

Pharmacy students' perceptions of a health promoter-led community-based diabetes educational intervention: a case study

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Abstract

Background: Over half of South Africans with diabetes mellitus are undiagnosed, while among those diagnosed and on treatment, frequently demonstrate poor diabetes control. Community-oriented primary care initiatives are being piloted to offer decentralised health promotion and preventive services to vulnerable communities. Trained health promoters (HPs) have yielded positive outcomes in the delivery of a structured diabetes educational outreach intervention. This study aimed to explore final year pharmacy students' learning perceptions following their participation in a HP-led community-based diabetes educational outreach intervention.

Methods: This descriptive, qualitative case study documented final year pharmacy students ($n = 4$) experiences of this outreach, which contributed to an interprofessional education activity required for their community health rotation assignment. Students presented the medicine use session and conducted face-to-face group interviews (pre- and post-intervention) to gauge the community participants' ($n = 13$) awareness of the educational messages from the outreach. An unstructured reflection session was conducted with the students at the end of the rotation. Student responses were independently transcribed, coded and thematically analysed.

Results: Students noted that community participants demonstrated an improved awareness of diabetes, diet and medication, and observed an equitable engagement between community participants and the outreach team, contrary to their traditional facility-based experiences. They especially lauded the HP's guiding style of communication, which prompted community participants to openly share their lived experiences resulting in peer and reciprocal learning. Students attested to improvements in their communication, confidence and interprofessional collaboration.

Conclusion: Students endorsed the HP-led community-based outreach experience. Trained HPs may be a resource for pharmacy experiential learning programmes.

Keywords: health promoter, interprofessional collaboration, pharmacy students, pharmacist preceptor, community-based experiential learning, group diabetes education

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Introduction

South Africa's rising prevalence of non-communicable diseases including diabetes mellitus^{1,2} places a significant burden on the health system.³ Disease prevention and health promotion activities, framed on the community-orientated primary care (COPC) approach for universal health coverage, underpin the national health insurance which is being scaled up to manage the Western Cape's disease burden.^{4,5} Health promoters (HPs) receive additional training in health education and promotion,⁶ serving as a conduit for community-based outreach activities at decentralised venues such as community centres, churches and schools.⁷ Even though the national health promotion policy and strategy advocates that HPs establish and facilitate community-based programmes for people who are at risk for developing diabetes,⁸ South Africa's health promotion workforce has largely been overlooked following the introduction of community health workers (CHWs) at the primary care level, specifically for disease prevention activities among the general population.⁹

Final year pharmacy students at the University of the Western Cape (UWC), School of Pharmacy are required to complete the Patient Care Experience (PaCE) experiential learning to fulfil the Bachelor of Pharmacy (BPharm) degree requirement. This module consists of a hospital (five weeks) and community health (five weeks) rotation. One of the prescribed activities for the latter, includes an interprofessional education (IPE) and collaboration activity, which requires pharmacy students to engage with healthcare workers in service delivery.¹⁰ While an interprofessional learning experience typically entails students from different health disciplines converging their skills towards holistic patient care,¹¹ synchronising experiential learning schedules across health science disciplines is often a challenge. Therefore, exposing pharmacy students to a community-based educational activity with an interprofessional outreach team would prepare them for COPC.⁴

Interprofessional teams at the primary care level include both registered (nurse, doctor, dietitian, pharmacist, pharmacist's

assistant), and non-registered (CHWs, HPs) health personnel, as every cadre contributes towards comprehensive preventative, curative and rehabilitative care.¹² Integrating pharmacy students as part of the outreach team, aims to sensitise them to the health and pharmaceutical education needs in underserved communities.¹³ A key question that emerges is: How might a HP facilitate pharmacy students' learning in a community-based comprehensive interprofessional healthcare team?

The aim of this study was to explore the students' perceptions and learning experiences in a HP-led community-based diabetes educational outreach intervention. The objective was to examine students' IPE experience in the delivery of a HP-led diabetes educational intervention to community participants in a local venue.

Methodology

Study design and setting

This case study followed a descriptive exploratory qualitative research design.

