BMC Medical Education

RESEARCH Open Access

Barriers and facilitators to interprofessional simulation-based learning in a Ugandan medical school: a qualitative study

Josephine N. Najjuma[1*], Albert Muhumuza[1], Data Santorino[1], Samuel Owusu Sekyere[2], Amaka N. Ocheke[3], Simon J. Yiltok[3] and Francis Bajunirwe[1]

Abstract

Background Although Interprofessional Education (IPE) is an important component of medical education, it has only recently come under consideration in Sub-Saharan Africa. IPE occurs when two or more professions learn from, about and with each other regarding effective collaboration and the improvement of health outcomes. Current academic programs focus more on traditional approaches to training physicians, pharmacists, respiratory therapists, physiotherapists and nurses like they were independent entities. Simulation-Based Learning (SBL) is a potential platform to introduce IPE to Mbarara University of Science and Technology in southwestern Uganda that has a well- established medical simulation center but IPE has not yet been implemented. Evidence is scarce regarding the barriers and facilitators to implementing simulation-enhanced IPE (Sim-IPE). Therefore, the purpose of this study was to obtain information on barriers and facilitators of IPE from various stakeholders.

Methods We conducted a qualitative study among university administrators, faculty and undergraduate medical and nursing students. We purposively selected undergraduate students to include 3rd and 4th year nursing students and 3-5th year medical students as they had been exposed to SBL. Guided by the Consolidated Framework for Implementation Research (CFIR), we conducted semi-structured interviews with administrators and faculty members, and focus group discussions with students ($n=31$). The focus group discussions were uniprofessional with individuals from the same class allowing participants to share their views freely. Interviews were transcribed verbatim. We used the deductive (CFIR-driven) method to develop relevant codes and themes.

Results The barriers and facilitators identified to implementing Sim-IPE program arose from the six CFIR domains namely, the intervention characteristics, inner setting, outer setting, individual characteristics and the process. The barriers included the intervention processes such as lack of interprofessional educational resources, scheduling and communication gap between departments, the nonexistence of protected interprofessional simulation time in the curriculum, attitudes and unfavorable perceptions toward interprofessional simulation, and lack of clear assessment mechanism. The facilitators include the significance of IPE and the support of simulation-enhanced IPE (Sim-IPE).

*Correspondence:
Josephine N. Najjuma
jnajjuma@must.ac.ug

Full list of author information is available at the end of the article

© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

Conclusions Implementation of Sim-IPE faces significant process and policy barriers that require addressing. There is an opportunity to capitalize on the significance that stakeholders place on IPE. The findings can be used as a benchmark for designing Sim-IPE in other low- and- middle-income countries.

Keywords Barriers, Facilitators, Interprofessional simulation-based learning, Uganda, CFIR

Background

Interprofessional teams in clinical practice improve patient care and reduce medical errors. For a team to be effective, team members from different health professions are required to function and effectively communicate with one another, cooperate and collaborate to ensure that care is continuous and effectively delivered [1]. Interprofessional health workforce is required to function effectively to ensure good patient outcomes. Interprofessional education (IPE) is an opportunity to create a cadre of health workers trained to work as a team. Although IPE presents several advantages and holds the promise to develop health workers prepared to work in interprofessional settings, medical and nursing students seldom learn in interprofessional teams. According to the World Health Organization, "Interprofessional education occurs when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes. Collaborative team behavior has been shown to improve with interprofessional education [2, 3]. Interprofessional education can also help clarify roles and lead to positive attitudes among health workers [4].

Simulation-based learning as a teaching tool is taking root in sub-Saharan Africa [5] including our institution [6, 7] and may be an appropriate vehicle to deliver IPE. When IPE is enhanced by simulation, it may have the potential to address communication and collaboration issues between health disciplines [8]. In the resource-rich countries, interprofessional education has developed through global forum workshops, private foundations and partnerships among health professional educational bodies. These collaborations encourage innovation and development of core competencies to guide effective training of students in different professions to facilitate interprofessional collaborative practice [9]. Interprofessional education, with simulation technology, can allow students of different professions to learn with and from each other in a safe environment while allowing group reflection and immediate feedback.

Although IPE presents several advantages, its implementation faces potential challenges ranging from logistics, scheduling and financial support [10] to skepticism about its IPE role, utility and in acceptability. In traditional health professionals' education programs, lines and visible boundaries are drawn between professions in training. The lack of interprofessional opportunities for training is a common challenge across African health training institutions. Most of the training is in the form of lectures and tutor-led skills demonstrations which do not present sufficient opportunity for team practice. The lack of inter professional team practice opportunities between medical and nursing students creates a mystery between professions. This includes professions not understanding each other's roles and responsibilities and development of implicit biases.

Limited studies in sub–Saharan Africa have examined opportunities to introduce and integrate IPE into the medical and nursing curricula but evidence shows that Simulation-Based Learning (SBL) as a teaching tool is effective and may be a superior method for training inter professional communication skills and should be considered as the gold standard for communication training [11]. A systematic literature review has shown that interprofession simulation training among nursing students strengthens their nurses' roles and understanding of the roles of other health workers [12].

Although SBL learning is well established at Mbarara University of Science and Technology in southwestern Uganda, the training of undergraduate medical and nursing students has not deliberately implemented interprofessional education. The study aimed to determine the barriers and facilitators to inter-professions simulation-based learning at a medical school with established medical simulation-based learning center in sub–Saharan Africa.

