Perceptions of Health Extension Officer Students in Divine Word University on Medical Simulation Training as a Preparation Tool for Clinical Placement: A Mixed Methods Study

J. Benjamin[1*], J. Kuzma[1]

[1]Divine Word University - FMHS, P.O. Box 483, Madang, Madang Province, Papua New Guinea

[*]Corresponding author email: jbenjamin@dwu.ac.pg

Abstract: Medical simulation training is an increasingly vital educational strategy for preparing healthcare professionals to meet the complex demands of clinical environments. This study explores the perceptions of Health Extension Officer (HEO) students at Divine Word University (DWU) regarding the effectiveness of medical simulation training as a preparation tool for clinical placement. The study aligns with Papua New Guinea's desire to produce skilled and competent healthcare professionals and this view is a natural extension into the Pacific region's goal of harnessing innovative technologies to improve healthcare delivery and support sustainable development. A mixed-methods approach using a sequential explanatory research design was utilized, involving a survey of 101 students across three academic years, followed by focus group discussions (FGDs) with 24 participants. The survey assessed satisfaction, perceived skill development, and resource adequacy, while the FGDs provided in- depth perspectives on the integration of basic medical sciences, development of interpersonal and clinical skills, and suggestions for enhancing simulation training.

Findings revealed that students perceive simulation as a highly effective tool for building clinical competencies, especially in technical skills, decision-making, and teamwork, all within a safe, low-risk environment. Participants valued structured feedback and opportunities for hands-on practice. However, they identified the need for longer sessions, improved basic science integration, and standardized instructor training.

This study highlights the transformative potential of simulation- based learning in strengthening healthcare education across Papua New Guinea (PNG). By investing in simulation technologies and enhancing teaching methodologies, institutions can better prepare future health workers to serve rural and underserved communities, contributing to safer and more equitable health outcomes. The results hold implications not only for DWU and PNG but also for similar health systems across the Pacific, where resource limitations and workforce challenges demand innovative, context-relevant solutions. In conclusion, medical simulation training as a core educational strategy into training of clinical healthcare professionals supports PNG's efforts towards building a resilient and competent health workforce, in doing so illustrating one positive approach desired to enhance safe, efficient, and sustainable healthcare improvements across the Pacific region.

Keywords: medical simulation training, healthcare education, innovative teaching, divine word university

Author Biography:

John Benjamin has served at Divine Word University's Faculty of Medicine and Health Sciences in Papua New Guinea for the past 10 years. He has a background in clinical practice across various provincial hospitals and spent 8 years in the medical research environment focused on pharmacokinetics studies.

He is both humbled and happy for the opportunity to lend a voice into the vibrant discussions for the 2025 PIURN conference theme, sharing insights from a study on medical simulation training and how integrating appropriate technologies into medical education can strengthen healthcare delivery - aligning with the conference theme of *"Harnessing Technologies for the Safe and Sustainable Development of the Pacific"*

1. BACKGROUND AND CONTEXT

Innovative and smart healthcare education is increasingly necessary to address the growing clinical and workforce challenges in Papua New Guinea (PNG) and the Pacific. Factors such as limited clinical exposure, a high burden of disease, and constrained resources call for forward-thinking training strategies. Simulation-based education (SBE) is a globally recognized approach that bridges the divide between theory and practice [McGaghie].

Medical simulation training (MST) provides safe, controlled learning environments for students to develop technical and interpersonal skills without risking patient safety [Lateef]. It allows for repeated practice and real-time feedback, promoting confidence, communication, and clinical competence [Okuda, Issenberg].

1.1 Historical development and purpose

Simulation in healthcare traces back to 17th-century anatomical models [Bradley], progressing to tools like Resusci Anne in the 1960s [Linder]. Today, simulation is integral in clinical education, focusing on patient safety, decision-making, and readiness for professional practice through scenario-based learning [Rosen].

1.2 Types and emerging trends

MST encompasses various modalities—ranging from low-fidelity manikins to high-fidelity systems, standardized patients, virtual reality, and hybrid models. Newer developments include AI-based feedback [Edelson], cloud-based training platforms [Chick], and open-source solutions tailored to low-resource settings [Harder], broadening accessibility and equity in simulation delivery.

