




“I Need to Be the First One with a Different Approach and to Make a Difference to the People”: A Mixed Methods Pilot Study on Non-Physician Clinicians Training in Malawi

Farzana Yasmin ^{1,*}, Andreas Schultz ^{2,3,*}, Ajib Phiri², Ralf Weigel ¹

¹Friede Springer Endowed Professorship for Global Child Health, Witten/Herdecke University, Witten, Germany; ²Kamuzu University of Health Sciences, School of Medicine and Oral Health, Lilongwe, Malawi; ³Institute for Hygiene and Public Health, University of Bonn, Bonn, Germany

*These authors contributed equally to this work

Correspondence: Farzana Yasmin, Friede Springer Endowed Professorship for Global Child Health, Witten/Herdecke University, Alfred-Herrhausen-Strasse 50, Witten, 58448, Germany, Tel +49 2302 926 796, Fax +49 2302 926 44746, Email farzana.yasmin@uni-wh.de

Purpose: To improve child health care depends on the availability of sufficient numbers of skilled healthcare workers. To achieve this, the German Society of Tropical Paediatrics & International Child Health supported the existing three-year Bachelor of Science in Paediatrics and Child Health training for Clinical Officers, a non-physician clinician cadre, from 09/2017 to 08/2019. This study aims to evaluate the project to inform forthcoming training.

Methods: All 17 students who were in training took part in this study. Quantitative data collection took place between 01/2018 to 06/2019 using the post-self-assessment bloc course survey, Research Self-Efficacy Scale (RSES), and Stages of Change (SOC) model. Students and key informants participated in three focus group discussions and five in-depth interviews during April 1–10, 2019.

Results: Students mostly perceived bloc course contents “At their level” (92%) and “Very important/relevant” (61%) with “Good quality” teaching (70.5%). The mean (SD) score for RSES (10-point scale) was 9.10 (0.91). The SOC (4-point scale) scores were higher for “Attitude” and “Intention” statements than “Action”. Students found the program well-paced, felt that their clinical knowledge and skills had improved, and valued the acquired holistic disease management approach. They reported increased confidence and being more prepared for leadership roles in their future work. The involvement of international teachers and supervisors enriched their global perspectives.

Conclusion: Students improved their clinical and non-clinical skills, developed self-efficacy and attitudes toward research, and were confident to build and utilize their networks. These transformative experiences could facilitate the development of change agents among current and future trainees.

Keywords: clinical officer, health partnership, child health, transformative learning, interdependence in education, change agent, non-physician clinician

Introduction

Malawi is a southeastern African country with a population of 18.36 million in 2019; 43% are aged 0–14 years.¹ In 2019, newborns, infants, and under-five mortality rates were 20, 31, and 42 per 1000 live births, respectively.² The critical shortage of skilled healthcare workers is one of the major limitations of the Malawian health system.³ Besides, the distribution of staff and health facilities across Malawi is uneven. For example, only 26% of the health facilities are in rural areas, where more than 80% of the population lives.⁴ Furthermore, retention of medical graduates in rural areas is difficult. Between 2006 and 2012, 80% of recent medical graduates remained in the public system, but less than one-third worked in rural areas.^{4,5} Medical specialists are almost absent at the district and sub-district levels. Rural areas seem to

be not attractive because of professional isolation, inadequate living and working conditions, and poor connectivity to health facilities for referral.⁶⁻⁸

In response, Malawi's Ministry of Health (MoH) introduced the clinical officer (CO), a mid-level Non-Physician Clinician (NPC) cadre, based on evidence of retention and successful task shifting to fill the gap of healthcare workers, especially in rural areas.⁹ Moreover, the College of Medicine (CoM) and the MoH introduced a three-year specialist Bachelor of Science (BSc) training program in Paediatrics and Child Health (PCH) for COs in 2012, following successful blueprints from other specialties.^{5,6} The COs from district and sub-district levels were eligible for enrollment, assuming they would return after their graduation, remain there, and take over selected tasks that used to be reserved for specialists. This system would allow people living in rural areas to access more advanced pediatric services.⁶

However, during the program implementation, problems were identified and solutions were tried. For example, the COs' motivation suffered because of a lack of professional recognition and development opportunities, low remuneration, and difficult working conditions; a staff retention strategy was also missing.^{6,10,11} In response, the MoH recognized the graduates as "Clinical Associates" and considered increasing their salaries. The MoH also realized the need for an additional training focus to improve the COs' skills in leadership and in communication and networking to strengthen their health system role and, thereby, increase their motivation.