Methods

Study setting

Mbarara University of Science and Technology (MUST) is located in southwestern Uganda about 250 km from the capital Kampala. Established in 1989, MUST has the second oldest medical school in Uganda. The Faculty of Medicine offers undergraduate and graduate degree courses including: Medicine, Nursing, Pharmacy, Medical Laboratory Science and Physiotherapy. At MUST, the combined population for undergraduate Nursing and Medical students is 600. MUST has successfully established a center of excellence for simulation-based learning, the only one of its kind in East Africa. The Sim for Life Center of Excellence was established in 2016 with support from the university and grant funding. The center is equipped with two simulation scenario rooms and debriefing spaces with both high and low fidelity manikins. The simulation faculty is drawn from the university faculty, staff and simulation trained post graduate

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

students. Currently SBL is incorporated into the curriculum for nursing and medical students at MUST, although, medical and nursing students separately undergo SBL with no elements of IPE.

Study design

We applied qualitative methods to explore faculty and student attitudes, barriers and facilitators to simulation-enhanced IPE (Sim-IPE) at MUST.

Eligible study participants

We had two categories of participants. The first were university managers and stakeholders involved in allocating time and designing curricula at MUST. These were individually approached; study objectives were explained and consent obtained. The second category of participants were selected undergraduate medical and nursing students at MUST in their clinical years. These participants were individually identified through their class leaders. The study was explained to them and written informed consent was obtained.

Sampling data collection

We purposively selected key stakeholders that are involved in the scheduling and teaching of the undergraduate medical and nursing students. We conducted all the in-depth interviews with faculty from the Departments of Nursing, Internal Medicine, Surgery, and Pediatrics and key stakeholders in timetabling and curriculum design. These departments conduct the bulk of clinical training for medical and nursing students. The questions focused on current practices of IPE for medical and nursing students, attitudes towards IPE, as well as its barriers and facilitators. We collected information on participants age, gender, roles, duration of service in the institution, exposure to simulation-based learning, place of exposure and frequency of simulation exposure experience. All interviews were audio recorded. We also conducted focused group discussions (FGDs) with undergraduate medical and nursing students. The FGDs were uniprofessional with individuals from the same class to allow participants to share their views freely. The FGD comprised of 5 to 7 members with equitable gender representation. Interviews were audio-recorded, transcribed and reviewed to ensure accuracy.

A semi-structured data collection tool (Supplementary file 1) was designed using the constructs of the Consolidated Framework for Implementation Research (CFIR) tool.

Data analysis

Data were analyzed using thematic content analysis based on a priori themes generated from the research questions designed using the CFIR model. We also considered emerging themes from the data. Data were transcribed verbatim and transcripts were read and re-read by two independent researchers and reviewing of Audio files (JTB and GM). Codes were grouped into categories and condensed intro broader themes. The first analysis was done by two independent qualitative researcher (JTB and GM). Two members of the research team (JNN and AM) double-coded the transcripts and compared their results with the results of the other two qualitative researchers. Finally, the research team met, reviewed transcripts, agreed on the codes and resolved any disagreements.

Ethical considerations

The study was reviewed and approved by the research ethics committee (REC) of Mbarara University of Science and Technology (MUST-2023-763). The research team also sought ethical approval from the Uganda National Council for Science and Technology (SS1858ES). Participants provided individual written informed consent. We adhered to the Helsinki declaration on the use of human subjects in research including voluntariness and respect for persons. Administrative clearance to conduct the study was obtained from the university. Privacy and confidentiality were maintained throughout the study. Participants were assigned unique identifiers and only these identifiers were included on the transcripts. All study data were stored on a password protected laptop. Our data transcripts do not report potential identifiers such as the gender, age, titles and specific role of the participants as the study setting is small and it would be easy to identify the respondents.

Results

We conducted 9 key informant interviews with faculty from the Departments of Nursing, Internal Medicine, Surgery, and Pediatrics as well as key stakeholders in timetabling, medical education committee and curriculum design. We also conducted 3 FGDs (two with medical students, and one with nursing students) to explore the dynamics among the different groups mix. For the medical students, the FGDs were also segregated based on years of study namely third and fifth-year Medicine and surgery students.

Demographic information

Four females and five males aged between 35 and 60 years were interviewed. Their roles included Academic registry leadership, heads of department, senior lecturers, lecturer, resident physician, medical education unit and curriculum committee leadership. Their length of experience in these roles ranged from 2 to 12 years. All but three had been exposed to simulation-based learning. Most had encountered simulation-based learning at Mbarara University of Science and Technology with

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

Table 1 Summary of key informant study participants

Participant	Role	Department	Duration in role (years)	Exposure to simulation-based learning	Place of exposure	Frequency of Exposure to IPE
01	Administrative staff	Academic Registrar	11–15	No	NA	None
02	Administrative and teaching	Surgery	0–5	Yes	MUST	Not often
03	Teaching staff	Internal medicine	11–15	No	NA	NA
04	Teaching staff	Pediatrics	6–10	Yes	MUST	Many times
05	Teaching staff	Internal medicine	0–5	Yes	MUST	Very often
06	Teaching staff	Nursing	11–15	Yes	MUST	Not often
07	Administrative and teaching	ALL	11–15	Yes	Makerere University	Once
08	Administrative and teaching	Curriculum and teaching	6–10	Yes	MUST	Once
09	Administration	Academic registrar	6–10	No	NA	None

Table 2 Summary of themes and subthemes regarding the facilitators and barriers to interprofessional simulation-based learning