1.3 Student perceptions and impact

Literature indicates that students value simulation for hands-on learning, critical thinking, and clinical preparedness [Laschinger]. Key features of effective simulation include realism, feedback, and reflection [Jeffries]. Challenges, however, remain—particularly session limitations, equipment shortages, and variable instructional quality [Cook, Harder]. Despite these issues, student satisfaction remains high [Motola], especially when programs incorporate feedback for improvement [Kim].

1.4 Medical simulation in PNG and at DWU

Medical simulation in PNG is still emerging, with limited institutional integration and scarce region-specific research. Barriers such as under-resourced labs and faculty training gaps persist [Robinson]. Recognizing this, DWU under its 2016–2026 Strategic Plan, introduced MST into its Health Extension Officer (HEO) program in 2018 to enhance student readiness for clinical placement and workforce demands [Divine Word University: Strategic Plan 2016–2026].

1.5 Rationale

While MST's effectiveness is well-documented in high-income settings, its impact in low-resource environments like PNG is less understood. At DWU, MST was implemented to improve clinical preparedness; however, its effects on student learning outcomes, confidence, and readiness have not been formally evaluated. Understanding student perspectives is essential to refining MST, especially where training opportunities and resources are limited.

2. PURPOSE AND OBJECTIVES:

This study explored HEO students' perceptions of MST as a preparatory tool for clinical placements and identified factors influencing its effectiveness. The objectives were:

1. To assess overall satisfaction with MST
2. To explore perceptions of its role in skill acquisition and decision-making
3. To identify areas for improvement based on student feedback.

3. METHODS

An explanatory sequential mixed methods design was employed to explore both quantitative and qualitative student experiences [Creswell, Tashakkori et. al.].

3.1 Phase 1: Quantitative

All Year 2–4 HEO students enrolled in 2024 (N = 110) were invited to participate through stratified random sampling. A minimum sample size of 86 was calculated using Slovin's formula at a 95% confidence level [Yamane]. The survey tool, developed from validated MST evaluation instruments, comprised items under five themes: BMS learning, soft skills, clinical skills, skill transfer, and administration. Responses were recorded using a 5-point Likert scale and pilot-tested for reliability. Analysis using SPSS v16 included descriptive and inferential statistics (e.g., Spearman's correlation), with Cronbach's alpha of 0.948 indicating excellent internal consistency.

3.2 Phase 2: Qualitative

Twenty-four students were purposively selected for six focus group discussions (FGDs), stratified by year and gender. A semi-structured guide explored themes identified in the survey, such as realism, facilitator support, and learning barriers. Discussions were recorded, transcribed, and anonymized [Krueger et. al.]. Data were analyzed thematically using Braun and Clarke's framework [Braun et. al.]. Codes and themes were integrated with quantitative findings to enhance interpretation through triangulation [Creswell et. al.].

3.3 Theoretical Framework:

This study is underpinned by multiple learning theories. Social Cognitive Theory supports skill acquisition through observation and modeling [Bandura], while Situated Learning Theory emphasizes context-based practice [Lave]. Kolb's Experiential Learning Theory describes a cyclical process of doing, reflecting, and adapting [Kolb 1984] suitable for advanced learners [Kolb 2018]. Cognitive Load Theory, which promotes aligning instructional design with learner capacity [Sweller] – this final theory was most applicable across all three-year groups of this study.

3.4 Ethics Approval:

The study received ethical clearance from the Faculty of Medicine and Health Sciences Research Committee (FRC/MHS/88-24) and the DWU Research Ethics Committee (DWU REC-13/24). Informed consent was obtained, and data were securely stored in accordance with ethical guidelines [Israel et. al.].

4. RESULTS

4.1 Phase 1: Quantitative Findings

A total of 101 students participated, including 31 second-year, 30 third-year, and 40 fourth-year students, exceeding the minimum sample size for a 95% confidence level.