The theoretical underpinnings for this new focus are the concepts of transformative learning and interdependence in education. Both lead to constructional and institutional reforms, central to the concept of developing "change agents"; both are consequences of fundamental shifts.^{12,13} Transformative learning is about "Shifting from fact memorization to searching, analysis, and synthesis of information for decision making; from seeking professional credentials to achieving core competencies for effective teamwork in health systems; and from noncritical adoption of educational models to creative adaptation of global resources to address local priorities".¹² "Interdependence in education is about shifting from isolated to harmonized education and health systems; from standalone institutions to networks, alliances, and consortia; and from inward-looking institutional preoccupations to harnessing global flows of educational content, teaching resources, and innovations".¹²

With these theories in mind, the CoM, Campus Lilongwe, entered into a partnership with the German Society of Tropical Paediatrics & International Child Health (GTP) to support the BSc PCH CO training program from September 2017 to December 2019. The partnership project added upgraded bloc courses found in line with this theory. In addition, it provided intense supervision, consultation, and mentoring of BSc PCH CO students supported by national and international teachers/consultants in one central (Kamuzu Central Hospital-KCH) and five peripheral health facilities (Kasungu District Hospital-DH, Dedza DH, Salima DH, Mchinji DH, and Namitete private Hospital).^{14,15} This pilot study aims to evaluate the effectiveness of the training style promoted by the partnership project. The objectives are to examine if the partnership-training project contributed to (1) improving the COs' clinical knowledge and skills, (2) enhancing their non-clinical skills, including their attitude and approach to care, leadership, communication and networking skills, and (3) their felt autonomy.

Intervention

Regular and Partnership-Supported Training Formats

The regular three-year (six semesters) BSc PCH CO training program includes one semester of basic medical sciences, two semesters of a district hospital, and three semesters of central hospital placements. During the first district semester in year 2, as "Junior clinical attachment", students learn about acute pediatric care and health promotion and prevention. During the second district semester in year 3, as "Senior clinical attachment", students develop their skills to run the district pediatric ward.¹⁴ The partnership project added the following training formats to the existing MoH training: 1) supervised ward rounds: one-to-one clinical sessions at the bedside at the central and district hospitals, 2) bloc courses: added clinical and non-clinical modules, e.g., disease or system-specific modules, reflective modules - communication, leadership, 3) research project: complementing the existing theoretical research module (Table 1).¹⁶

Table 1 List of Upgraded and Added Features to the Training Program During the Partnership Project

Feature	Upgraded	Newly Added
Soft skills		
Quality of care standards*		
Quality assurance, quality management and quality cycle at workplace*		
Audit and audit cycle*		
Global health knowledge and skills*		
Communication in health profession*		
Understanding health seeking behaviour		
Clinical reasoning		
Essential interventions along the Reproductive, maternal, neonatal, child and adolescent health (RMNCAH) curriculum		
Professional ethics		
Professional skills (includes leadership, communication, writing, referring, record keeping, periodization)*		
Running a children's ward*		
Clinical and non-clinical modules		
History taking and physical examination		
Concepts of neonatology		
Immunology and infectious diseases		
Paediatric cardiac diseases		
Nutrition and Gastroenterology		
Paediatric emergencies		
Paediatric oncology and palliative care		
Renal diseases		
Endocrinology in limited settings		
Respiratory diseases		
Neurodevelopment in children		
Research module and project		
Communication		
Child development		
Child play therapy		
Non-clinical interventions		
Journal Club		
WhatsApp group for communication and case discussion		

Notes: *Knowledge and skills about leadership included as a crosscutting topic. Blue shaded box: Upgraded and added component to the existing curriculum.

Abbreviations: RMNCAH, Reproductive, maternal, neonatal, child and adolescent health.

Materials and Methods

Study Design and Sampling Frame

In this mixed methods study, we used different tools for data collection [(e.g., post self-assessment survey of bloc courses, Research Self-Efficacy Scale (RSES), Stages of Change (SOC) model, in-depth interview (IDI), and focus group discussion (FGD)] to improve the data reliability and validity^{17,18} (Table 2). We used process, content, and outcome indicators to measure the results of the new training formats – bloc course, supervised ward round, and research project.^{17,19} The process indicators measure the bloc course delivery, supervised ward rounds implementation, and research project conduction and supervision. Content indicators relate to bloc courses' subjects, and topics. Outcome indicators measure the changes in students' attitudes, behaviors, and practices in bloc courses and supervised ward rounds. Outcome indicators also measure student research skills changes through the research project. All BSc PCH CO students enrolled in the training during the project period took part in the study.