UWC faculty preceptors (MvH, AB), a health facility's pharmacist preceptor (FS) and HP identified a community-based structured diabetes educational activity for student learning. The HP, who received the Group Empowerment and Training (GREAT, Western Cape Metropole District Health Services 2019)⁶ co-ordinated the outreach schedule.⁸ The PaCE community health rotation for the student group (30 July to 30 August 2019) was conducted at an accredited community day centre, while the outreach was scheduled in a church venue.

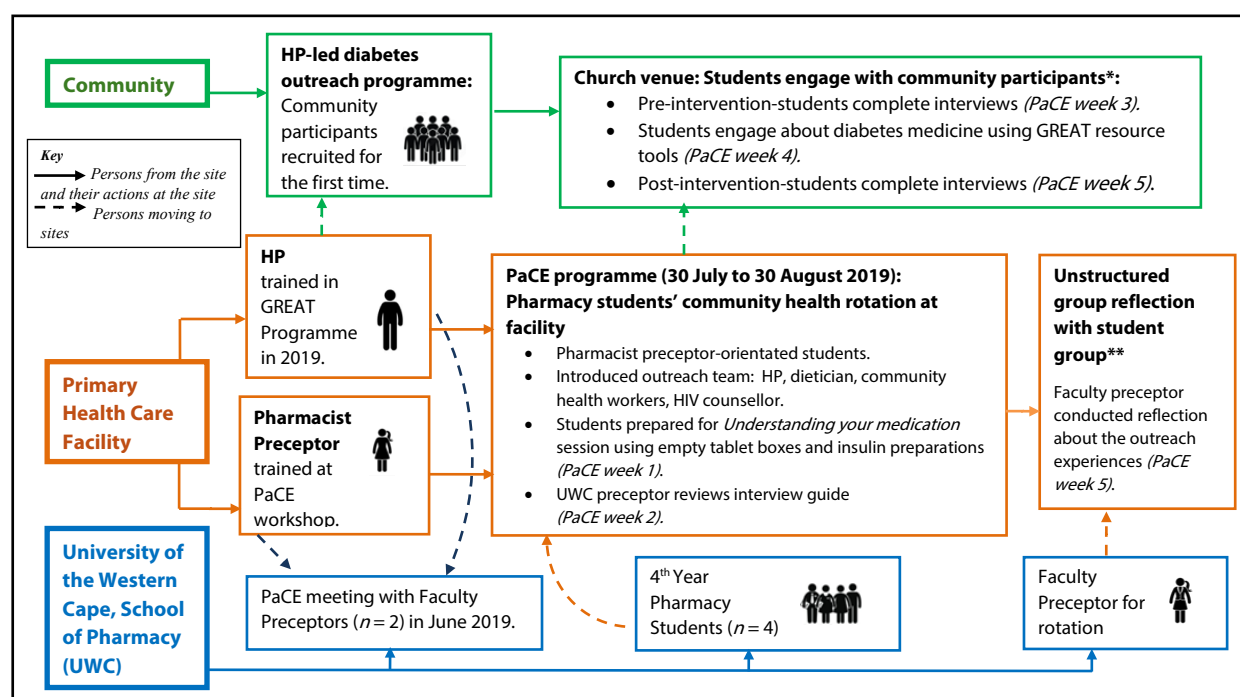
Study population

The study population was comprised of fourth-year pharmacy students using a purposive sampling technique.¹⁴ Inclusion criteria included registrations as pharmacy students with the South African Pharmacy Council (SAPC) and registration with UWC for the BPharm IV module (PHC 405).¹⁰ Community participants' inclusion criteria included adults (> 18 years) with or without a diagnosed chronic condition and excluded those participants who did not reside in the eastern sub-district suburb.

Community-based diabetes educational outreach intervention

The purpose of this community-based educational intervention was to empower chronic diabetic patients and those at risk of diabetes who may not readily have access to health information.¹⁵

The facility pharmacist preceptor orientated the students, outlined the PaCE activities, introduced the HP who shared the structure of the outreach sessions, and the interprofessional team members consisting of a dietician, CHWs ($n = 3$) and a HIV counsellor. Figure 1 outlines the operational process between the role players for the outreach. As the provision of pharmaceutical information falls within the scope of practice of the pharmacy students,¹⁶ they were responsible for supplementing the GREAT diabetes educational resource materials⁶ with empty tablet boxes and insulin dosage forms as tangible aids to facilitate medicine identification for community participants. The four educational sessions conducted once weekly over three weeks, included the students' session 'Managing diabetes with medication' (Table 1).