4.1.1 Primary Analysis: Overall Perceptions of MST –

Students' responses clustered around five key themes:

- ***Basic Medical Science (BMS) Learning****:* 70.3% agreed simulation reinforced BMS knowledge, though only 39.6% believed it was adequately covered beforehand. This highlights pre-simulation instructional

gaps.

- ***Interpersonal Soft Skills****:* Professionalism was highly rated (84.2% agreement), with teamwork also positively evaluated (Median = 4). However, communication skills received mixed reviews, with 29.7% agreeing, 19.8% strongly agreeing, and 19.8% disagreeing.
- ***Core Clinical Skills****:* While 69.3% affirmed improved bedside skills, clinical reasoning scored lower (Mean = 3.35), with 26.7% neutral and 11.9% in disagreement.
- ***Skill Transfer to Practice****:* A majority (73.3%) felt simulation prepared them for clinical placement, but only 20% agreed it aided preparation for post-residency training (Mean = 2.63), suggesting limited perceived long-term benefit.
- ***Simulation Administration****:* High satisfaction was reported with teaching quality (71.3%) and instructor knowledge (88.1%). Assessment activities were also positively rated (Median = 4).

A summary of the descriptive analysis of survey study items can be noted on *Table-1* while a highlight of the best and worst perceptions by the HEO students of the MST under the five key themes can be noted on *Table-2.*

4.1.2 Secondary Analysis: Correlation Findings

Spearman correlation revealed strong associations: teamwork and communication (rs = 0.715), simulation relevance and clinical performance (rs = 0.530), and teaching effectiveness and placement readiness (rs = 0.514). Moderate correlations reinforced links between BMS knowledge, professionalism, and teamwork. *Table-3* illustrates further the correlation between these variables.

Table-1: Descriptive analysis of survey study items showing frequency, percentages, mean and median.

Q No.	Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Median	Mean
1	My understanding of basic medical science content I learnt prior to the medical simulation sessions did help when attending these sessions.	7 (6.9%)	7 (6.9%)	16 (15.8%)	46 (45.5%)	25 (24.8%)	4	3.75
2	My knowledge in basic medical sciences was enhanced when attending the medical simulation training sessions.	6 (5.9%)	8 (7.9%)	18 (17.8%)	28 (27.7%)	41 (40.6%)	4	3.92
3	Basic medical science content was adequately covered by the time regular medical simulation training sessions commenced.	8 (7.9%)	17 (16.8%)	24 (23.8%)	40 (39.6%)	12 (11.9%)	4	3.31
4	Performing medical simulation training sessions improved my communication skills for history taking.	9 (8.9%)	20 (19.8%)	22 (21.8%)	30 (29.7%)	20 (19.8%)	3	3.32
5	Performing medical simulation training sessions improved my bedside exam skills for patient examinations.	11 (10.9%)	3 (3.0%)	17 (16.8%)	38 (37.6%)	32 (31.7%)	4	3.76
6	I was able to develop judgment and critical clinical reasoning skills from the medical simulation sessions.	10 (9.9%)	12 (11.9%)	27 (26.7%)	37 (36.6%)	15 (14.9%)	4	3.36
7	I was able to develop professional attitudes and attributes from the medical simulation sessions to apply into the clinical placement.	4 (4.0%)	3 (3.0%)	9 (8.9%)	24 (23.8%)	61 (60.4%)	5	4.33
8	Medical simulation sessions advanced my skills to work as part of a team.	10 (9.9%)	7 (6.9%)	19 (18.8%)	34 (33.7%)	31 (30.7%)	4	3.68
9	Planned activities covered during medical simulation sessions were relevant to what we observed during clinical placement.	3 (3.0%)	6 (5.9%)	16 (15.8%)	42 (41.6%)	34 (33.7%)	4	4.00
10	In general, the medical simulation teaching is conducted effectively so the session aims are achieved each time.	7 (6.9%)	9 (8.9%)	13 (12.9%)	39 (38.6%)	33 (32.7%)	4	3.82
11	The simulation teaching team are knowledgeable in their role.	0 (0.0%)	4 (4.0%)	8 (7.9%)	39 (38.6%)	50 (49.5%)	4	4.34
12	During clinical placement, I was able to perform some procedures well due to being exposed to them in simulation training.	6 (5.9%)	5 (5.0%)	16 (15.8%)	44 (43.6%)	30 (29.7%)	4	3.86
13	The skills and knowledge I learned during simulation training prepared me well for clinical placement.	7 (6.9%)	8 (7.9%)	23 (22.8%)	40 (39.6%)	23 (22.8%)	4	3.64
14	Overall, I feel that the medical simulation training component was beneficial to support my clinical placement.	4 (4.0%)	14 (13.9%)	15 (14.9%)	25 (24.8%)	43 (42.6%)	4	3.88
15	The skills and knowledge I learned during simulation training have equipped me well to consider further training after my residency (4th years only).	8 (20.0%)	9 (22.5%)	14 (35.0%)	8 (20.0%)	1 (2.5%)	3	2.63
16	Performing assessment activities (e.g., OSCE) in the simulation room will support my clinical skills training and preparation for clinical placement.	0 (0.0%)	6 (5.9%)	18 (17.8%)	36 (35.6%)	41 (40.6%)	4	4.11