Data Collection and Analysis

Quantitative Part

The post-self-assessment survey (using a five-point Likert scale) with open-ended questions assessed the bloc courses. In addition, RSES and SOC, including Likert scales, assessed and evaluated the research skills.^{17,18} The RSES measured the research self-confidence using a 10-point scale (1= not able at all, to 10 = very able); the SOC assessed the research-related changes in attitudes, intentions, and actions using a four-point scale (1= strongly disagree, to 4 = strongly agree). All enrolled students (n=17) received the post-self-assessment survey questionnaire for bloc courses. Fifteen out of 17 students returned their questionnaires and were included in the analysis. Survey questionnaires for 12 of 15 bloc courses were completed and included in the analysis. During the study, 10 of 17 students were conducting or had already conducted a small-scale research project and filled up the RSES and SOC questionnaires and we included them in the analysis. Baseline values for RSES and SOC are not available. Data collection took place between January 2018 and June 2019. Data were analyzed using Microsoft Excel version 16.

Qualitative Part

We used a semi-structured interview guide for IDI and FGD. All enrolled students were interviewed (n=17). Three FGDs (one from each intake year) and two IDIs captured the students views at different training levels. Three supervisors involved in the project implementation served as key informants. The study objectives were explained, and written informed consent was obtained from all participants to participate in the study and to publish the data anonymously. Interviews took place at the KCH in Lilongwe, Salima and Mchinji district hospitals, and the Queen Elizabeth Central Hospital in Blantyre between April 1 and 10, 2019. The analysis used the modified grounded theory with a mix of inductive and deductive approaches and a thematic approach using NVivo.²⁰

Results

Quantitative Part

Clinical Knowledge, Skill, and Self-Confidence

The students in this study evaluated twelve bloc courses. Table 3 shows that most students perceived the bloc courses “At my level” (92%) and of “Good quality” teaching (70.5%). In addition, most students found the topics discussed in the

Table 2 Evaluation Framework of the Study

Areas of Improvement	Training Formats	Tools	Sampling Frame
Services	Supervised ward rounds	IDI, FGD	Intake year 2016/17 (8 students)
Structural reinforcement	A research project	RSES, SOC, IDI, FGD	Intake year 2017/18 (5 students)
Knowledge and skills	Bloc courses	Post self-assessment survey, IDI, FGD	Intake year 2018/19 (4 students)

Abbreviations: IDI- In-depth Interview; FGD- Focus Group Discussion; SOC- Stage of Change; RSES- Research Self-Efficacy Scale.

courses “Very important and relevant” to their daily clinic work (61%). The courses also impacted students’ patient management skills, rated as “Every time” (55%) followed by “Almost every time” (43%). Moreover, students “Strongly agree” (55%) that it improved their way of working with other trainees (teamwork) at the hospital, followed by “Agree” (39%). Besides, it enhanced students’ stress coping mechanism at the hospitals, rated as “Agree” (51%) followed by ‘Strongly agree’ (49%). Additionally, the responses indicated that the courses had a ‘Major effect’ (94%) on the student’s perspective on Malawi’s public health system.

Non-Clinical Skills

Evidence-Based Clinical Practice and Quality of Care

The overall mean (SD) rating of 9.10 (0.91) on the RSES 10-point scale (Table 4) shows that students developed research self-efficacy, which may have resulted from conducting a small research project individually or in a group. Students felt enabled to identify research problems, formulate research questions, perform a literature search, and write a literature review. In addition, they gained the confidence to conduct research as a team, plan, collect data, and present their findings.

The project changed the students’ research-related attitudes, intentions, and actions in a positive way. Students “Attitude” towards the importance of learning and understanding research and incorporating it into their clinical practice and commitment to putting research findings into practice were highest rated, mostly as “Strongly agree” (100%) (Table 5). The study found that students’ “Intention” to learn more about research and incorporate its findings into their clinical work was comparatively lower than the SOC “Attitude” statements (Table 5). Students’ perceived changes

Table 3 Post Self-Assessment Survey of the Bloc Courses (n=12)

