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ORIGINAL ARTICLE

Establishing Multidisciplinary Clinical Vocational Centres of Excellence: An Interprofessional Clinical Training Approach in Zambia

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ABSTRACT

Background: In Zambia, the rapid expansion of health training institutions has outpaced the availability of infrastructure and teaching staff, creating significant challenges in healthcare training. This situation requires the acquisition of clinical skills, which can be challenging for trainees. Clinical skills laboratories have emerged as a vital solution, offering a safe and supportive environment. However, many training institutions cannot adequately equip their skills labs, despite their importance, as mannequins and models are often too costly. Additionally, interprofessional training is rarely used in most set ups

Programmatic review: This paper presents a descriptive programmatic review of SolidarMed's project, which established and operationalised two Vocational Centres of Excellence (VCEs) at Kabwe Central and Kafue General Hospitals, each with simulation labs, e-learning suites, and multipurpose spaces. Additionally, 140 interprofessional healthcare workers were trained as preceptors.

Results: In 2024, over 12,000 learning encounters were recorded, with 76.4% utilisation of the VCE spaces. Trained healthcare educators reported increased confidence, improved attitudes towards student teaching, effective communication, enthusiasm, and collaboration.

Conclusion: The VCEs provide high-quality, standardised environments for healthcare training, addressing critical gaps in clinical education. However, challenges such as limited equipment and insufficient funds persist. We recommend that the Ministries of Health and Education adopt this model and enact a policy for all training institutions.

Introduction

Skills laboratories, commonly referred to as "skills labs," provide a safe and controlled environment where learners can practice clinical skills before

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Keywords: clinical simulation, interprofessional training, preceptors, Zambia, e-learning, skills lab

This article is available online at: http://www.mjz.co.zm, http://ajol.info/index.php/mjz, doi: https://doi.org/10.55320/mjz.53.2.742
The Medical Journal of Zambia, ISSN 0047-651X, is published by the Zambia Medical Association

applying them in real clinical settings[1]. The use of a skills lab has increasingly been identified as an essential resource for health professions training[2]. It has been classified as a prerequisite for accreditation for health training programmes in Zambia.

Zambia has experienced an exponential increase in training institutions, resulting in an increase in students without a corresponding increase in teaching staff and learning infrastructure. Several factors have contributed to this increase, including the following: the liberalisation of the training industry, which has seen the mushrooming of health training institutions everywhere, the re-designation of hospitals to training levels, as well as the increase in the number of programmes in the existing schools, colleges, and universities [2].

This has resulted in clinical teaching and learning on patients being practically impossible for all learners to gain the required clinical skills [4,5]. Furthermore, patients are now more informed and have higher expectations, and are less likely to accept the role of passive participants in bedside education with enthusiasm. They also retain the right to decline involvement with students[6]. Clinical skills lab, therefore, offers the best alternative for learning skills before practising them on patients[3].

Clinical skills laboratories are valuable resources for teamwork and inter-professional education[7]. They offer students access to learning opportunities in a safe and supportive environment. This setting helps bridge the gap between classroom learning and clinical practice, thereby reducing students' anxiety [3]. Studies have shown that students who graduated from innovative medical schools utilised more skills during their clerkships than those who completed traditional programmes[8].

Clinical simulation is increasingly used in nursing education to enhance students' clinical competence and self-efficacy [9]. High-fidelity simulations, utilising patient simulator manikins, can replicate real-life scenarios, allowing students to practice both technical and non-technical skills in a safe environment[10].

Despite their importance, training institutions cannot stock their clinical skills labs with mannequins to cover the whole spectrum of learning procedures for students and qualified staff. Additionally, many of the mannequins and models used in healthcare institutions are worn out and unusable, and the replacement costs are often beyond the reach of most healthcare training institutions.

SolidarMed conducted a needs assessment at provincial hospitals in the country which receive significant numbers of students on clinical rotation. The major findings were Inadequate infrastructure and a lack of capacity building for the clinical teachers. With this background, SolidarMed supported a project on Advancing Vocational Clinical Education in Zambia (ACEZ). SolidarMed seeks to sustainably strengthen the National Health Education System in Zambia by developing decentralised vocational health education hubs. The project has three main objectives:

1. Improving practical vocational training by establishing Vocational Centres of Excellence.
2. Improving Instructor Training by strengthening existing training models.
3. VCE and Instructor training models are sustainably integrated in the national health education system.

The ACEZ project initiative aligns with Zambia's National Health Strategic Plan 2022–2026 and the Human Resources for Health Strategic Plan 2020–2024, both of which emphasise the need for quality clinical education and expansion of the health workforce through innovative approaches [14].