Key: PaCE = Patient Care Experience; HP = health promoter; GREAT = Group Empowerment and Training

Figure 1: Schematic representation of the health promoter-led diabetes outreach with pharmacy students and data collection with community participants questionnaire* and student group reflection**

Table I: Description of diabetes outreach sessions presented over three weeks⁶

Session 1: Understanding diabetes	Session 2: Living a healthy lifestyle	Session 3: Understanding your medication	Session 4: Preventing complications
<i>PaCE week 3</i>	<i>PaCE week 4</i>		<i>PaCE week 5</i>
• <i>Students conduct pre-intervention group interviews.</i> • HP introduced the programme to participants. • Common myths and facts about diabetes: HP with assistance of students used true and false cards. • <i>What is diabetes?</i> HP used flipchart to explain diabetes in the body.	• Introduction: HP asked participants to share what they have learnt thus far. • <i>What is healthy food?</i> The dietician used food choice cards, with students assisting. • Dietician used flipchart to engage community participants about: - What are sensible or healthy portion sizes; - How to prepare food; -Timing of meals and snacks; -Physical activity; - Lifestyle issues (smoking, stress, depression, alcohol).	• Introduction: HP asked participants to identify what they have learnt thus far. • <i>Managing diabetes with medication:</i> Students used the flipchart to explain how medicines work; used empty tablet boxes to identify medicines and differentiate between brand names of medicines, demonstrated use of insulin preparations, and drew attention to common side-effects of medicines. • Dealing with hypoglycaemia: HP presented.	• Introduction: HP asked participants to share what they have learnt thus far. • HP presented: - The dangers of high blood glucose - Recognising and controlling high glucose - What medical assessments need to be done to effectively identify and prevent complications and when these should be done • <i>Students conduct post-intervention group interviews.</i>
Closing session: HP encourages group to share SMART goals.			

Blood glucose testing, blood pressure measured and HIV testing: performed by community health workers, HIV counsellor and students recorded readings. Participants who were identified to be unstable were referred to the clinic.
(HP = health promoter; SMART = smart, measurable, achievable, relevant and a timeframe)

The CHWs conducted blood glucose testing and measured blood pressure, which students recorded onto pre-coded (de-identified) questionnaires.

Data collection

On the final day of the community health rotation at the facility, the UWC faculty preceptor held an unstructured group reflection with the students, which was audio recorded, to ascertain their experiences with the HP, the outreach team, use of the educational resources, and engagement with the community members in a community-based setting.

For the student learning activity, students drafted a questionnaire, which was finalised by the UWC faculty preceptor (MvH) (Table II), to ascertain whether there were changes in community participants’ awareness of the information on diabetes¹⁷ at the outreach sessions. The same question guide was administered during face-to-face group interviews at pre-and post-intervention, responses were captured verbatim on pre-coded questionnaires that de-identified each community participant’s screening test results, which were only known to the HP and CHWs.

Data analysis

A rapid qualitative evaluation technique¹⁸ was undertaken to analyse the results. In addition, an independent health researcher was included to further analyse the data sets.

Student group reflection

Audio recording of the unstructured group reflection was transcribed verbatim for manual thematic analysis, using inductive qualitative content analysis.¹⁹ The question guide was used to code the transcription, recurring codes were highlighted, and categorised. Emergent themes were identified through constant

Table II: Students’ question guide used during pre- and post-intervention during the outreach
Question 1: What do you understand about diabetes?
Question 2 (a): What kinds of foods are you eating? (b): What types of things are you doing when it comes to keeping active?
Question 3: What type of medication are you taking?

comparison from data immersion, refined and verified by the co-authors (AB, MvH). Alpha-numeric codes were used to conceal the students’ identity from the respective quote.

Community participants’ pre- and post-intervention responses

Pre- and post-intervention responses were tracked for each community participant using an alpha-numeric identifier, noted verbatim, coded and analysed thematically. After constant comparison, emergent themes about awareness of practical diabetes concepts were identified and presented in detailed narrative. One of the co-authors (AB) who was not involved in questionnaire design checked the codes and emergent themes, which the two co-authors (MvH, FS) verified.

