



Exploring Ethics of Care with Emerging Technologies: An Assessment of Advanced Medical Training Through High Fidelity Simulations – A Case of the Centers for Advanced Medical Training (CAMT) at the Teaching, Research & Referral Hospitals in Western Kenya

Fredrick Ochieng Omogah^{1*}, Lily Lukorito², Salome Sumba³, Collins Odero⁴, Sarah Ochieng⁵,
Clara Asena⁶

¹Lecturer, Uzima University, Kisumu, Kenya

^{2,3,4,5,6}B.Sc. Student, Health Systems and Development, Uzima University, Kisumu, Kenya

Abstract— Background: With references to the emerging technologies in healthcare sector, Ethics for best practices in care given to patients is becoming an issue. This study explores the intersection of ethics and technology in training medical professionals, with a focus on Centers for Advanced Medical Training (CAMT) utilizing high fidelity simulations. This study investigates the ethical dimensions of care within advanced medical training programs, at the Teaching, Research & Referral Hospitals in western Kenya. **Method:** all-inclusive assessment was conducted to assess the impact of high-fidelity simulations on the ethics of care among healthcare professionals. Observation, feedback mechanisms, and qualitative analysis were employed to gather data on participants' experiences and perceptions. **Results:** The findings reveal that high fidelity simulations play a significant role in shaping the ethics of care within medical training. Participants reported enhanced awareness of ethical considerations, improved decision-making skills, and heightened sensitivity to patient needs. Moreover, the simulations fostered a collaborative approach to care delivery, emphasizing teamwork and empathy. **Conclusion:** This study underscores the importance of integrating emerging technologies into medical training to enhance ethical practice. High fidelity simulations offer a valuable tool for cultivating a culture of ethical care among healthcare professionals in western Kenya. By incorporating these simulations into training programs, the Teaching/Research & Referral Hospitals in western Kenya can further promote patient safety and quality of care.

Index Terms— Exploring ethics of care, High fidelity simulations, Advanced medical training, Emerging technologies, Patient safety.

1. Introduction

In the jurisdiction of global healthcare, the evaluation of Advanced Medical Training Centers (AMTC) employing High Fidelity Simulations (HFS) has become an increasingly

compelling area of inquiry. This convergence of ethics, technology, and medical training demands immediate attention, given the swift integration of technology and its profound impact on advanced medical training and patient care. As these advancements continue to shape medical training practices, they offer promising avenues for enhancing medical education while simultaneously addressing ethical considerations in patient care (Okuda et al., 2009; Patel et al., 2020).

Central to this discussion is the concept of the "ethics of care," which is indispensable for understanding the ethical dimensions crucial to healthcare delivery. This aspect constitutes a critical facet of medical training, especially considering the rapid evolution of medical technology. The examination of how emerging technologies, such as high-fidelity simulations, influence the ethical framework of care has become both timely and significant in today's healthcare landscape (Gilligan, 1982).

High fidelity simulations represent a modern technological innovation in advanced medical training, providing realistic scenarios for the development of clinical and non-clinical skills. Evaluating their efficacy within the specific context of the Teaching/Research & Referral Hospitals' simulation center would amplify the practical value of research (McGaghie et al., 2010). This exploration is indispensable for grasping the potential impact of high-fidelity simulations on the ethical dimensions of care delivery and skill development within healthcare settings.

This research endeavor aims to examine into the influence of high-fidelity simulations on the ethics of care within medical training programs, with a particular focus on the case of the Centers for Advanced Medical Training (CAMT) at the

*Corresponding author: fo2001ke@yahoo.com

Teaching/Research & Referral Hospital in Western Kenya. By examining the experiences of healthcare professionals engaged in advanced training sessions, this study seeks to shed light on how emerging technologies shape ethical decision-making, patient safety, and collaborative care practices. Through this investigation, we aspire to gain deeper insights into optimizing medical education methodologies and ultimately enhancing the quality of healthcare delivery.