It also responds to regional priorities outlined in the WHO Global Strategy on Human Resources for Health: Workforce 2030 and the 2023 WHO Africa Health Workforce Status Report, which recommend investing in decentralised and simulation-based learning models to address workforce shortages in sub-Saharan Africa[12,13].

SolidarMeds' implementation of the ACEZ project in Zambia contributes to a growing body of regional evidence demonstrating the effectiveness of decentralised, skills-based health education in sub-Saharan Africa. Similarly, the USAID-funded Human Resources for Health (HRH) Kenya Mechanism successfully strengthened health workforce training. Some of the outputs included accrediting expert practicum sites, structured mentorship, and aligning curricula to national competency-based standards[16].

Likewise, Rwanda's National Simulation and Skills Training Centre illustrates how targeted investment in simulation-based learning can deliver high-impact, context-appropriate training in low-resource settings [15]. These comparable initiatives affirm that SolidarMed's strategy to establish VCEs, enhance instructor training, and integrate these innovations into Zambia's national health education system is both feasible and scalable.

The ACEZ project's experience reinforces the importance of decentralisation, simulation-based learning, and faculty capacity-building as effective levers for strengthening practical vocational training across the region.

METHODOLOGY/ INTERVENTION

This paper is a descriptive programmatic review that outlines how SolidarMed established and operationalised two multidisciplinary VCEs to enhance clinical training and improve healthcare outcomes. Integrated within Kabwe Central Hospital and Kafue General Hospital, each VCE comprises an e-learning suite, a general skills lab, an advanced skills lab, a seminar room, and a multipurpose hall.

Data sources include SolidarMed's Monitoring and Evaluation (M&E) systems, VCE administrative records, preceptor training attendance logs, utilisation tracking dashboards, and partnership activity reports.

Development of Training Resources and Standardisation

SolidarMed, in partnership with the University of Zambia Department of Medical Education and Development (UNZA-DMED), developed a Multidisciplinary Preceptorship (MDP) curriculum and procedure manuals to ensure consistent, high-quality training. These resources provide standardised instruction for preceptors, detailing methodologies for delivering hands-on practical skills training.

The MDP curriculum encompasses essential competencies, including clinical training, assessments, simulation exercises, clinical reasoning, and skills lab management. The curriculum was accredited as a Continuous Professional Development (CPD) course by the Health Professions Council of Zambia (HPCZ) in 2024, awarding participants 30 CPD points upon completion of the training.

Training and Capacity Building

Following the successful development of the curriculum, a series of 10-day MDP training workshops were conducted across the VCE sites. These workshops targeted healthcare professionals, including doctors, medical licentiates, clinical officers, nurses, and midwives. The number of preceptors to be trained was guided by the Nurses and Midwives Council of Zambia (NMCZ) recommended preceptor-to-preceptee ratio of 1:50.

A purposive sampling approach was employed to select health professionals who were expected to teach but had not yet received adequate training to do so. Using the MDP training manual as a guide, the workshops adopted a competency-based, modular, and participatory approach to build skills in clinical instruction, simulation-based training, and assessment techniques. These workshops equipped preceptors to serve as certified trainers and advocates for quality assurance in healthcare education.

Strategic Partnerships and Institutional Collaboration

Key partnerships were forged with Zambia's Ministry of Health (MoH), Ministry of Education (Higher Education Authority), and the University of Zambia to support the VCE initiative. The University of Zambia collaborated closely with SolidarMed on the development of MDP training curriculum and procedure manuals. The University of Zambia also facilitated the training of 140 preceptors.

The MoH supported the implementation of VCE activities at the provincial level, ensuring coordination with local healthcare facilities and the integration of training programs. The MoH supports salaries for all staff serving at the VCEs, as per the Memorandum of Understanding, for the sake of sustainability.

SolidarMed also partnered with AMBOSS (www.amboss.com), a leading digital medical education platform, to offer free access to a digital medical library to medical licentiate VCE users, supporting continuous education and skill refinement. Collaborating with Swansea University in the UK, SolidarMed incorporated simulation training and lab design expertise to develop tailored programs for VCE educators.

Breathe Medical has been added as another partner for clinical simulation, with a twist for preceptors: they can use an app called Upleap to create clinical simulation training scenarios. SolidarMed's support extended to sponsoring postgraduate certificate courses in medical education for preceptors, fostering a sustainable pool of qualified trainers.