Dependability was achieved by an audit trail, which included the comparison of the pharmacist preceptor’s field and facility notes from the start to completion of the student group’s rotation. Discussions and reflections between the researchers during the planning, during and after the implementation of the activity were diarised to provide rigour to the study. All co-authors checked the students’ unstructured group reflection transcriptions and the questionnaire responses. Credibility was ensured at each thematic analysis step, between the independent researcher and the research team to concur inferences from the data. The independent researcher’s analysis and systematic approach to categorise the data aimed to overcome biased reporting.

Ethical considerations

Ethics approval for the study was obtained from the UWC Biomedical Research Ethics Committee (BM18/6/14, 31 July 2019) and the UWC Registrar (UWCRP080419MVH, 08 April 2019). The pharmacist preceptor and HP obtained informed consent from students and community members respectively. Students were informed that should they opt not to participate in the group reflection, no penalty would be imposed for any of their assessments in the rotation.

Results

All pharmacy students (female [$n = 1$], male [$n = 3$]) participated in the interprofessional educational activity for their community health rotation, the diabetes educational outreach sessions and the unstructured group reflection (student 1 [P3], student 2 [P4], student 3 [P5] and student 4 [P6]) which amounted to 70 minutes. Students' engagement with community participants ($n = 13$), consisted of pensioners (female [$n = 10$], male [$n = 2$], unspecified [$n = 1$]), either Afrikaans or English speaking, diagnosed with DM ($n = 6$) and undiagnosed ($n = 7$).

Four emergent cross-cutting themes gleaned from the student group reflection were identified, namely: 1) community participants' awareness of key diabetes messages (pre-and post-intervention), 2) engagement with community participants in a non-traditional venue, 3) IPE experience, and 4) application of pharmaceutical concepts, communication and social awareness skills.

Theme 1: Students' observations and perceptions of community participants' awareness of information about the causes of diabetes, diet, exercise, and medication use

Students reflected that community participants were able to recall information in their understanding of diabetes and risks with treatment non-adherence, as noted in their pre-and post-intervention responses.

'And (*after the sessions*) we asked them what diabetes is and they can answer ... that is actually very nice.' (P4)

Students recalled that while community participants could identify high risk foods, at post-intervention opted for healthier food choices (participant A3) and active lifestyle.

'We asked them the same questions (*after the sessions*), and they could tell you, it's sugar and it's dangerous, the food groups for eating properly, the exercises that you must do... so you can see they actually learned something, they actually know something.' (P4)

Students attested that most participants initially did not know much about the medicine indication and the consequences of not adhering to their treatment regimen. They added that community participants' nondescript pre-intervention responses about their medicines, were limited to dosage form (injection, tablets) and colour, but changes emerged at post-intervention where they referred to medicine names (metformin, simvastatin).

Theme 2: Student perceptions about community participants engagement in a non-traditional venue

Students espoused that community participants openly shared their personal experiences with diabetes, as they felt being heard, which also created a conduit for peer-learning.

'And it helps that the community (*participants*) is helping each other, they're supporting one another. And I enjoyed like this one lady that said her son was quite young and he died of diabetes. And I said that's the kind of story you should be sharing in your groups because they need to open their eyes that this thing can kill you.' (P3)

Students noticed how the outreach environment, located away from the confines of a health facility, was conducive for equitable engagement between healthcare workers and community participants.

'I think they (*community participants*) are more comfortable when they're in their space, they can just talk to you...because as soon as you are here (at the facility) they know this is the pharmacists, so they give you that title of pharmacists so they are afraid to talk to you about many other things, but in their space, it is their comfort zone, so they're actually more open to talk about certain things.' (P5)

'It's very important to have the sessions there (*in the community*) because the window (*at the pharmacy*) also creates a barrier... it's you (*the patient*) you're inferior and I'm (*the pharmacy staff*) superior so there is no time for engagement.' (P4)

Theme 3: Interprofessional experiences

Students observed the HP's respect for professional boundaries, and how he synchronised the available technical expertise towards an educational goal for the community. The absence of hierarchical barriers led to a harmonious working relationship, which enabled the students' seamless integration into the team. Students' novel experience with a HP as facilitator and the CHWs was also shared.