	Thematic areas	Key points
Facilitators	**Significance of Interprofessional Education**	Interprofessional collaboration and mutual learning
		Preparation for future teamwork
		Breaking down professional silos
		Roles clarification
	Support of Interprofessional Simulation-based learning	Departmental support
		Individual faculty support of Inter-profession training
		Absence of formal administrative support
Barriers	**Barriers during the simulation session**	Lack of leadership clarity
		Unequal numbers of certain professions in simulation groups
		Lack of familiarity with the group members
		Perceived hierarchies between medical and nursing students
		Information sharing gap among students
	Lack of Resources	Lack of resources: time and physical faculties i.e space
		A limited number of instructors
		Simulation scenario design
	Curriculum Integration	Difficulties in scheduling
	Attitudes and Perceptions towards IPE SIM	Facilitator bias towards certain sub-groups
	Attitudes and Perceptions toward IPE SIM	Resistance to change
		Mixed Perceptions towards simulation learning

frequencies described from rare to very often. Individual responses are not included in this manuscript to preserve confidentiality. Details of Key informant participants are summarized in Table 1.

The FGD included 10 male and 9 female students aged between 21 and 25 years. All the participants were exposed to simulation before and were currently in their clinical rotations.

Themes from key informant interviews and FGD transcripts

Thematic analysis was employed to identify key themes and subthemes that emerged from the participants' responses regarding the facilitators and barriers to Sim-IPE. We categorized the results as shown in Table 2.

Theme one: significance of interprofessional education

Interprofessional collaboration and mutual learning

Participants from all groups emphasized the importance of interprofessional collaboration during simulation-based learning. A faculty member expressed,

> *"the biggest benefit is when you bring the different professionals together, they come in with the unique skills that are beneficial to the other group. For instance, if a nursing student comes to this simulation-based learning, they bring their set of skills that a medical student is not aware of but needs to know or learn about…and vice versa. So, there's cross pollination of skills at that level." Key informant 07.*

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

The interprofessional education experience leads to mutual respect for each other's professions. Participants appreciated the contributions of each profession in patient care, that helped boost the esteem of each team member.

A third-year medical student stated,

> *"For me, I'll give an experience… I learned a lot from the physiotherapists, they're better at doing these examinations, especially neuro examinations; for the nursing students, they had more to do with the caring for the Nasogastric tube because he was in a coma. So I learned really quite well from them… We came to appreciate that each of us, like our professions, really matter." … Speaker 3, Male, FGD 03.*

Interprofessional education involving medical and nursing students working together mainly on the wards was perceived as a facilitator. It allowed them to learn from each other and benefit from their different perspectives and expertise. Although this occurred occasionally, it showed them how important it would be for them to learn together in other avenues like simulation.

> *"Now that we are in third year, I think I've seen that happen on the ward where sometimes we have the nurses with us, and at the same time, we also have the medicine students together. Okay, I have mainly seen it on hospital ward mainly in third year, where we are actually working together." Speaker 6, Female, FGD 03.*

Preparation for future teamwork

Interprofessional simulation prepares students for future collaboration in healthcare settings. Simulation sessions involving different professions bring the experience closer to real-life scenarios, preparing students for the collaborative nature of healthcare practice.

> *"In the future, we won't be working as medical persons, like doctors alone. You have to work with the nurses, you have to work with the physiotherapists, to manage the patient… It's preparing us for the future." Speaker 5, Male, FGD 03.*

Breaking down professional silos

Participants articulated the role of Sim-IPE on breaking silos created as a result of nursing and medical students training separately. Sim-IPE is an opportunity to learn what happens in each 'silo', creating an avenue for communication and knowledge sharing while breaking the information gap between the two professions. One nursing student stated,

> *"You realize when we start clinical, we tend to take different routes because you will find that is when medical students are going to go to their departments. So that gap, at least during that clinical… Because at least this is the time during the clinical whereby we should be together… is the time when we are separated. But during the simulation sessions, at least they will bring us back together each other such that, after these sessions, after the post debriefing, they tell us this and this and this." Speaker 6, Male, FGD 01.*

Roles clarification

Participants acknowledged that co-involving undergraduate medical and nursing students in their teaching is essential in appreciating each other's roles in patient management. These experiences help to prevent confusion of roles and students know their professional scope of practice. A head of department shared,

> *"it helps understand the different roles that each one is supposed to play to help a patient get better. What you notice is that in simulation, they tend to take roles that are assigned to them by nature of their future employment. …you have medical students taking up the roles of clinicians while the nurses will take on the roles of the nurse… the medical students tend to be the lead physician and give out instructions to the nurses and what they expect them to do. We find situations where medical students are getting lost doing nursing roles and the nursing students are also getting lost doing the medical roles. So, if they train together it would be easy to streamline to know this is the role you're supposed to take, this is how it's supposed to be done" Key informant 04.*

A medical student stated,

> *"the simulation session is going to help you understand what roles can the nurses help you with. If you're alone, can a nurse do an exam? If you ask them to perform maybe a respiratory exam, can they do it or do they need guidance? Can you confidently ask someone to maybe take vitals?" Speaker 1, Male, FGD 02.*

Participants also emphasized the importance of assigning roles based on each profession's technical knowledge and expertise thus improving efficiency and teamwork during simulations.