Statements/Questions	5-Point Likert Scale					
	Far too high	Challenging	At my level	Below my level	Unacceptably low	No comments
Rate the level of the sessions.	-	8%	92%	-	-	-
Are the topics discussed in the bloc important or relevant to your daily clinical work?	Very important/ relevant	Important/ relevant	Moderately important/ relevant	Of little importance/ relevant	Not important/ irrelevant	No comments
	61%	25%	8%	-	-	6%
Rate the way the topic was taught (quality).	Exceptional	Good quality	Standard	Not Satisfying	Poor quality	No comments
	8%	70.5%	19.5%	-	-	2%
Did the bloc course change how you manage patients with conditions discussed during the module?	Every time	Almost every time	Occasionally	Rarely	Never	No comments
	55%	43%	2%	-	-	-
The course improved the way I cope with the stress of my rotation.	Strongly agree	Agree	Sometimes	Disagree	Strongly disagree	No comments
	49%	51%	-	-	-	-
Did the course affect your perspective on the public health system in Malawi?	Major effect	Moderate effect	Neutral	Minor effect	No effect	No comments
	94%	2%	2%	-	-	2%
The course improved my way of working with other trainees on the ward.	Strongly agree	Agree	Sometimes	Disagree	Strongly disagree	No comments
	55%	39%	4%	-	-	2%

Abbreviation: SD- Standard Deviation.

Table 4 Mean Score for Each Statement on the Research Self-Efficacy Scale in Order of Agreement (n=10)

Statement: As a Result of the Program I Am Able To ...	Mean Score (Out of 10)
Identify a clinical problem that is amenable to research	9.70
Formulate a clear research question or a testable hypothesis to address a clinical/public health problem	9.20
Do an effective electronic database search of the literature	9.60
Write a balanced and comprehensive literature review	9.20
Choose a research design that will answer my research question or hypothesis	8.90
Put together a team to help you to conduct your research	9.50
Design and implement the best strategy for collecting my data	9.10
Design and implement the best data analysis strategy for my research study	8.50
Effectively present my study and its implications to large groups of clinical/public health researchers	9.30
Teach someone else how to design and implement a simple research project	8.90
Write a scientific report out of my results research	8.80
Mean (SD)	9.10 (0.91)

Abbreviation: SD- Standard Deviation.

expressed in the SOC “Action” statements are lower than the “Attitude” and “Intention” statements (Figure 1). Eighty percent of students “Strongly to generally agree” to suggest their colleagues to do research, 80% to talk in a formal meeting to increase the research work, and 70% to increase the use of research work at their workplace/unit (Figure 1). Involvement in research projects other than the current one appeared lower (61%).

Qualitative Part

We present the findings according to emerging themes from the open-ended questions of the post-self-assessment survey, RSES, SOC, and IDIs, and FGDs. IDI and FGD numbers, interview location, and interview date appear after each quote.

Clinical Knowledge, Skill, and Self-Confidence

All interviewed students found the bloc courses and supervised ward rounds helpful and relevant to their clinical practice. These training formats helped them to improve their clinical knowledge and skills. They addressed their gaps in theory and practice and improved their clinical reasoning and problem-solving capacity. Thereby, their confidence to assess and manage patients as frontline healthcare worker and their decision-making for referrals increased.

Table 5 Percentage of Agreements with the Statements About Research-Related “Attitude” and “Intention” - on the “Stages of Change” (SOC) Model (n=10)

Statements for “Stages of Change” Model	
Attitudes	
Learning research skills is important	100%
Understanding how to do research is relevant to my work	100%
I should incorporate research findings into my clinical practice	100%
I should do more research myself	90%
Intentions	
I plan to learn more about how to do research	80%
I will bring up the idea of incorporating research into our work with colleagues	90%
I plan to include the use of research findings in my clinical practice	100%
I will suggest that we discuss how to improve our use of research results at our departmental meetings	70%

