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The Role of Simulation in Enhancing Competence Among Theatre Nurses and Perioperative Professionals

Ameliyathane Hemşireleri ve Perioperatif Profesyonellerinin Yetkinliğini Artırmada Simülasyonun Rolü

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ABSTRACT

Aim: Simulation-based training enhances clinical competencies in operating theatre nurses and perioperative professionals. This review evaluates its impact on learning outcomes and identifies skill gaps in perioperative practice, focusing on professional roles and responsibilities. Subjects and Method: A document review of 20 studies (2009–2024) from Scopus, Web of Science, PubMed, and CINAHL was conducted. The studies included randomized controlled trials, qualitative research, and cohort designs. Key data on study aims, methods, participants, and findings were extracted. Thematic analysis identified major trends. Results: The review of the selected studies resulted in the identification of four main themes. These themes are as follows: (1) enhancement of technical skills and clinical performance, (2) development of teamwork, communication, and crisis management, (3) feasibility and acceptance of simulation technologies, and (4) learner experiences with simulation: nursing and operating department practitioner students. Conclusion: Simulation-based training effectively bridges the gap between theory and practice in perioperative care. Its broader adoption, using standardized, evidence-based approaches, could improve competencies. Further research is needed to refine training models and assess long-term outcomes.

Keywords: Operating room nursing, clinical competence, inter-professional relations, perioperative care, simulation training.

ÖZET

Amaç: Simülasyon temelli eğitim, ameliyathane hemşireleri ve perioperatif profesyonellerin klinik yetkinliklerini artırır. Bu derleme, bu eğitimin öğrenme çıktıları üzerindeki etkisini değerlendirmekte ve profesyonel rol ve sorumluluklara odaklanarak perioperatif uygulamadaki beceri eksikliklerini belirlemektedir. Örneklem ve Yöntem: Scopus, Web of Science, PubMed ve CINAHL veri tabanlarından 2009–2024 yılları arasında yayımlanan 20 çalışmanın belge incelemesi yapılmıştır. Dahil edilen çalışmalar randomize kontrollü araştırmalar, nitel araştırmalar ve kohort tasarımlarını kapsamaktadır. Çalışmaların amacı, yöntemi, katılımcıları ve bulgularına ilişkin temel veriler çıkarılmıştır. Tematik analiz ile başlıca eğilimler belirlenmiştir. Bulgular: İncelenen çalışmaların değerlendirilmesi sonucunda dört ana tema tespit edilmiştir. Bu temalar şunlardır: (1) teknik beceriler ve klinik performansın geliştirilmesi, (2) ekip çalışması, iletişim ve kriz yönetiminin geliştirilmesi, (3) simülasyon teknolojilerinin uygulanabilirliği ve kabulü, (4) simülasyon deneyimleri: hemşirelik ve ameliyathane öğrencileri. Sonuç: Simülasyon temelli eğitim, perioperatif bakımda teori ile uygulama arasındaki boşluğu etkili bir şekilde kapatmaktadır. Standartlaştırılmış, kanıta dayalı yaklaşımlarla daha yaygın benimsenmesi yetkinliklerin artırılmasına katkı sağlayabilir. Eğitim modellerinin iyileştirilmesi ve uzun vadeli etkilerin değerlendirilmesi için daha fazla araştırmaya ihtiyaç vardır.

Anahtar Kelimeler: Ameliyathane hemşireliği, klinik yetkinlik, meslekler arası ilişkiler, perioperatif bakım, simülasyon eğitimi

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Introduction

In the high-risk, fast-paced environment of modern surgery, perioperative professionals, including Operating Department Practitioners (ODPs) and theatre nurses, must maintain high levels of clinical competence to ensure patient safety. This competence involves not only technical and theoretical knowledge but also decision-making and collaborative skills across all phases of surgical care (Blomberg et al., 2019; Alavi et al., 2022; Cadman et al., 2025). However, rising procedural complexity, rapid technological advancements, and workforce-related challenges have made maintaining such competence increasingly demanding (Stucky et al., 2023; Hung et al., 2024; Xie et al., 2024).

To address these challenges, simulation-based training has emerged as a powerful educational strategy, enabling professionals to rehearse clinical skills in controlled, risk-free environments (Cant et al., 2020; Costa & Monger, 2024; Zabaleta et al., 2024). A key advantage of simulation is that it provides a psychologically safe setting in which learners can make and correct errors without compromising patient safety, allowing repeated practice and progressive skill refinement (Elendu et al., 2024). These immersive simulations replicate real-life scenarios, improving clinical reasoning, procedural accuracy, and team performance—especially in high-stakes surgical settings (Livesay & Lawrence, 2018; Chen et al., 2024). Through deliberate practice, structured feedback, and guided debriefing, simulation also supports the integration of theoretical knowledge with hands-on performance, strengthening both psychomotor abilities and clinical judgement (Daneshfar & Moonaghi, 2025).