> *"For instance, I know a nurse is better at cannulation. So, say IV access and fluids, we assign them to the nurses." Speaker 6, Male, FGD 02.*

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

Theme two: support of simulation-enhanced IPE (Sim-IPE)

Departmental support

Participants stressed their contribution towards training postgraduate students in their departments to facilitate effective interprofessional learning. One departmental head highlighted,

> *"All we have done as a department, is to make sure all our postgraduate students get the training, to advocate for all our post graduates getting trained [in simulation] such that they engage into the training of students." Key informant 2.*

Individual faculty support of interprofessional training

Key informants mentioned that they are committed to teaching students and being receptive to Sim- IPE. This willingness to facilitate sessions creates an easy environment for learning. A faculty remarked,

> *"I think for us we are very open and we would love to have the nurses trained with the medical students, we would love them to be part of our wards because we really believe in…we need them, they can help us in management of the patients. But we also believe that we have something to learn from them. So, our attitude is something that we would embrace that partnership or collaboration where we can train the students together both the nursing and medical students." Key informant 4.*

Absence of formal administrative support

There is lack of clear policies outlining how interprofessional education should be conducted. A faculty member experienced in medical education noted, this in part could also be the cause of the information and communication gaps between the departments, students and facilitators.

> *"We wanted to develop guidelines of how to conduct interprofessional education because we saw it as a missed opportunity here in our faculty of medicine, that the medical students are by themselves, the nursing students are also by themselves and others." Key informant 7.*

Theme: barriers during the simulation session

Lack of leadership clarity

Assigning leadership positions in interprofessional teams may be difficult due to varying levels of seniority and may lead to reluctance or conflicts.

> *"…Now, here is a scenario whereby a nursing student among us, maybe four medical students, and I want to be the team leader. It's going to really be hard for some people (to accept). Of course, you may be competent, but just because by the mere setting of things that you know a nurse cannot lead in the presence of a doctor. I think it is going to pose some bit of suppression. Yet we may have some competent people who can lead teams during the sessions. So, it's really going to bring some element of dominance to a certain extent." Speaker 6, Male, FGD 01.*

Unequal numbers of certain professions in simulation groups

Participants mentioned that some rotations or classes had bigger numbers than others. For instance, there could be more nursing students than medical students and sometimes more medical students than nursing students, resulting in imbalanced role assignments. This disparity could lead to some team members feeling underutilized or excluded, which could cause a tendency for the facilitators to focus on the profession with the majority.

> *"…how they are going to divide these groups. Because if you are having one nurse among five medical students, it's going to pose another, actually, a major risk … that they will concentrate in one area. Because it is known the medical students in our year is around 100 and something. We are only 33. So you can see that you can feel that it's going to be a big challenge anyway." Speaker 3, Female, FGD 01.*

Lack of familiarity with the group members

Some participants expressed challenges in working with students from a different class, as they had never interacted with them before the simulation session. Being unfamiliar with group members could hinder effective communication and team dynamics during the session.

> *The other thing is, because these two groups have not interacted for a given period of time, usually it is easier to do a given task within you that you don't know each other. But now here, since these people have never interacted, like someone say, we had a different year all together and you never see them before. So it really makes these connections a little bit having some gap. Speaker 2, Male, FGD 02.*

Perceived hierarchies between medical and nursing students

Some students reported feeling anxious or fearful when working with others from different professions, especially when hierarchical barriers exist. This can hinder effective collaboration and communication.

> *"Because of simulation, when you're working together, a nurse… it reduces that anxiety and fear that a nurse has for a doctor… you get to identify*

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

those things in simulation." Speaker 4, Female, FGD 03.

A faculty member highlighted,

"...one of them [weaknesses] could be just like inferiority complex, you know sometimes when you are there and you are in a group, you may say that okay now I am a nurse or I am a doctor, if it is nursing intervention, I may say something that is wrong or if I am a nurse and I want to make diagnosis, I may fail because doctors are there." Key informant 6.

Information sharing gap amongst students

Some medical students felt uncertain about how to effectively work with nursing students during simulation sessions, leading nursing students to feeling left out or ignored, and this reduces the ability of the nursing students to cooperate and achieve the set goal during the learning sessions. An undergraduate medical student stated,

"... we also had the same session with nurses... But then during the session, it happened that..., the communication, we had a bit of breaks in the communication. ...most of us here, since we are usually used to doing the simulations as medical students, sometimes we don't really go deep into what instruction you've given the person. We don't know what they need to know and what is relevant to them. We don't know what to keep for ourselves and what to give them." Speaker 4, Male, FGD 02.

Theme: lack of resources

Lack of resources: time

The lack of frequent interprofessional simulation sessions was mentioned as a barrier to further enhancing collaboration between medical and nursing students. The opportunities available for the groups to meet and have the learning are few to realize the desired benefits of interprofessional learning. When asked about their experience of being involved in interprofessional simulation sessions, a medical student said,

So you find that the group you're dividing is having many students and you are limited by time. So maybe for our success, for that case, we need to increase more time. Maybe if it is a Friday afternoon, it will be a full Friday afternoon just for simulation practices. But of now, we are practicing on Thursdays and its only for two hours. Speaker 1,Female, FGD 01.

Lack of resources: space

The limited space in the simulation labs was mentioned as a barrier to accommodating a required number of students from different professions to enable IPE. Numerous sessions are required and this creates long durations of waiting before students can access the labs, and this often results into fatigue and loss of morale for some of the students as stated by participants below.

"Then another thing would be space. He has talked about it. So if this one is to be a success, then they should put into account the space bit of it. We have two labs at the moment, and you realize we are 33 in our class of nurses. And you realize sometimes we even have to encroach on the time for other lectures." Speaker 6, Male, FGD 01.