2. Exploring Ethical Aspects of Technology in Advanced Medical Training

New technology integrations at the Centers for Advanced Medical Training (CAMT) through High Fidelity Simulations (HFS) have brought to light significant ethical considerations. It is paramount that this review examines the existing research on the intersection of ethics of care and emerging technologies in the context of advanced medical training, specifically focusing on high fidelity simulations. By synthesizing findings from relevant studies, the review seeks to clarify the current understanding of ethical dimensions in medical education and identify gaps for future investigation (Patel *et al.*, 2020).

3. Ethics of Care in Healthcare Delivery

The ethics of care in healthcare delivery emphasizes empathy, relationships, and responsiveness to patients' needs, highlighting the moral significance of caring and being cared for (Tronto, 1993). This ethical framework foregrounds the relational aspects of healthcare, emphasizing compassion and attentiveness to patients' needs. Scholars like Gilligan (1982) have argued for a shift from traditional ethical frameworks, such as deontology and utilitarianism, towards an ethic of care that acknowledges the complexities of human relationships in healthcare settings.

Integrating these principles into advanced medical training through simulation can significantly enhance the learning experience. By creating realistic scenarios, simulation fosters patient-provider communication, emotional intelligence, and contextual sensitivity. It provides a risk-free environment for practicing complex medical situations, offering immediate feedback and promoting reflective practice (Issenberg *et al.*, 2005). Incorporating the ethics of care into simulation-based training ensures that healthcare professionals develop the skills needed for compassionate, patient-centered care (Ziv *et al.*, 2005).

4. Emerging Related Technologies in Medical Education

Many factors, such as the evolving healthcare landscape, the evolving role of the physician, shifting societal expectations, the fast-changing field of medical science, and the variety of pedagogical approaches, are influencing the rapid changes in medical education. Patient safety is now the priority due to shifting cultural expectations, which also pose ethical questions about learning interactions and procedures on actual patients. The traditional teaching approach of "see one, do one, teach one" is no longer appropriate.

Technology in medical education aims to teach students

about a variety of topics, including how to acquire fundamental knowledge more easily, make better decisions, enhance perceptual variation, improve coordination of skills, prepare for unexpected or important events, train learning teams, and improve psychomotor abilities. These objectives can be met by various technologies such as wearables (Google Glass), podcasts and videos with flipped classrooms, mobile devices with apps, video games, and simulations (part-time trainers, integrated simulators, virtual reality). Utilizing technology can offer the foundation and means of addressing numerous obstacles in the future medical education system (Guze, 2015).

High-fidelity simulations have revolutionized medical education by providing immersive and realistic training environments. These simulations utilize advanced technology to replicate clinical scenarios, allowing learners to practice diagnostic and procedural skills in a safe and controlled setting. Research by Okuda *et al.* (2009) demonstrates the effectiveness of high-fidelity simulations in improving clinical competency and decision-making among medical trainees. By integrating these technologies, medical education can better adapt to the rapid changes and meet the evolving needs of both learners and the healthcare system.

Despite their benefits, high fidelity simulations raise ethical concerns related to patient safety, consent, and psychological impact. For example, McGaghie *et al.* (2010) discuss the importance of informed consent and debriefing procedures to mitigate potential harm to participants during simulation sessions. Additionally, scholars like Isenberg *et al.* (2005) highlight the need for faculty oversight and ethical guidelines to ensure the responsible use of simulation technology in medical education.

5. Integrating Simulation Technologies in Medical Training

The Center for Advanced Medical Simulation provides comprehensive training using high-fidelity simulators like the Human Patient Simulator (HPS) and Sim Man. These tools enhance both technical and non-technical skills, improving patient safety and reducing medical errors through realistic practice environments (Center for Advanced Medical Simulation, n.d.). The HPS and Sim Man replicate human physiology and responses, allowing students and healthcare professionals to practice and refine their skills in a controlled, risk-free setting. These simulators help bridge the gap between theoretical knowledge and practical application, ensuring that learners are well-prepared to handle real-life medical situations with confidence and competence (Issenberg *et al.*, 2005).