Yet, while the benefits of simulation are well recognised, its adoption faces significant obstacles. Resource limitations, high operational costs, and inconsistencies in instructional quality remain persistent barriers (Schram et al., 2024; Park et al., 2025). Moreover, existing research often isolates specific clinical settings, with limited studies directly focusing on both ODPs and theatre nurses in the perioperative context (Redjem et al., 2025).

This review aims to synthesize recent global research on simulation-based training for perioperative professionals—specifically theatre nurses and ODPs. It explores the effectiveness, applicability, and limitations of simulation as a training strategy, offering insights for educators, healthcare administrators, and policymakers committed to enhancing perioperative competence and patient safety.

Sample and Method

Research Design

A document review technique was employed to examine and interpret the content of existing studies. This method allows for detailed analysis and the development of empirical insights (Bowen, 2009).

Data Collection Process

The review followed a structured and transparent process, including clearly defined eligibility criteria, a search strategy across the Scopus, Web of Science, PubMed, and CINAHL databases, and a documented selection procedure involving title and abstract screening as well as full-text review.

All stages of the review process were conducted independently by two reviewers with academic backgrounds in perioperative nursing and healthcare education. Both reviewers had prior experience in conducting literature reviews. They approached the analysis from an interpretivist perspective, grounded in their professional experience, which informed the interpretation of themes, particularly regarding clinical relevance and applicability to practice. Initial title and abstract screening was performed independently using pre-established inclusion and exclusion criteria. Reviewers were blinded to each other's selections during this phase to enhance objectivity and minimize selection bias. The full-text review of eligible studies followed the same procedure. A structured data extraction form was completed independently by both reviewers, and the extracted data were cross-checked for consistency and accuracy.

Search Strategy

To collect data, the keywords "operating theatre nurses" OR "operating room staff" AND "simulation" were searched in the Scopus, Web of Science, PubMed, and CINAHL databases. The initial search yielded 34 studies. After screening titles and abstracts, 10 studies were excluded due to irrelevance. The full texts of the remaining 24 articles were reviewed, with an additional 4 studies excluded. Ultimately, 20 studies met the inclusion criteria and were included in the review (Figure 1).

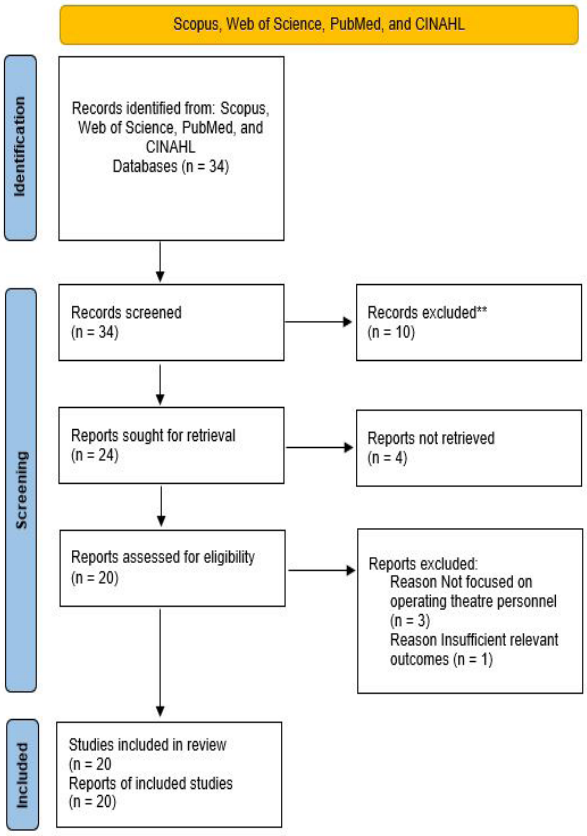

Figure 1. The Selection Process of the Studies Conducted

The selected studies primarily focused on simulation-based training for operating theatre nurses. These studies employed various designs, including randomized controlled trials, quasi-experimental and non-experimental quantitative studies, as well as qualitative methodologies. Studies were excluded if they focused exclusively on instructors, patients, medical students, residents, or specialists, or if they were not directly related to operating theatre practice. Conference abstracts, theses, and books were also excluded.