Limited number of instructors

Another barrier mentioned by the participants was an inadequate number and availability of qualified instructors to conduct the simulation sessions. A nursing faculty shared,

"You know sometimes you go and you find the same facilitators and they get tired. So, if we could get enough man power or personnel. ... you know sometimes they make the group so big because of the shortage of the facilitators and also... another thing to have enough models which can facilitate and other equipment you find that they are lacking. Because when you go there sometimes and they tell you that this one we don't have it." Key informant 6.

Theme three: curriculum integration

Lack of integration of interprofessional simulation as a method of teaching students into the curriculum was identified as a crucial barrier to successful Sim-IPE to happen. For Sim-IPE to be prioritized during scheduling, it must be incorporated into the teaching curriculum of the students. An administrator whose role involves allocating teaching time mentioned,

"There is no way you're going to prioritize Sim-IPE when it's not in the curriculum. The curriculum is very clear it talks about these are the courses which are there. So, when you bring in IPE-simulation may look at it as something that has been imported into the students. I will first timetable all these other classes which are in the curriculum. Then, where students are free like OK fine now here they are free let us timetable simulation," Key informant 1.

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

Theme four: simulation scenario design

Participants mentioned a lack of input from tutors of both nursing and medical students in simulation scenario design with input as one of the requirements in order to have the expectations of both groups met during the simulation sessions. A faculty member expressed,

> *"Like I said, you find a case scenario about management of stroke and all of it is medical and nobody has said anything about the nursing care. If we can have these cases prepared by both so that you have the nursing section and you have the medical section…, so that all these things are together in one case to enable each be executed …favoring both sides." Key informant 4.*

Theme: difficulties in scheduling

Participants stressed the lack of harmonization of the timetable to have simulation sessions for both undergraduate medical and nursing students happen at the same time. An administrator whose role involves designing the teaching timetable mentioned,

> *"if we are specifically talking about simulation, the timetable I have done for simulation really I've not seen it timetabling nursing students and medicine students at the same time. Actually, it's always separate. You have…I always timetable medical students in year three alone when they are free, you do it for medical students in year five alone, you do it for nursing students alone. I've not seen a scenario where I've combined medicine year three, nursing year three together. It has always been separated on the timetable." Key informant 1.*

Another participant who is a facilitator also noted,

> *"…this has to be harmonized at the schedules' level, that when we are drawing schedules, these times should be scheduled together so that we know that when medical students are having simulation sessions even the nursing students at that time should be free to come and actually have these sessions with the medical students. Otherwise, you look at the schedules they're drawn differently so the time when medical students are there the nursing students are probably having a lecture and vice versa." Key informant 5.*

One of the nursing students from the focused group discussion also emphasized the same point,

> *"if the people in charge can put maybe simulation for both of us during the same time on the timetable, that will help us to put in our mind even prior when, Okay, we are there and we know we are going to participate together with the medical students." Speaker 3, Female, FGD 01.*

Altering the timetable to accommodate more simulation sessions could impact the time spent on actual clinical rotations, raising questions about the trade-off between simulation and real patient care.

> *"… it might affect lecture time or ward time. Most likely it would be ward time. I don't think it would be a problem if it did affect the ward time, but the question is, is it worth reducing the ward time for it?" Speaker 4, male, FGD 01.*

Theme: attitudes and perceptions

Facilitator bias towards sub-groups

There is also a tendency of the facilitators to be inclined towards one profession during the debrief sessions and this leads one of the professions to feel ignored. A student stated,

> *"If it's a doctor who is taking us through the debriefing, remember, we are with medicine students. They will concentrate more on the medicine side because that's what they are comfortable with. Then if it's also a nurse who is taking us through the session, they will concentrate more on that nursing side. One of the groups will… They will lose out…ok not so much, but they will not get what they're supposed to get. Maybe if they are to have both a doctor and like a nurse taking us through the debriefing, it would be better because they will project the roles of each of the groups. But if it is one person of like a specific profession, they will be biased." Speaker 4, Female, FGD 01.*

Resistance to change

Some faculty members are resistant to adopting new methods of teaching like simulation making it a challenging to implement Sim-IPE. One of the administrators who is also a faculty mentioned.

> *"Many people don't think they need it… they're thinking of, this is how we have always done it, some people are so static, they don't want to change." Key informant 8.*

In addition, students in the final year of medical school who had some level of seniority in the practice did not also find it very relevant to practice on mannequins when they had already had real encounters with patients of similar cases on wards.

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

"I think simulation sessions should be end at level of third year level ,....when, we are motivated. And another thing, we have not handled real patients [then]. But now in fifth year, say we are going to discuss a patient with abortion, I've already manage the patient on ward with abortion. So, I know, I realized there's no need to come to the mannequin and pretend." Speaker 6, Male, FGD 02.

Mixed perceptions towards simulation learning

Participants reported mixed attitudes and perceptions towards simulation-enhanced IPE (Sim-IPE) but majority of faculty members and administrators were supportive of the learning methodology. A faculty member stated,

"I believe this should be good news to the students because now everyone gets to practice at their level of professional training and get better at it and also attain the confidence. we are all welcome to having these joint sessions and I for one can't wait to … I think it's a good thing." Key informant 5.

Theme: lack of clear assessment mechanism

Students felt that the lack of academic recognition for simulation participation could lead to reduced motivation and attendance. There is a need for clear marking guidelines. Participants emphasized the importance of clearly defining how marks will be awarded during interprofessional simulations.