'Like I feel there's a lot of respect going around because there's respect for our level and knowledge and we respect him (*the HP*) in his level of knowledge. And that's how we work together...is respect to each other's profession. Even the healthcare workers, like we all...and the dieticians, we work with a few different professions and there was...it was a team, it wasn't like okay no, I'm here and you're there. No one bossed no one around or anything. It's just a matter of that's your expert field and you're going to handle that field, that's your expert and you're going to do...which is very nice.' (P3)

'I've heard about a health promoter but I've never like could meet them. And like working in the facility with (*HP's name*) and the other counsellors and everyone, it's so nice and like the nicest thing about working with (*HP's name*), he doesn't treat you like a student at all. He would tell us like you guys know better than me...as long as like you prepare and you go there...he lets you talk.' (P4)

Theme 4: Students' learning experiences in applying pharmaceutical concepts, improving communication and becoming socially aware

Students attested that by applying classroom-based theory at the community coalface, they could improve their communication skills, build confidence and became socially aware.

'Last time we did diabetes with (name of lecturer), so it's different from theory in class and then actually putting it into practice.' (P4)

'It really opened our eyes to diabetes, like especially for education...like diabetes, the insulin, the tablets. It's something that will stay with us forever, because you'll always remember it, you'll always use counselling skills on diabetic medication. So it's very helpful for us, I think.' (P3)

'I for one, definitely (feel more confident)...we came here for example two weeks ago, we had to do a presentation of the poster. I stood there in front, I didn't say anything. He (*HP name*) spoke the whole time, I didn't say anything. And yesterday I was actually comfortable enough to talk to the patients in the waiting area and I was like 'oh, okay', I actually spoke to a group of patients today.' (P4)

'For me I was doing a(n) insulin use demonstration. So on my first visit in the community, I was nervous and I was shaking, I couldn't like teach them like, but on my last visit I did very well and *facility pharmacist preceptor* even complimented me.' (P6)

Students endorsed the reciprocal nature of the educational interaction, observing how the guiding style superseded the didactic approach typically experienced during information dissemination in the pharmacy service environment. In the absence of the traditional directing style, students underscored the HP's guiding style when communicating with the community participants, creating mutual respect and an equitable relationship.

'We get to apply more MI (*motivational interviewing*) outside with *HP name* than in the pharmacy.' (P4)

'... I've learned a great deal especially from (*HP name*) like when you have to stand in front of people and then, you don't want to lecture them but you want to be more entertaining like the smiling, maybe something a joke or something...like just being expressive with the hands and stuff. I think I learned a lot in that aspect.' (P5)

'I think that communication we've learned in the group discussions can apply now to individual patients in the pharmacy.' (P3)

Discussion

This study investigated pharmacy students' perceptions and learning experiences of an interprofessional HP-led community-based diabetes educational outreach intervention. To our knowledge, this is the first description of this type of experiential learning activity compared to IPE designs noted in the literature.²⁰

Students reported that community participants' awareness about diabetes risk, healthy dietary preferences and medicine use showed an improvement from pre-to post-intervention responses. Similarly, enhanced recall and understanding by participants were shown in other studies that employed this educational intervention.^{6,21} Students perceived that by using empty diabetes medicine packaging to concretise the concept of generic substitution, participants were alerted to familiarising the name of the active ingredient to identify their prescribed treatment, which, if overlooked, would negatively affect adherence.²²

Locating the students' IPE and collaborative activity in a community setting unveiled the health facilities systemic (overcrowding, long patient queues) and infrastructural (pharmacy window, poor acoustics) barriers that induce stress among healthcare practitioners and patients, limiting communication time and quality service provision, thereby compromising provider-patient relationships.²³ Students perceived an advantage for the non-traditional setting to contextualise their learning in preparation for interprofessional practice in COPC.²⁴