Ethical Statement

This programmatic review did not involve human subjects and was therefore exempt from review under the ethical guidelines.

Early Outcomes

With the growing population of healthcare-related program personnel, the demand for infrastructure and trained teachers proved prudent to aid the smooth transfer of skills and knowledge. Establishing VCEs and multidisciplinary training of preceptors has helped narrow the challenges in training healthcare providers.

Notable early positive strides resulting from the implementation of this program have had a positive impact on the overall healthcare system in terms of health education. Some early, impactful outcomes of the system include improved attitudes towards student teaching among healthcare workers, expansion of healthcare training infrastructure, and development of multidisciplinary and interprofessional collaboration through effective communication.

Expansion of training infrastructure space

Initially, the decentralised model of training healthcare providers had shortfalls regarding training space, particularly with an increased number of students in the hospital. This presented challenges in training students, leaving them with few or no opportunities to acquire, practice and perfect clinical skills. Figure 1 below shows the different spaces available in the VCEs and their utilisation.

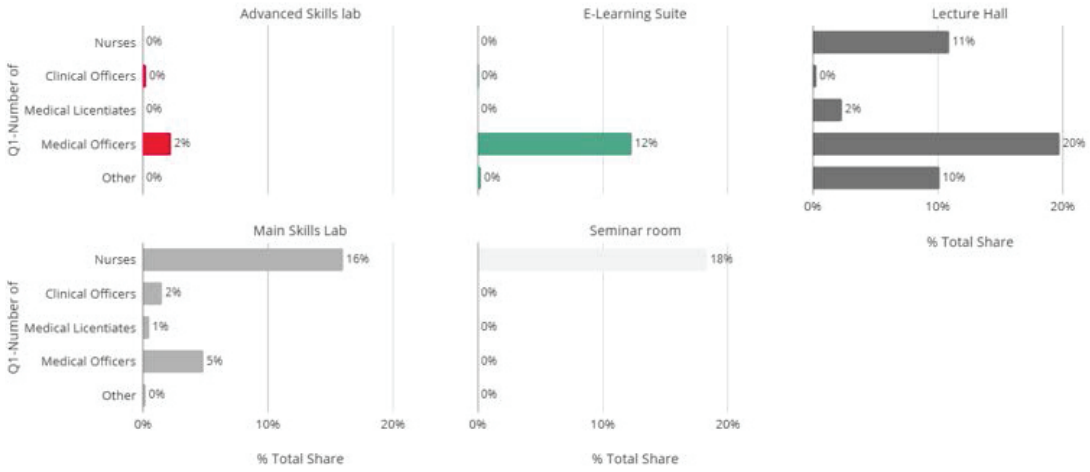

Figure 1: Utilisation of the different spaces in the VCE: ***Utilisation****: Proportion of available VCE operating hours used for training sessions, calculated as total hours used / total possible training hours per week.*

With the introduction of VCEs attached to hospitals and training institutions, healthcare workers and students have more space to practice and refine their clinical skills. This can be evidenced by VCE's programmatic database statistics, which show a 76.4% usage of VCEs in Kafue and Kabwe among various training students and healthcare workers. In addition, the VCEs are equipped with high-fidelity mannequins, which provide extra motivation for learners to acquire and perfect their clinical skills.

In 2024, there were over 12,000 learning encounters across all the VCES, which is encouraging as these students would not typically have an optimal learning environment.