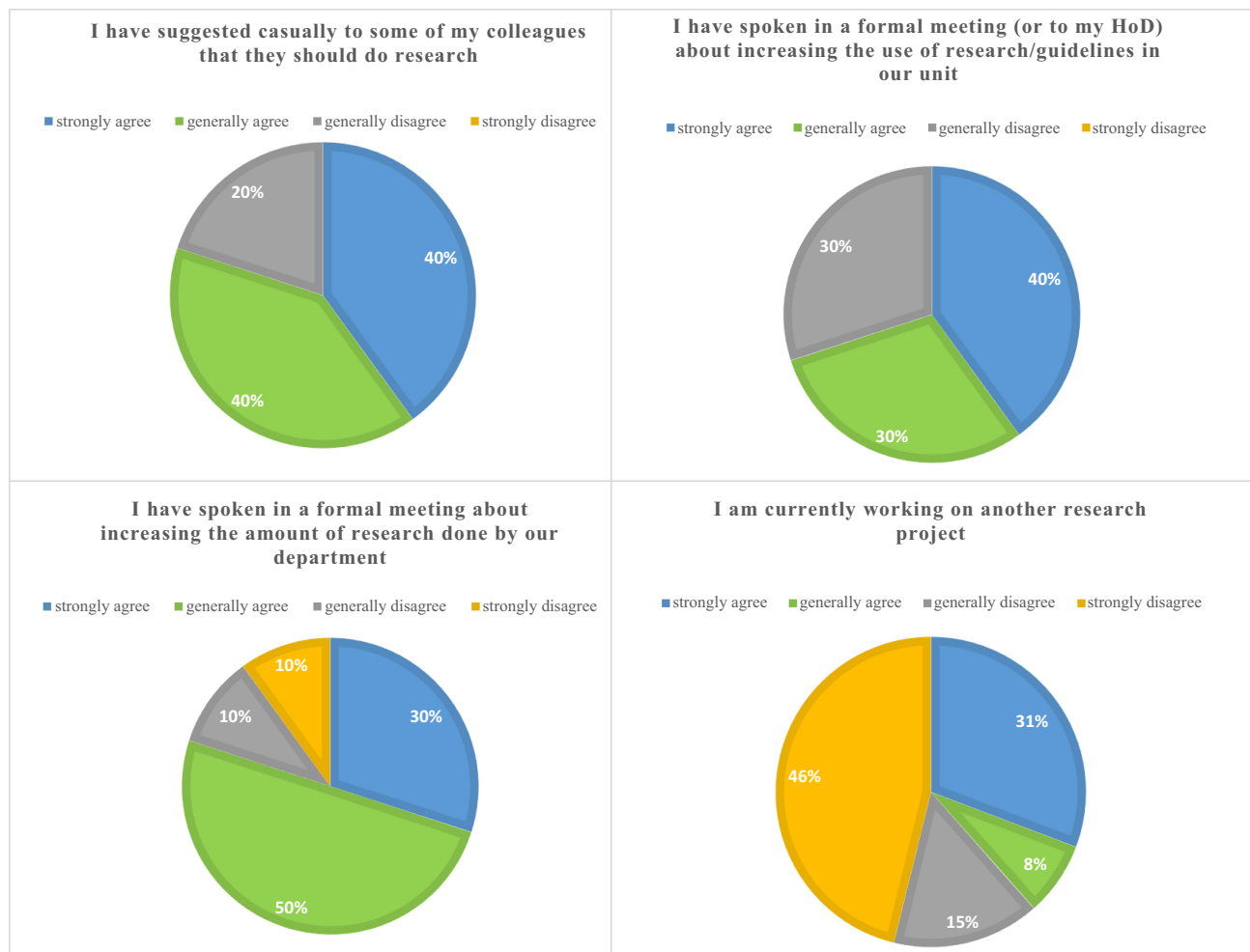


Figure 1 Percentage of agreements with the statements about research-related "Action" - on the "Stages of Change" (SOC) model (n=10).
Abbreviation: HoD, Head of Department.

It is very important to be equipped with the proper knowledge to make the proper diagnosis and to make the proper first management, treatment and to make the proper decision of referring on time. (FGD3/BT/08042019)

You [students] are the first one to crack [deal with] the patients... the first thing you learn from there [in wards] is that one has confidence (FGD1/LG/02042019).

Non-Clinical Skills

Evidence-Based Clinical Practice and Quality of Care

Students viewed research skills as necessary for healthcare professionals because they help to deliver evidence-based clinical care and improve the overall healthcare situation of Malawi.

Research skills are important. Because it has helped me to understand both scientific and ethical ways to address a relevant topic in the medical profession (RSES-SOC-6).

Research-based clinical practice will enable our system to improve care and reduce morbidity and mortality (RSES-SOC-9).

Research can change the management of our patients and results in improved care (RSES-SOC-8).

Students valued the research they conducted as part of their training because they could use the research evidence in their clinical practice. Although, in their view, applying their research findings to their practice is rare in African countries. Students believed that research would contribute to improving the quality of care.