Note: SA = Strongly Agree (5), A = Agee (4), N = Neutral (3), D = Disagree (2), SD = Strongly Disagree (1).

Weighted average = Sum of means / No. of survey items = 59.71/16 = 3.73

Table-2: Best and worst perceptions noted by HEO students according to the key themes.

Key Theme	Best Perceptions	Worst Perceptions
Prior Basic Medical Science (BMS) Learning Experience	68.3% agreed that simulation reinforced BMS knowledge (Median = 4).	Some students (23.8%) felt BMS content was not adequately covered before simulations (Mean = 3.31).
Development of Interpersonal Soft Skills	84.2% agreed that simulation effectively fostered professionalism (Mean = 4.33).	Communication skill improvement had mixed responses, with 19.8% disagreeing (Median = 3).
Development of Core Clinical Skills	69.3% (combined agreement) felt simulation improved bedside exam. skills (Mean = 3.75).	Clinical reasoning skills had variability, with 26.7% neutral and 11.9% disagreeing (Mean = 3.35).
Transfer of Clinical Skills to Practice	73.3% felt prepared to perform procedures during clinical placement (Median = 4).	Limited impact on future training, with only 20.0% agreeing that simulation prepared them for post-residency training (Mean = 2.63).
Perception of the Administration of Simulation Training	88.1% expressed high confidence in the knowledge of instructors (Mean = 4.34).	No major negative perception reported under this theme.

Table-3: Relationships between different variables utilizing Spearman's coefficient correlation

Variables	n	Spearman's p	p-value
Performing medical simulation training sessions improved my communication skills for history taking (Q4) & I was able to develop professional attitudes and attributes from the medical simulation sessions to apply into the clinical placement (Q7)	101	0.436	< 0.000
My understanding of basic medical science content (Anatomy, Biochemistry, Physiology and Pharmacology) I learnt prior to the medical simulation sessions did help when attending these sessions (Q1) & Basic medical science content was adequately covered by the time regular medical simulation training sessions commenced (Q3)	101	0.501	< 0.000
I was able to develop professional attitudes and attributes from the medical simulation sessions to apply into the clinical placement (Q7) & Medical simulation sessions advanced my skills to work as part of a team (Q8)	101	0.508	< 0.000
In general , the medical simulation teaching is conducted effectively so the session aims are achieved each time (Q10) & Overall, I feel that the medical simulation training component was beneficial to support my clinical placement (Q14)	101	0.514	< 0.000
Planned activities covered during medical simulation sessions were relevant to what we observed during clinical placement (Q9) & During clinical placement I was able to perform some procedures well due to being exposed to them in simulation training (Q12)	101	0.530	< 0.000
Medical simulation sessions advanced my skills to work as part of a team (Q8) & Performing medical simulation training sessions improved my communication skills for history taking (Q4)	101	0.715	< 0.000

4.2 Phase 2: Qualitative Findings

Thematic analysis revealed five key themes: perceived benefits, challenges and limitations, preparedness for clinical placement, program administration, and overall perceptions and recommendations, each reflecting distinct aspects of students' experiences with medical simulation training.