"Then the other thing is as well about the reward. Just as they have been saying that people learn by either punishment or reward. Yes. Most of the time, these marks actually there. Our logbooks have simulation sessions. And the marks were not even accounting for the final mark." Speaker 4, female, FGD 03.

"…even the way marks will be awarded by the particular facilitators should be laid down clearly because I don't think it will remain the same like how we have been having where they're giving us team… group work marks and all that, because now in this case we are different." Speaker 7 (female), FGD 02.

Discussion

In this study, we focused on understanding the barriers and facilitators to interprofessional simulation-based learning at a medical school in Uganda. Overall, students reported having had an experience with interprofessional education while all of the key informants knew about it, some had had an experience with it, while others had not had any experience.

Generally, all participants were knowledgeable about Sim-IPE and acknowledged its importance in narrowing the gap between the medical and nursing students and improving the quality of patient care. A meta-analysis by Reeves et al., 2016 showed improvement in attitudes and perceptions towards one another and increased knowledge and skills needed for future collaborative working among students when IPE is implemented [13]. Despite the lack of strong evidence as reported by Reeves et al., 2016 that IPE improves patient care and outcomes, participants in this study stressed that the overall goal of IPE-Simulation is to improve patient care and were very hopeful that its implementation will lead to that.

Faculty and students believed it is vital to clarify professional roles to avoid collision between the professionals and to help learners know their professional scope of practice. The simulation sessions are designed so that students take up roles in line with their profession which inculcates the roles and scope of practice [14]. Contrary to Yu et al., 2020 [15] participants in this study saw Sim-IPE as an opportunity for the students to dispel the myth that nurses take on subordinate roles from physicians but work together to achieve linked or shared objectives and outcomes. The discrepancy between the two findings can be explained by the fact that in the clinical settings, their roles are different, with doctors having a more directive role, while nurses take on the subordinate role focused on patient care.

There was also willingness by stakeholders to take up the Sim-IPE program in the university and such optimism had been reported earlier when the simulation center was established in this setting [16]. Stakeholder buy-in is essential in ensuring the success of Sim-IPE. Administration support would be a driving force towards better enforcement of SBL. Top management makes decisions regarding the curricula and allocating resources to the different programs. This administrative and faculty support is key to the implementation and sustainability of Sim-IPE, absence of which jeopardizes the longevity of this program [17].

There were reports of the inadequate number of facilitators. Therefore, faculty development and training in simulation techniques to ensure sustainability of the program would be key. West, C et al., 2016 reported that faculty development is important since the interactive nature of Sim-IPE requires specific skills among the facilitators without which learners may not be actively engaged in learning [10].

Barriers

The lack of incorporation of Sim-IPE in the curriculum as a method of teaching students was acknowledged as a barrier and Al-Elq and Abdulmohsen H [18]identified it as a requirement for effective SIM- implementation. Another barrier was scheduling and timetabling. Students reported inadequate time during the learning

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

sessions and few simulation scenarios. Studies at universities in the United States [10, 19] also showed that limited simulation time and scheduling make it difficult to focus on the core competencies required for interprofessional training and the time available is not enough for the learning to be effective. However, it is recommended to include programs in the teaching curriculum that increase exposure to social interactions among students from different professional disciplines so that students are exposed to such interprofessional experiences and hence benefit fully from interprofessional education experiences [15].

Students expressed concerns over the lack of clear communication and information sharing among themselves while working as an interprofessional team which confirms a similar finding by Watts et al.,2022 [20]. This communication gap created a feeling of unworthiness which impedes Sim-IPE because of limited socialization in the group. The frequency with which the Sim-IPE happened was limited as some students reported having had only one session. Consequently, there is insufficient opportunity to interact and learn for both professions to bond and work collaboratively which ultimately hinders the effectiveness of Sim-IPE.

There were no set guidelines on how to conduct the SBL and not all staff were involved. The absence of clear institutional guidelines on the operation of Sim-IPE was a hindrance to fully unleash the gains from Sim-IPE. Although integrating Sim-IPE in the curriculum through working with different departments in the university to develop guidelines on how it is going to be implemented was identified as key to its success [16], it has not been realized. The implication is that if scheduling and financing of Sim-IPE are not prioritized, the core courses reflected on the training curriculum for each profession will remail the only scheduled learning opportunities. The lack of administrative support has been shown to lead to minimal attention and resource allocation for IPE [17].

The absence and or the limited number of Sim-IPE trained faculty impacts negatively the running of the program. In addition, Watts et al., found that facilitators/instructors played a crucial role in IPE experiences in setting realistic goals, designing learning scenarios, motivating learners, managing interactions to ensure equal participation and ensuring that all those taking part felt equally "valued and empowered" [19].

The perceived hierarchy between the different professions impedes socialization among the student due the attitudes and professional stereotypes acquired on joining the training institutions. This existence of professional hierarchies has been reported by Watts et al. [20]. This subsequently limits collaborative learning and practice opportunities [13].

Strengths

Our study has important strengths as it employed a systematic implementation research tool to explore and report findings. Second, the study used thematic analysis, which is a rigorous qualitative research method, to identify key themes and subthemes from participants' responses. Lastly, the study collected perspectives from various stakeholders, including faculty members, key informants, and students, providing a comprehensive view of the barriers and facilitators to Sim-IPE.

The study provides a dense description of the context, process and results making it easier for a reader to apply the results to their context. Therefore, the lessons learned can be used as benchmarks for other medical schools planning to implement Sim-IPE as method of teaching in a resource-limited settings.