In developing countries like Malawi, there are few clinical research projects. Most studies that influence our clinical practice is either adopted from research done outside Africa or in a few African countries. These findings might be irrelevant to our setting. Hence, it is important to enhance local research to strengthen our health system... Research-based clinical practice will enable our system to improve care [quality] and reduce morbidity and mortality. (RSES-SOC-9)

Students showed their interest and valued the importance of being involved in further research. However, the lack of funding and human resources to continue research at the district level concerns them.

Attitude and Approach to Care

Students mentioned their gained holistic approach to disease management during training. They learned to consider patients' and their families' socioeconomic and psychological status, acute and chronic disease conditions, and to identify root causes for disease management. Students believed this approach would help reduce the overall disease burden and hospitalization rate.

We should not look only on the disease, but also on the other aspects... should know a patient holistically... that a child can be treated holistically in all aspects. (FGD3/BT/08042019)

Now we see, not just a disease itself... but what is causing this problem... actual source of the problem. (FDG2/SL/03042019)

Communication and Networking Skills

Students found the "Communication" bloc course module relevant because the practices they carried out during the supervised ward rounds improved their communication skills. They considered these skills helpful in and outside the team and health facility. Students thought to be more effective team workers than before due to their improved communication skills- a crucial strength for their clinical practice.

Teamwork is the most important thing in medicine [clinical practice]. You gain a lot of clinical knowledge, but if you don't develop or grow the knowledge of teamwork, then that is nothing... we have learned here to build an effective team. (FGD3/BT/08042019)

According to the students, effective communication is essential to inform patients and families about disease management and referral processes. Students' networks with physicians from different hospitals made them feel connected. In addition, they found it useful for the referral.

We are gaining knowledge, but we are also making links, getting the contacts of important persons or consultants or of the departments [hospitals] where we are referring [patients]. (FDG3/BT/08042019)

Students also used technology for communication: a WhatsApp group involving supervisors and students served as a platform for discussing, diagnosing, treating, and referring patients on time.

The Global Perspective For Diseases Management and Decision-Making

Students valued the involvement of international teachers and supervisors as it put their knowledge and practice into a global context and widened their horizons.

It is not only one country that it becomes, the whole world coming together...It is like teaching us and making us fit for everything as far as the globe is concerned. (FGD1/LG/02042019)

They appreciated reading scientific articles during the bloc courses. The reading brought their learning to an international level and familiarized them with global healthcare standards and guidelines. This exposure helped them understand the influence of global decisions on local practice.

Spirit of learning...lots of articles to read... it motivates us to have a resourceful mind... it [bloc course] was always the latest information ... read those papers [relevant papers suggested by the teachers]. It was so encouraging... because we are updating our knowledge. (FDG3/BT/08042019)

Leadership Skills and their Role

Leadership is one of the non-clinical skills the project focused on. Students mentioned that the learning process made them feel confident and prepared them to play a leadership role or act as role models for their health facility and community.

We have learned a lot about leadership ... different attitude ... how we can approach certain problems, how we can solve certain problems, even the conflicts within the workers. (FGD3/BT/08042019)

We need to be the front runners and then let people see us doing... copy the example that we are having. (FDG1/LG/02042019)

I need to be the first one with a different approach and to make a difference to the people. (IDI1/MJ/04042019)

Felt Autonomy

The acquired research knowledge and skills made students motivated, dedicated, and feel autonomous to make evidence-based decisions to improve the quality of care at their level.

I will be the pediatric team lead in the district. It is paramount for me to do research by myself to improve the quality of care in the pediatric department. (RSES-SOC-7)

The improved clinical and non-clinical knowledge and skills made students confident to take responsibility for delivering quality care at their level. It also inspired, dedicated, and committed them to serve at their best to improve the paediatric and overall health situation in Malawi.

When you have the knowledge, you do something with confidence. (IDI2/MJ/04042019)

... a lot of children are suffering and dying there [at district] because of mistreatment and mismanagement ... when I go back home [at district], I should treat the patients even with the least management that is there [available at district level]. But, I have to give the best management. (FGD1/LG/02042019)

Concerns Beyond the Training Formats

Students expressed concern about the acknowledgment of the new cadre (specialist pediatric CO) in the public system. Without a salary increase, the new cadre may leave the public system, they anticipated.

If they [COs] are not promoted [with a new title and pay scale], they will go out [of the public system], and the gap will remain the same. (FGD3/BT/08042019)

Students worried about their further professional development and about having an opportunity to do a relevant "Master's" degree. They saw a Master's degree as a motivation for themselves and upcoming BSc PCH COs. They suggested continuing the BSc PCH CO program with supervision after graduation as more pediatric COs would be available at the district level and contribute to improving the quality of care. The key informants agreed with students' views but mentioned the supervising and teaching staff shortage as a barrier. During the studies, the COs also stated several logistical issues, such as high tuition fees, lack of financial support, and accommodation facilities.