Perceived benefits: Students praised MST for improving confidence and essential clinical skills.

- *"The SIM Lab helped me build to be confident... you get a good idea how to perform it." (Yr. 2 male)*
- *"It strengthens the theoretical knowledge of basic medicine... through hands-on practicals" (Yr. 3 male).*

Challenges and limitations*:* Key issues included overcrowding, equipment shortages, and limited practice time.

- *"Only one simulation room... and not enough equipment for students to practice." (Yr. 4 male)*

- *"We sometimes rush to complete procedures which we have to do critically" (Yr. 3 female)*

Preparedness for clinical placement: Many students reported feeling well-prepared for clinical procedures after simulation. A second-year female student reflected,

- *"I felt confident when I was asked to palpate a pregnant mother... because we had already practiced in the simulation room."*

Program administration*:* Students appreciated teaching quality but raised concerns about inconsistent facilitation. Calls for increased session frequency were common. One third year male student remarked,

- *"Some instructors explained too much and we ran out of time."*

Overall perception and recommendations*:* Students valued the realism of simulation

- *"It really simulates the feeling of being in a real hospital" (Yr. 2 female).*

They recommended more sessions, better equipment, and OSCE integration. Several also emphasized the need for improved BMS preparation:

- *"We need to learn Anatomy and Physiology well in Year 1 and 2 to help our simulation training" (Yr. 3 female).*

5. DISCUSSION

This study affirms that MST is perceived as an essential preparation tool by HEO students at DWU. Although most students felt simulation reinforced BMS knowledge, the low rating (39.6%) for prior BMS coverage highlights a critical need for better integration of foundational sciences. These findings are supported by earlier studies [McGaghie , Al-Elq] and are consistent with Robinson et al., who observed similar issues in Pacific contexts where students often begin simulation with limited scientific grounding.

Interpersonal skills, particularly professionalism and teamwork— were widely recognized as benefits of MST, with a notable correlation between teamwork and communication ($r_s = 0.715$). Although history-taking communication received mixed feedback, students consistently reported simulation as confidence-building. This aligns with the work of Jeffries and Kolb 1984, who emphasize the value of experiential learning in developing soft skills.

Technical competence in bedside procedures was affirmed across both quantitative and qualitative data. However, the relatively lower score for clinical reasoning (Mean = 3.35) suggests a need for more decision-focused scenarios. This supports recommendations by Issenberg et al., that high-fidelity simulations with critical thinking components are key to fostering deeper learning.

Most students (73.3%) reported that simulation helped them prepare for clinical placement, confirming its importance as a bridge between classroom and practice. While teaching quality was generally rated highly, students noted logistical challenges including inconsistent facilitation and time constraints—echoing barriers previously reported in the Pacific region by Robinson et al., such as space limitations and equipment shortages.

In summary, MST was viewed as significantly enhancing student confidence, clinical competence, and overall preparedness. To maximize its effectiveness, improvements in BMS integration, scenario complexity, and consistent delivery are recommended.

5.1 Study Limitations

This single-institution study had a limited sample size, which affects the generalizability of findings. Self-reported data may be influenced by recall bias or social desirability. The scope focused on selected clinical skills rather than the full competency spectrum. Variation in BMS preparedness among students likely shaped their simulation perceptions. Additionally, equipment shortages, inconsistent teaching, and limited time posed learning barriers. The study measured only short-term simulation outcomes, leaving long-term impacts unexplored. Despite these constraints, findings offer critical insights to guide simulation-based education in similar low-resource contexts.

6. CONCLUSION

This mixed methods study presents the first formal evaluation of MST perceptions among HEO students at DWU. The results confirm simulation's value in strengthening clinical skills, building confidence, and enhancing preparedness for rural practice in PNG. These outcomes reinforce the importance of investing in simulation infrastructure and instructional design. Moreover, the positive feedback supports broader regional strategies to develop a skilled, adaptable healthcare workforce across the Pacific.

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