Specialized simulators for surgical and endoluminal interventions, such as the GI Mentor and Uro Mentor, enable precise training in procedures like gastroscopy and endourology. The GI Mentor, for instance, provides a realistic simulation of gastrointestinal endoscopy procedures, including ERCP and colonoscopy, while the Uro Mentor focuses on endourological techniques. These simulators offer immediate feedback and allow for repetitive practice, which is crucial for mastering complex procedures (Ziv *et al.*, 2005). By incorporating these advanced technologies into medical

training, healthcare professionals can develop the necessary skills to perform procedures accurately and safely, ultimately enhancing the overall quality of healthcare delivery (Issenberg et al., 2005).

6. Integrating Ethics of Care in Medical Training

Recent studies have explored ways to integrate the ethics of care into high-fidelity simulation-based training. For instance, Patel et al. (2020) describe a pilot program that incorporates scenarios emphasizing empathetic communication and patient-centered care into simulation sessions. Similarly, Jones et al. (2020) advocate for the inclusion of reflective exercises and debriefing discussions focused on relational aspects of care to foster ethical awareness among medical trainees.

The integration of the ethics of care plays a crucial role in addressing ethical challenges that arise when transitioning from primary to secondary care. The ethical concerns in integrated care settings revolve around professional identity, autonomy, responsibility, non-maleficence, integrity, and the need for evidence-based strategies. The ethics of care contributes to empirical research by recognizing new relationships between patients and healthcare professionals, as well as new ethical challenges.

This integration, especially in advanced medical training, prepares healthcare professionals to deliver compassionate, patient-centered care in an increasingly technology-driven healthcare system. This aligns with the introduction of AI and machine learning, which are used in healthcare to improve diagnosis and treatment planning (Topol & Longo, 2018). While these technologies offer significant benefits in terms of accuracy and efficiency, they raise ethical concerns related to data privacy, bias, and accountability. To ensure they are used ethically in healthcare settings, professional organizations have issued guidelines on best practices for ethics in healthcare. To navigate these complexities, healthcare providers can benefit from integrating ethical frameworks that focus on both duty-based obligations and relational aspects of care. This has been done through:

- *Professional Identity and Autonomy*; clarifying the roles and autonomy of healthcare professionals within integrated care settings.
- *Extent of Professional Responsibility*; determining the extent of professional responsibility in integrated care settings using shared decision-making and collaborative practices.
- *Need for Evidence-Based Strategies*; Ensuring ethical decision-making in healthcare integration is informed by robust evidence on what works best for patients, providers, and the healthcare system. By incorporating these ethical considerations into medical training, healthcare providers can more effectively address the complex ethical issues that arise in integrated care settings.

This review therefore shows that more people are realizing the importance of caring ethics in medical training, especially when using advanced simulations. Even though new

technologies can improve skills, it's crucial to stick to ethical rules that focus on patients' well-being and relationships in healthcare. Future studies should find new ways to teach caring ethics in medical training, so professionals can be skilled and ethical in their work (Gilligan, 1982; Jones et al., 2020).

Lastly, high fidelity simulations are increasingly used in medical training, yet their ethical impact on healthcare professionals remains unclear. This study, at the Teaching, Research & Referral Hospitals in Western Kenya investigated how these simulations affect ethical decision-making, patient safety, and collaborative care, addressing a significant gap in understanding their influence (McGaghie et al., 2010).

7. Material and Method

A qualitative study explored into ethical aspects of medical training simulations. Through semi-structured interviews and focus groups, insights from diverse healthcare professionals from three Teaching/Research & Referral Hospital in Western Kenya, actively involved in high fidelity simulation programs, were gathered. Twenty (20) respondents, were purposively selected from various specialties, ensured diverse perspectives were represented. They were composed as follows: three (3) medical officers who are general practitioners, six specialists (6) represented as Paediatrics, Gynecologists, Surgeons, Oncologists, Dentists and Cardiologists, four (4) nurses, three (3) clinical officers, two (2) lab-Techs and two (2) (pharm-Techs).

Individual interviews explored participants' ethical views on high fidelity simulations, while focus groups facilitated collaborative dialogue, sharing insights and experiences. Data Analysis adopted thematic analysis to analyze the qualitative data collected from interviews and focus group discussions. Systematic coding identified recurring themes regarding high fidelity simulations' impact on ethics, decision-making, patient safety, and collaboration among healthcare professionals. Ethical considerations ensured informed consent, confidentiality, and the right to withdraw without consequences for participants (Isenberg et al., 2005).