Discussion

The BSc PCH CO students were delighted with the training formats delivered by the partnership project. Their scores indicate a perception of better clinical and non-clinical skills and an improved attitude toward practice-related research, and confidence to conduct it. Students reflected on the value of a professional network in-and outside Malawi, the need

for a holistic disease management approach, and the ability to initiate and receive referrals. They appreciated the developed leadership, communication and networking skills and felt ready for their future role at their workplace. They also felt prepared to exercise evidence-based clinical practice through the gained research skills. Overall, the increased clinical and non-clinical knowledge and skills made them confident to take a leading position and make their decisions to improve the quality of child health care at their level.

The combined classroom and practical case-based teaching at the bedside enhanced the students' clinical reasoning and problem-solving. The two training formats increased their decision-making capacity in diagnosing, treating, and referring patients. These capabilities are cornerstones of quality care, a comprehensive concept exceeding clinical knowledge acquisition.²¹ In addition, the more profound insights about the social determinants of health allow viewing patients holistically, beyond purely managing the diseases.²² As a result, a transformation may have occurred, causing changes in attitude, behavior, and practice that are essential for providing quality care.¹²

This study shows that BSc PCH CO students improved their searching, analyzing, and synthesizing capacities. Applying these capacities, student conducted their research, led by local needs, and aligned with national agendas. As a result, students developed research skills that helped them connect evidence and practice, demonstrating a fundamental shift associated with transformative learning and a motivation to work.¹² For example, a heavy daily clinical routine makes it difficult for practitioners to update their knowledge and skills affecting their motivation negatively. To counteract this process, the partnership introduced a supervised research project to complement the existing research module under the assumption that it is motivational when the daily clinical practice relies on self-researched ideas and evidence to see the impact. Indeed, the uptake of research findings by practitioners and policymakers is more likely, when embedded in the local cultural and political context.²³ Therefore, strengthening research capacities is one of the most effective and sustainable means of advancing health care.²³

The improved communication and networking skills and experiences observed among the students may represent changes resulting from a shift from an isolated and standalone to a more harmonized and connected educational model - a hallmark of interdependence in education.¹² For example, the Communication bloc course improved students' communication with patients and their families and colleagues inside and outside the team and health facilities. Besides, the WhatsApp group helped them in case-based discussions and referral decisions. Communication skills, including the use of technology, are vital for a good working relationship, team engagement, and patient-centered care.²⁴ Moreover, students appreciated the involvement of foreign teachers and the supervisor with new educational and research materials that added a global perspective to the learning. Knowledge about the global perspective of diseases and health improves the understanding of the causes and solutions of local health-related problems.¹² Consequently, students felt connected as global professionals and citizens - fundamental to interdependence in education.

Students recognized the importance of leadership in their clinical practice and valued its inclusion in their training. The project introduced leadership skills using evidence from simulation and real-life exercises that proved helpful for teamwork and quality of care.^{25,26} In addition, the exposure to different leadership skills and role models allowed the students to prepare themselves for future roles.^{27,28} According to Frenk et al (2010), gaining leadership attributes is the main objective of transformative learning and, thereby, to develop "enlightened change agents". Understanding and valuing leadership is integral to clinical practice, though often not recognized in reality.^{12,29} We hope that COs, equipped with leadership attributes, will fulfill their essential role in the Malawian health system.

The improved clinical and non-clinical knowledge and skills made the students well-equipped, confident, and feel autonomous to practice it at their level. The professional autonomy could be knowledge-based and logistic-based.³⁰ According to Salvatore et al (2018), there are three main dimensions of autonomy: 1) clinical work freedom, 2) social and economic work freedom, and 3) influence on organizational decisions.³¹ The "clinical work freedom (knowledge-based)" is the apparent type of autonomy in clinical practice, including clinical decision-making about treatment, management, and referral.^{30,31} Students' perceived confidence about disease management, and communication and networking skills, that may facilitate referral, will pursue this type of autonomy. The autonomy of the "influence on organizational decisions" refers to the voices and influences at the organizational or departmental level about the hospital and unit decisions and functions.³¹ We believe that students' improved leadership skills and intention to apply their

gained research skill for evidence-based clinical care involving the respective department will enable them to influence organizational decisions.