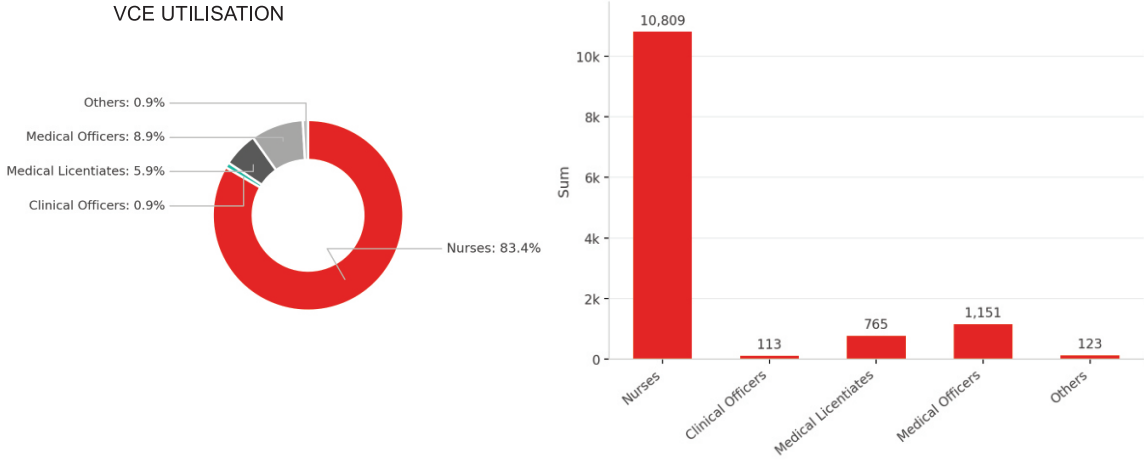

Figure 2: Dashboard data for summary student learning encounters for the year 2024. Learning Encounters: Any recorded session of individual or group skills practice, e-learning access, or simulation session conducted at the VCE.

Summary Table: VCE capacities and Utilisation

VCE site	Number of Preceptors trained	E-learning Encounters	Utilisation
Kafue	30	7021	72%
Kabwe	32	5940	64.5%

Improved attitude and vocational skills transfer

Currently, specialised healthcare providers are mainly placed at level 3 hospitals, leaving level 1 and 2 hospitals with few personnel for health teaching. Training students from sites other than level 3 hospitals is more challenging, especially in training-specific programs, such as medical doctors, medical licentiates, and clinical officers.

Anecdotal data indicate that health workers across all training programs at the clinical placement centres generally showed an underwhelming interest and a negative attitude towards teaching students. The two apparent barriers that may have contributed to this were the limited learning space and the healthcare workers' lack of clinical teaching skills in these facilities.

The establishment of VCEs near hospitals, coupled with MDP training, has improved healthcare workers' general attitude and interest in student teaching, particularly at Kafue General Hospital and Kabwe Teaching Hospital. Individuals trained in the MDP program have stepped up to narrow the gap in clinical teaching by demonstrating active enthusiasm for teaching students and sharing clinical skills among themselves in the VCEs.

The figure below illustrates some of the procedures taught in the facility.

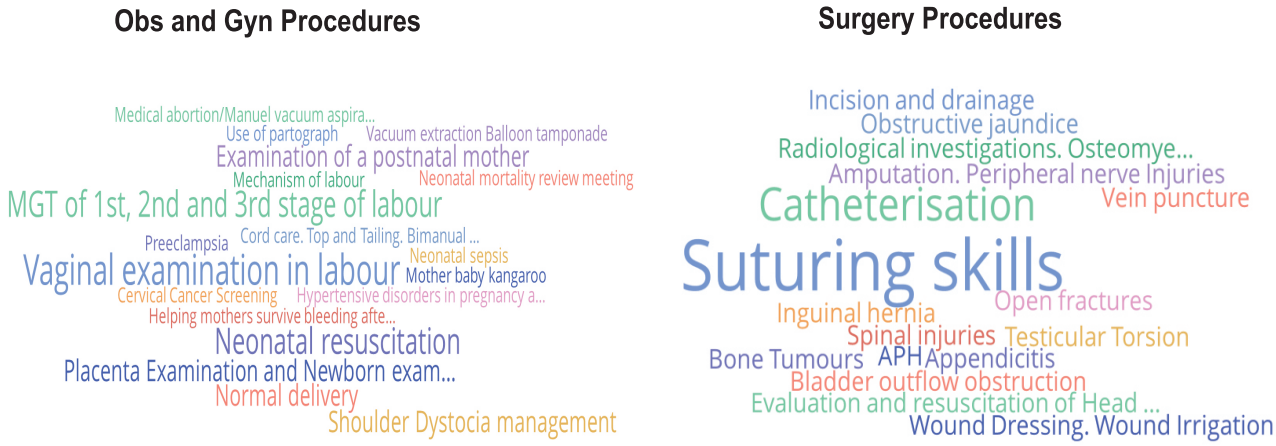

Figure 3: Some of the procedures done at the VCEs

DISCUSSION

Multidisciplinary and Multisectoral Collaboration

The establishment of VCEs and the MDP training conducted at Kafue General Hospital and Kabwe Central Hospital have improved and increased the number of interprofessional relationships. This is a positive development regarding building a healthy working environment, which leads to improved skills transfer among health professionals and, thereby, better patient management.

Furthermore, VCEs are headed by the SMS/MS at a hospital, with the assistance of the head of the college from the nursing school, creating a focal point where the training institutions and hospitals merge. This platform enables effective communication between training institutions and hospitals, which is crucial for student clinical placement and training. The running of the VCEs in Kafue and Kabwe has shown early positive gains in improving communication and collaborative activities.