Students appreciated the HP's leadership and facilitation of the interprofessional healthcare team, which contributed to their seamless integration. They believed that the HP and pharmacist preceptor's preparation, HP's open communication, mutual respect with team members, and understanding each presenter's role and responsibilities, were key factors that facilitated interprofessional collaboration, similarly noted in the literature.²⁵ Students were allowed to work independently, which is often cited as a challenge for traditional IPE facilitators.²⁶ While HPs have managed to carve out a role in community engagement, training and supervising of CHWs, they might be an invaluable training resource in pharmacy experiential learning activities.⁹

By applying theoretical concepts students perceived that their knowledge and confidence in patient counselling increased, similarly reported in the United States where an interprofessional service-learning experience in a paediatric 'diabetes camp' showed improved student knowledge of diabetes, confidence in patient counselling and comfort with teamwork.²⁷ Furthermore, students noted that the guiding style used in motivational interviewing contributed towards improved community awareness to diabetes, concurring with the finding from a student-led smoking cessation interprofessional and collaborative practice activity in Arizona.²⁸

Limitations and recommendations

The findings are not generalisable for pharmacy training, as the study was limited to a very small student sample size, confined to one community and one interprofessional learning rotation. Comparative studies are needed to determine pharmacy students' interprofessional training experiences at health facilities where COPC is operational to arrive at more conclusive findings. Pharmacy students' health education interventions should prioritise community-based settings to contextualise their learning experiences.

Conclusion

Pharmacy students valued the interprofessional, HP-led community-based structured educational outreach intervention which may be considered as an experiential learning option for training institutions.

