. NP conducted all experiments. NP, KSBN and JKA performed material preparation, data collection and analysis. The first draft of the manuscript was written by KSBN and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Ethical approval

Ethical clearance to conduct the study was obtained from the Durban University of Technology Ethics Committee (IREC 55/17). Written and verbal consent to participate in the study was

obtained from each participant prior to conducting the focus groups.

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