Conclusions

In this study, we aimed to examine the barriers and facilitators to Sim-IPE. We demonstrate the main facilitators as perceived benefits in interprofessional collaboration, mutual learning, and preparation for future teamwork as contributors to a positive learning experience. The emerging barriers were lack of clear policies, inadequate resources, communication gaps, hierarchical attitudes, and absence of curriculum integration hinder the potential benefits of this approach. To overcome these challenges and fully leverage the benefits of Sim-IPE, it's important to address issues related to communication, faculty training, curriculum integration, resource allocation, and changing hierarchical attitudes. These insights provide valuable information for educators, administrators, and policymakers to enhance the implementation and effectiveness of such educational initiatives.

Abbreviations

MUST	Mbarara university of science and technology
SBL	Simulation based learning
IPE	Interprofessional education
Sim	IPE-simulation-enhanced IPE

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12909-024-06521-9.

Supplementary Material 1

Acknowledgements

We would wish to acknowledge the participants of the study and research assistants.

Author contributions

JNN conceptualization of the idea, participated in designing the study and data collection tools, obtaining funding, supervised data collection, analysis and interpretation of data, drafted the first draft of the article, AM was involved in the conceptualization of the idea, participated in designing the study and data collection tools, analysis and interpretation of data, review and editing of manuscript DS was involved in the conceptualization of the idea, analysis

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

and interpretation of data, SOS concept development, data analysis and interpretation and review of the article, ANO idea development, data analysis and interpretation and review of the article, SJY assisted with data collection, data analysis and interpretation and review of the article, FB was involved in the conceptualization of the idea, developing study design and data collection tools, analysis and interpretation of data, and writing and reviewing of the article. All authors read and approved the final article.

Funding
This study was supported by grant 1R25TW011217 from the US National Institutes of Health (NIH)/Fogarty International Center (FIC) which also includes co-funds from the U.S. Department of State's Office of the U.S. Global AIDS Coordinator and Health Diplomacy (S/GAC) and the President's Emergency Plan for AIDS Relief (PEPFAR) to the African Forum for Research and Education in Health (AFREhealth). The Grant Principal Investigators are Profs. Nelson K .Sewankambo (contact PI), Prisca Adejumo, Jean Bisimwa Nachega, Fatima Suleman.

Data availability
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study was reviewed and approved by the research ethics committee (REC) of Mbarara University of Science and Technology (MUST-2023-763). The research team also sought ethical approval from the Uganda National Council for Science and Technology (SS1858ES). Participants provided informed consent. We adhered to the Helsinki declaration on the use of human subjects in research including voluntariness and respect for persons. Administrative clearance to conduct the study was obtained from the university. Privacy and confidentiality were maintained throughout the study. Participants were assigned unique identifiers and only these identifiers were included on the transcripts. All study data were stored on a password protected laptop. Our data transcripts do not report potential identifiers such as the gender, age, titles and specific role of the participants as the study setting is small and it would be easy to identify the respondents.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Mbarara University of Science and Technology, Mbarara, Uganda
[2]African Forum for Research and Education in Health, Kumasi, Ghana
[3]University of Jos, Jos, Nigeria

Received: 29 February 2024 / Accepted: 12 December 2024
Published online: 25 December 2024