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Conflict of interest

The authors declare they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

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References

1. International Diabetes Federation. IDF Diabetes Atlas 10th ed. IDF, Brussels, 2021. Available from: <https://diabetesatlas.org/atlas/tenth-edition/>. Accessed 10 May 2024.
2. Statistics South Africa. Non-communicable diseases in South Africa: Findings from death notifications 2008–2018. Statistics South Africa, Pretoria, 2023. Available from: <https://www.medicalbrief.co.za/wp-content/uploads/2023/10/STATS-SA-Report-03-08-012018.pdf>. Accessed 17 May 2024.
3. Pheiffer C, Pillay-van Wyk V, Joubert JD, et al. The prevalence of type 2 diabetes in South Africa: a systematic review protocol. *BMJ Open*. 2018;8(7):e021029. <https://doi.org/10.1136/bmjopen-2017-021029>.
4. Mash B, Ray S, Essuman A, Burgueño E. Community-orientated primary care: a scoping review of different models, and their effectiveness and feasibility in sub-Saharan Africa. *BMJ Glob Health*. 2019;4(Suppl 8):e001489. <https://doi.org/10.1136/bmjgh-2019-001489>.
5. Mash R, Goliath C, Mahomed H, et al. A framework for implementation of community-orientated primary care in the Metro Health Services, Cape Town, South Africa. *Afr J Prim Health Care Fam Med*. 2020;12(1):a2632. <https://doi.org/10.4102/phcfm.v12i1.2632>.
6. Botes AS, Majikela-Dlangamandla B, Mash R. The ability of health promoters to deliver group diabetes education in South African primary care. *Afr J Prim Health Care Fam Med*. 2013;5(1):484. <https://doi.org/10.4102/phcfm.v5i1.484>.
7. Nichols-English GJ, White CA, Brooks PJ. Bridging community based pharmacy outreach with service-learning principles. *Am J Pharm Educ*. 2002;66(2):124–31. Available from: <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=711a9a5c1ceaa40d-4b2e43545aea4be19dfb1d89>. Accessed 29 December 2021.
8. National Department of Health. The national health promotion policy and strategy 2015–2019. National Department of Health, Pretoria, 2015. Available from: <https://knowledgehub.health.gov.za/system/files/elibdownloads/2023-04/National%252520health%252520promotion%252520policy%252520and%252520strategy%2525202015%252520-%2525202019.pdf>. Accessed 05 December 2024.
9. Rwafa-Ponela T, Eyles J, Christofides N, et al. Implementing without guidelines, learning at the coalface: a case study of health promoters in an era of community health workers in South Africa. *Health Res Policy Syst*. 2020;18(1):46. <https://doi.org/10.1186/s12961-020-00561-5>.
10. Coetzee R, Bheekie A, van Huyssteen M. Patient Care Experience (PaCE) rotation PHC 405 second semester 2019 course reader. Cape Town: University of the Western Cape; 2019.
11. Van Wyk H, de Beer M. Inter-professional education: Healthcare students' experiences. *S Afr J Occupational Therapy*. 2017;47(2):35–40. <https://doi.org/10.17159/231-3833/1017/v47n2a6>.
12. D'amour D, Oandasan I. Interprofessionalism as the field of interprofessional practice and interprofessional education: An emerging concept. *J Interprofessional Care*. 2005;19(Suppl 1):8–20. <https://doi.org/10.1080/13561820500081604>.
13. Bheekie A, Bradley H. Re-engineering of South Africa's primary health care system: where is the pharmacist? *S Afr Fam Pract*. 2016;58(6):242–8. <https://doi.org/10.1080/20786190.2016.1186365>.
14. Polit DF, Hungler BP. *Nursing Research: Principles and Methods*. 5th ed. Philadelphia: Lippincott; 1995.
15. Mash RJ, Schouw D. The sustainability of group empowerment and training for people with diabetes in South Africa. *S Afr Fam Pract*. 2024;66(1):a5918. <https://doi.org/10.4102/safp.v66i1.5918>.
16. South African Pharmacy Council. Student scope of practice. South African Pharmacy Council, Pretoria, 2023. Available from: https://www.pharmacouncil.co.za/Student_Scope. Accessed 22 July 2023.
17. Rahman ZU, Irshad M, Khan I, et al. A survey of awareness regarding diabetes and its management among patients with diabetes in Peshawar, Pakistan. *J Postgrad Med Inst*. 2014;28(4):372–7.
18. Vindrola-Padros C, Brage E, Johnson GA. Rapid, responsive, and relevant?: A systematic review of rapid evaluations in health care. *Am J Eval*. 2021;42(1):13–27. <https://doi.org/10.1177/1098214019886914>.
19. Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs*. 2008;62(1):107–15. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>.
20. Machado AC, Czock A, Boone J, et al. How interprofessional education is offered to pharmacists and pharmacy students: A scoping review. *J Interprofessional Educ Pract*. 2022;29(1):100563. <https://doi.org/10.1016/j.xjep.2022.100563>.
21. Serfontein S, Mash RJ. Views of patients on a group diabetes education programme using motivational interviewing in South African primary care: a qualitative study. *S Afr Fam Pract*. 2013;55(5):453–8. <https://doi.org/10.1080/20786204.2013.10874395>.
22. Kvarnström K, Westerholm A, Airaksinen M, et al. Factors contributing to medication adherence in patients with a chronic condition: a scoping review of qualitative research. *Pharm*. 2021;13(7):1100. <https://doi.org/10.3390/pharmaceutics13071100>.
23. Steyn K, Levitt NS, Patel M, et al. Hypertension and diabetes: Poor care for patients at community health centres. *S Afr Med J*. 2008;98(8):618–22.
24. Ugwuanyi AE. Community-oriented primary care footprinting: An undergraduate programme experience. *S Afr Fam Pract*. 2024;66(1):a5854. <https://doi.org/10.4102/safp.v66i1.5854>.
25. Seaton J, Jones A, Johnston C, et al. Allied health professionals' perceptions of interprofessional collaboration in primary health care: an integrative review. *J Interprofessional Care*. 2020;35(2):217–28. <https://doi.org/10.1080/13561820.2020.1732311>.
26. Van Diggele C, Roberts C, Burgess A, et al. Interprofessional education: tips for design and implementation. *BMC Med Educ*. 2020;20(Suppl 2):455. <https://doi.org/10.1186/s12909-020-02286-z>.
27. Johnson JL, Crawford LD, LaRochelle JM. A summer diabetes camp as an interprofessional service-learning experience for early experiential pharmacy students. *Curr Pharm Teaching Learn*. 2014;6(4):494–501. <https://doi.org/10.1016/j.cptl.2014.04.003>.
28. Tsu L, Buckley K, Early N, et al. Evaluation of multidisciplinary and pharmacy-only student-run clinics on student's perceptions of interprofessional roles. *Curr Pharm Teaching Learn*. 2018;10(6):785–94. <https://doi.org/10.1016/j.cptl.2018.03.018>.