Sustaining achieved results is a common challenge of any partnership project.²³ Will graduates remain motivated, strive for change by applying evidence, and nurture networks? First, this partnership project had built on an existing BSc PCH CO training program. Institutional partners complemented the program after carefully analyzing the existing training program through shared decision-making between partners and in an atmosphere of mutual trust.^{15,32} Second, the project aimed to improve students' autonomy and address local needs and priorities- prerequisites for local ownership and sustainability.^{15,23} Third, MoH's recognition of graduates as "Clinical Associates" is an essential step because adequate recognition, remuneration, working conditions, and a career path are crucial in a staff retention strategy.¹⁵ All these factors play a part in maintaining the project's achievements. However, funding the program itself is crucial and may become a major threat to the BSc PCH CO training program scale-up if lacking.

There are other challenges too. To maintain the skills and motivation of the COs, they need support in the future. According to this study, graduates need ongoing supervision and mentoring through MoH structures and a strengthened continuous professional development system (CPD). The limited availability of dedicated NPC teaching faculty in the public system is also challenging.¹⁰ As suggested by WHO, an e-learning platform using a network of national and international resources might be an option.¹³ Ongoing support through CPD and mentoring will motivate the COs and help them overcome professional isolation. In addition, COs' improved communication and networking skills may help mobilize national and international funds for this purpose.¹⁵

Limitations and Strengths

The study limitations are 1) small sample size, 2) absence of a control group or a pre-and-post training comparison, 3) difficulties in defining the exact contribution of the partnership project as it complements an existing MoH training program, and 4) cross-sectional design of this short-term project, which falls short of long-term results. Conversely, the strengths are 1) the inclusion of all enrolled students allowing a complete sampling frame analysis, and 2) the use of methodological, data, and investigator triangulation.

Conclusion

Health professionals need attributes beyond expert clinical knowledge and skills to meet the needs of 21st-century health system challenges to serve their patients better and withstand a lack of motivation through exhausting working conditions.^{12,13} The partnership training formats complement the existing BCs PCH CO training curriculum to achieve a transformative learning experience and interdependence in education. This study shows achievements in that direction, laying the foundation for this cadre to enact change at their workplace and to serve as a role model for a comprehensive approach to childcare in low-resource settings. To sustain these achievements and realize this new cadre's potential, we recommend adopting the additions as a regular part of the BSc PCH curriculum. Alumni of the BSc PCH training would benefit from CPD initiatives and mentoring. Monitoring and evaluating this cadre's actions and the realities at their workplaces would help assess the long-term effects of the training at their workplace and the quality of care.

Abbreviation

BSc, Bachelor of Science; BT, Blantyre; CoM, College of Medicine; CO, Clinical Officer; CPD, Continuous Professional Development; DH, District Hospital; FGD, Focus Group Discussion; GTP, German Society of Tropical Paediatrics & International Child Health; IDI, In-depth Interview; KCH, Kamuzu Central Hospital; LG, Lilongwe; MJ, Mchinji; MoH, Ministry of Health; NPC, Non-physician Clinician; PCH, Paediatrics and Child Health; RSES, Research Self-Efficacy Scale; RMNCAH, Reproductive, maternal, neonatal, child and adolescent health; SD, Standard Deviation; SL, Salima; SOC, Stages of Change.

Data Sharing Statement

Data will be available on request. Farzana Yasmin is responsible for data access.

Ethical Approval

Ethical approval was granted from the Ethics Commission of the Witten/Herdecke University, Germany (Application No. 94/2018) and the College of Medicine, Malawi (P.06/18/2428).

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Author Contributions

Farzana Yasmin (FY): Made a significant contribution to the work reported -in the conception, study design, execution, acquisition of data, analysis, and interpretation. She drafted the article.

Andreas Schultz (AS): Made a significant contribution to the work reported - in the conception, study design, execution, acquisition of data, analysis, and interpretation. He partly drafted and substantially revised the article.

Ajib Phiri (AP): Made a significant contribution to the work reported - in the conception, study design, and execution. He critically reviewed the article.

Ralf Weigel (RW): Made a significant contribution to the work reported - in the conception, study design, and interpretation. He critically reviewed the article.

All authors (FY, AS, AP, RW) have agreed on the journal (Advances in Medical Education and Practice) to which the article will be submitted.

All authors reviewed and agreed on the version of the article for submission and agreed to take responsibility and be accountable for the article's contents.

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