Challenges and Mitigation Strategies

Establishing and operating VCEs in Zambia has limitations. Addressing these limitations is critical to maximising the centres' potential as hubs for practical skills development in healthcare.

1. **Lack of awareness and understanding of the importance and purpose of the VCEs:** Without sensitisation, the centres are underutilised, resulting in wasted resources and missed opportunities for skill acquisition. Effective sensitisation programs for staff and other stakeholders are necessary to ensure that everyone involved understands the value of the VCEs and actively engages with the available resources.
2. **Limited Equipment for Certain Procedures:** Addressing this challenge requires partnerships with other NGOs that invest in various equipment to ensure comprehensive training that meets the required standards. SolidarMed should continue working with stakeholders who can support the additional purchase of these materials.
3. **Funds for Routine Management:** This can delay essential purchases, maintenance, and general operational expenditures. Establishing a transparent finance management system for the VCEs would enable quicker responses and improve the centres' efficiency and responsiveness. The memorandum of understanding signed between SolidarMed and the VCE sites should be enforced to ensure the seamless implementation of various activities.

Once these challenges are mitigated, VCEs can become more effective, inclusive, and sustainable, ultimately empowering trainees with the skills they need to succeed in their respective fields and improve patient outcomes.

Lessons Learned

Implementing the Vocational Centres of Excellence revealed several key lessons for enhancing healthcare training. Training preceptors significantly boosts VCE utilisation and fosters a systematic approach to teaching, allowing preceptors to fill instructional gaps effectively when specialists are unavailable. Students involved in clinical settings provide valuable manpower, strengthening healthcare teams while deepening their practical knowledge and skills.

High-fidelity mannequins emerged as essential tools, offering realistic training experiences that improve student competency. Accessibility to facilities and resources enables healthcare professionals to refine their skills, promoting higher standards of care. Additionally, targeted sensitisation campaigns are vital to ensure stakeholders fully understand the VCE's purpose, fostering greater engagement and effective utilisation. Hospitals and nursing colleges should collaborate closely for success.

Developing operational guidelines provides structure and clarity for consistent VCE operations, while addressing equipment needs is essential for comprehensive training. Limited mannequins restrict hands-on group practice, so increasing these resources could improve training efficiency.

Next steps

1. Hospitals with VCEs should establish policies mandating annual use for all staff as part of their continuous professional development. This policy will ensure regular engagement with the VCE, fostering consistent skill development and professional growth among healthcare staff.
2. Introducing a user fee for accessing VCE facilities can create a sustainable revenue stream, supporting maintenance and enabling ongoing enhancements to ensure the facility remains a high-quality learning environment.
3. Expanding the VCE model to additional regions and health facilities will broaden access to state-of-the-art training and reinforce healthcare education and professional development on a larger scale.
4. Increasing the number of trained preceptors at each VCE will extend the reach and quality of training, providing more healthcare professionals with comprehensive, hands-on learning opportunities.
5. Implementing Train the Trainer programs will equip experienced preceptors with the skills to train new preceptors, creating a sustainable knowledge transfer cycle and capacity building within the VCE network.
6. Integrating interactive projectors into the VCEs will enrich training sessions, enabling more dynamic and immersive learning experiences and supporting complex clinical simulations, resulting in a more effective educational environment.

CONCLUSION

The novel initiative of Vocational Centres of Excellence in Zambia is critical in strengthening healthcare education in low-resource settings. It is closely aligned with Zambia's National Health Strategic Plan (2022–2026) and Human Resources for Health Strategic Plan (2020–2024), as well as regional and global strategies calling for innovative, decentralised approaches to health workforce development.

By providing a dedicated space for skills labs, e-learning, and advanced clinical practice, the VCEs bridge the gap between theoretical learning and practical application. Developed with support from SolidarMed and key partners, such as the University of Zambia and the Ministry of Health, the VCEs are equipped with essential resources and high-fidelity mannequins, enabling trainees to gain hands-on experience in a structured environment.

Plans include policy advocacy to expand the VCE model nationally for training facilities, developing policies to integrate VCE utilisation into continuous medical education, and implementing sustainable financing options. VCEs have the potential to further improve healthcare training and outcomes across Zambia, creating a resilient and skilled healthcare workforce prepared to meet the country's evolving health needs.

Conflict of interest: None

Funding: This work is supported by SolidarMed and Liechtenstein Development Service

Author approval: All authors read and approved the publication of this article

Acknowledgements: We would like to thank the management teams and all those involved in diligently managing the VCES.

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