Based on the information provided and the need of this study, the dependent variable measured was "ethics of care within medical training," and the predictor variable was "utilization of high-fidelity simulations."

In this light of reason, the researchers formulated a multiple linear regression (MLR) model like this:

$$\text{Ethics_of_Care} = \beta_0 + \beta_1 * \text{High_Fidelity_Simulations} + \epsilon$$

Where:

- Ethics_of_Care represents the level of ethics of care within medical training.
- $\text{High_Fidelity_Simulations}$ is a binary variable indicating the utilization of high-fidelity simulations (1 if utilized, 0 if not).
- β_0 = the intercept term.
- β_1 = the coefficient representing the effect of utilizing high fidelity simulations on the ethics of care within medical training.
- ϵ is the error term.

Table 1

Theme	Sub-theme	Description
Ethics of Care	Professional Integrity	Participants emphasized the importance of upholding ethical standards in patient care during high fidelity simulations.
	Patient Dignity	Respect for patient dignity emerged as a significant aspect of ethical considerations during simulation-based training.
Decision-making	Clinical Judgments	The ability to make sound clinical decisions under pressure was highlighted as a key skill honed through high fidelity simulations.
	Ethical Decision-making	Participants discussed the ethical dilemmas encountered during simulations and the process of navigating them ethically.
Patient Safety	Error Recognition	High fidelity simulations helped participants recognize and mitigate errors effectively, contributing to enhanced patient safety.
	Communication	Improved communication among healthcare professionals during simulations positively impacted patient safety outcomes.
Collaboration	Inter-professional Teamwork	Collaboration and teamwork were fostered through simulation-based training, leading to better coordination and patient care outcomes.
	Leadership	Simulation scenarios provided opportunities for participants to develop leadership skills and enhance their role within healthcare teams.

Data was collected on the utilization of high-fidelity simulations and the level of ethics of care within medical training from participants in the Teaching, Research & Referral Hospitals in western Kenya. Based on this the study estimated the coefficients (β_0 and β_1) using multiple linear regression analysis to see the relationship between the utilization of high-fidelity simulations and the ethics of care within medical training.

8. Results

A. Data Presentation and Analysis

The thematic matrix arranged the findings of thematic analysis into identifiable themes and sub-themes. This offered a systematic summary of the primary insights gathered from the data collected that presented the emergent themes and subthemes as shown in the table below:

9. Conclusion

The findings of this study underscore the profound impact of high-fidelity simulations on the ethics of care, decision-making, patient safety, and collaboration among healthcare professionals. Through the immersive experience provided by simulations, participants not only honed their clinical skills but also developed a heightened awareness of ethical considerations and a deeper commitment to upholding professional integrity. Moreover, the collaborative nature of simulation-based training engendered a culture of teamwork and leadership, thereby enhancing the overall quality of patient care.

10. Recommendations

Based on the insights gleaned from this study, the following recommendations are proposed:

- 1) *Integration of High-Fidelity Simulations*: Institutions should prioritize the integration of high-fidelity simulations into medical training programs to enhance ethical practice and promote patient safety.
- 2) *Ethics Training*: Incorporating structured ethics training modules within simulation-based curricula can further reinforce ethical decision-making skills among healthcare professionals.
- 3) *Inter-professional Education*: Emphasizing inter-

professional education within simulation settings can foster collaboration, teamwork, and effective communication among multidisciplinary healthcare teams.

- 4) *Continuous Evaluation and Improvement*: Regular evaluation and refinement of simulation scenarios and debriefing processes are essential to ensure ongoing efficacy and relevance in addressing evolving healthcare challenges.
- 5) *Research and Innovation*: Continued research and innovation in simulation technology are warranted to explore novel approaches to enhance the fidelity and effectiveness of simulation-based training programs.

By implementing these recommendations, institutions can cultivate a culture of ethical care, bolster professional competency, and ultimately elevate the standard of healthcare delivery for the benefit of patients and communities alike.

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