References

1. Greiner AC. Committee on the Health Professions Education Summit. Health professions education: A bridge to quality. 2003.
2. Reeves S, Perrier L, Goldman J, Freeth D, Zwarenstein M. Interprofessional education: effects on professional practice and healthcare outcomes. Cochrane Database Syst reviews. 2013(3).
3. Riskiyana R, Claramita M, Rahayu G. Objectively measured interprofessional education outcome and factors that enhance program effectiveness: A systematic review. Nurse Educ Today. 2018;66:73–8.
4. Illingworth P, Chelvanayagam S. The benefits of interprofessional education 10 years on. Br J Nurs. 2017;26(14):813–8.
5. Dean WH, Buchan J, Gichuhi S, Philippin H, Arunga S, Mukome A, et al. Simulation-based surgical education for glaucoma versus conventional training alone: the GLAucoma Simulated Surgery (GLASS) trial. A multicentre, multicountry, randomised controlled, investigator-masked educational intervention efficacy trial in Kenya, South Africa, Tanzania, Uganda and Zimbabwe. Br J Ophthalmol. 2022;106(6):863–9.
6. Data S, Dubé MM, Bajunirwe F, Kyakwera C, Robinson T, Najjuma JN, et al. Feasibility of an Interprofessional, Simulation-Based Curriculum to Improve Teamwork Skills, Clinical Skills, and Knowledge of Undergraduate Medical and Nursing Students in Uganda: A Cohort Study. Simul Healthc. 2021;16(6):e100–8.
7. Najjuma JN, Bajunirwe F, Twine M, Namata T, Kyakwera CK, Cherop M. Stakeholder perceptions about the establishment of medical simulation-based learning at a university in a low resource setting: a qualitative study in Uganda. BMC Med Educ. 2020;20(1):1–10.
8. Granheim BM, Shaw JM, Mansah M. The use of interprofessional learning and simulation in undergraduate nursing programs to address interprofessional communication and collaboration: An integrative review of the literature. Nurse Educ Today. 2018;62:118–27.
9. Cuff P, Schmitt M, Zierler B, Cox M, De Maeseneer J, Maine LL, et al. Interprofessional education for collaborative practice: views from a global forum workshop. Taylor & Francis; 2014. pp. 2–4.
10. West C, Graham L, Palmer RT, Miller MF, Thayer EK, Stuber ML, et al. Implementation of interprofessional education (IPE) in 16 US medical schools: common practices, barriers and facilitators. J Interprofessional Educ Pract. 2016;4:41–9.
11. Foronda C, MacWilliams B, McArthur E. Interprofessional communication in healthcare: An integrative review. Nurse Educ Pract. 2016;19:36–40.
12. Horsley TL, O'Rourke J, Mariani B, Doolen J, Pariseault C. An integrative review of interprofessional simulation in nursing education. Clin Simul Nurs. 2018;22:5–12.
13. Oandasan I, Reeves S. Key elements of interprofessional education. Part 2: factors, processes and outcomes. J Interprof Care. 2005;19(sup1):39–48.
14. Rossler K, Molloy MA, Pastva AM, Brown M, Xavier N. Healthcare simulation standards of best PracticeTM simulation-enhanced interprofessional education. Clin Simul Nurs. 2021;58:49–53.
15. Yu J, Lee w, Kim M, Choi S, Lee S, Kim S, et al. Effectiveness of simulation-based interprofessional education for medical and nursing students in South Korea: a pre-post survey. BMC Med Educ. 2020;20:1–9.
16. Najjuma JN, Bajunirwe F, Twine M, Namata T, Kyakwera CK, Cherop M, et al. Stakeholder perceptions about the establishment of medical simulation-based learning at a university in a low resource setting: a qualitative study in Uganda. BMC Med Educ. 2020;20:1–10.
17. Reeves S, Fletcher S, Barr H, Birch I, Boet S, Davies N, et al. A BEME systematic review of the effects of interprofessional education: BEME Guide 39. Med Teach. 2016;38(7):656–68.
18. Al-Elq AH. Simulation-based medical teaching and learning. J Family Community Med. 2010;17(1):35–40.
19. Watts P, Langston SB, Brown M, Prince C, Belle A, Skipper MW, et al. Interprofessional education: a multi-patient, team-based intensive care unit simulation. Clin Simul Nurs. 2014;10(10):521–8.
20. Watts F, Lindqvist S, Pearce S, Drachler M, Richardson B. Introducing a post-registration interprofessional learning programme for healthcare teams. Med Teach. 2007;29(5):443–9.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Content courtesy of Springer Nature, terms of use apply. Rights reserved.

Terms and Conditions

Springer Nature journal content, brought to you courtesy of Springer Nature Customer Service Center GmbH (“Springer Nature”).
Springer Nature supports a reasonable amount of sharing of research papers by authors, subscribers and authorised users (“Users”), for small-scale personal, non-commercial use provided that all copyright, trade and service marks and other proprietary notices are maintained. By accessing, sharing, receiving or otherwise using the Springer Nature journal content you agree to these terms of use (“Terms”). For these purposes, Springer Nature considers academic use (by researchers and students) to be non-commercial.
These Terms are supplementary and will apply in addition to any applicable website terms and conditions, a relevant site licence or a personal subscription. These Terms will prevail over any conflict or ambiguity with regards to the relevant terms, a site licence or a personal subscription (to the extent of the conflict or ambiguity only). For Creative Commons-licensed articles, the terms of the Creative Commons license used will apply.
We collect and use personal data to provide access to the Springer Nature journal content. We may also use these personal data internally within ResearchGate and Springer Nature and as agreed share it, in an anonymised way, for purposes of tracking, analysis and reporting. We will not otherwise disclose your personal data outside the ResearchGate or the Springer Nature group of companies unless we have your permission as detailed in the Privacy Policy.
While Users may use the Springer Nature journal content for small scale, personal non-commercial use, it is important to note that Users may not:

1. use such content for the purpose of providing other users with access on a regular or large scale basis or as a means to circumvent access control;
2. use such content where to do so would be considered a criminal or statutory offence in any jurisdiction, or gives rise to civil liability, or is otherwise unlawful;
3. falsely or misleadingly imply or suggest endorsement, approval , sponsorship, or association unless explicitly agreed to by Springer Nature in writing;
4. use bots or other automated methods to access the content or redirect messages
5. override any security feature or exclusionary protocol; or
6. share the content in order to create substitute for Springer Nature products or services or a systematic database of Springer Nature journal content.

In line with the restriction against commercial use, Springer Nature does not permit the creation of a product or service that creates revenue, royalties, rent or income from our content or its inclusion as part of a paid for service or for other commercial gain. Springer Nature journal content cannot be used for inter-library loans and librarians may not upload Springer Nature journal content on a large scale into their, or any other, institutional repository.
These terms of use are reviewed regularly and may be amended at any time. Springer Nature is not obligated to publish any information or content on this website and may remove it or features or functionality at our sole discretion, at any time with or without notice. Springer Nature may revoke this licence to you at any time and remove access to any copies of the Springer Nature journal content which have been saved.
To the fullest extent permitted by law, Springer Nature makes no warranties, representations or guarantees to Users, either express or implied with respect to the Springer nature journal content and all parties disclaim and waive any implied warranties or warranties imposed by law, including merchantability or fitness for any particular purpose.
Please note that these rights do not automatically extend to content, data or other material published by Springer Nature that may be licensed from third parties.
If you would like to use or distribute our Springer Nature journal content to a wider audience or on a regular basis or in any other manner not expressly permitted by these Terms, please contact Springer Nature at

onlineservice@springernature.com