Quality Appraisal

Methodological limitations and potential sources of bias were assessed qualitatively by the two independent reviewers. The appraisal focused on: (1) sampling methods (random vs. non-random and representativeness), (2) data collection procedures (use of standardized tools and sources), (3) control of confounding variables, (4) appropriateness of statistical analysis, and (5) management of missing data. Overall, studies showed variable methodological quality, with some exhibiting strong sampling and data collection methods, while others lacked adequate control of confounding factors.

Data Inclusion and Extraction Criteria

Studies were included if they focused on simulation-based training within operating theatre settings, involved operating theatre nurses and ODPs as participants, were original research articles published in peer-reviewed journals, employed qualitative, quantitative, or mixed methods, and were published in English. A structured data extraction form was used to collect key information from eligible studies, including author names, year of publication, study design and aims, participant details, main findings, journal, and country of origin. When necessary, authors of selected studies were contacted for clarification or additional information.

Due to the limited number of studies focusing exclusively on operating theatre personnel and the heterogeneity of reported learning outcomes, meta-analysis was not feasible. Although narrowing the population to operating theatre staff restricts the scope, the main reasons preventing meta-analysis were the small number of eligible studies and substantial heterogeneity in study designs, participant characteristics, interventions, and reported outcomes. This diversity precluded statistical pooling of results, making narrative synthesis the most appropriate approach. Consequently, findings were synthesized using a document review methodology.

Ethical Statement

Ethical approval for each included study was verified by reviewing the original publications. Only studies explicitly stating that ethical approval was obtained from relevant institutional review boards or ethics committees were included.

Results

The earliest study included in the review was published in 2009 (Sevdalis et al., 2009), while the most recent studies date from 2024 (including Chen et al., 2024; Mohebbi et al., 2024; Sewell et al., 2024; Skov et al., 2024; Vladinov & Foronda, 2024; Zabaleta et al., 2024), with 2024 representing the peak publication year with six studies. The median publication period falls within the 2021–2022 range. The studies comprise a diverse range of research designs, including five randomized controlled trials

Table 1. Summary of Empirical Studies on Simulation-Based Training for Operating Room Nurses and Allied Perioperative Teams

Author	Year	Study Type	Participants	Main Theme
Sewell et al.	2024	Descriptive quality improvement study	33 OR nurses	VIBe scale for intraoperative bleeding management and team communication; improved situational awareness and team interaction.
Skov et al.	2024	Prospective cohort study	12 endovascular scrub nurses	Role-reversal simulation improved performance and reduced stress during endovascular aortic repair; stress and errors reduced by 64%.
Vladinov & Foronda	2024	Descriptive feasibility and usability study	87 novice nurse anesthesia MSc students (47 AR, 40 VR)	AR vs VR virtual escape room simulations for anesthesia equipment; feasible and acceptable, some VR cybersickness noted.
Mohebbi et al.	2024	Single-group intervention study	28 OR nursing students	Simulation of basic laparoscopic skills improved attitudes (interest, competence, stress).
Zabaleta et al.	2024	Open parallel-group randomized clinical trial	56 OR nurses	VR simulation in thoracic surgery improved performance; high satisfaction.
Khalafi et al.	2023	Quasi-experimental pre-test/post-test	72 (36 anesthesia residents + nurse anesthesia students intervention, 36 control)	Inter-professional simulation enhanced attitudes and teamwork.
Park et al.	2023	Quasi-experimental pre-test/post-test	45 OR nurses (22 exp., 23 ctrl.)	Patient safety simulation improved compliance, safety culture and satisfaction.
Chen et al.	2024	Before-and-after self-controlled	74 (27 OR nurses, 31 med postgrads, 16 residents)	VR laparoscopy training improved skills; nurses approached resident level.
Ffrench-O'Carroll et al.	2022	Prospective observational	34 OR nurses	Structured training improved obstetric GA assistance; knowledge retention lasted six months.
Alavi et al.	2022	Qualitative descriptive	20 (7 MSc students, 7 grads, 6 instructors)	Barriers and facilitators for gerontological nursing graduates' clinical competence.
Kremer et al.	2021	Conceptual/applied simulation	No direct participants	EMA Work Designer simulated OR processes; improved ergonomics and workflow.
Zhang et al.	2021	Randomized controlled intervention	41 OR nurses (20 exp., 21 ctrl.)	Hierarchical teaching + scenario simulation improved skills, knowledge, satisfaction.
Lee & Kim	2018	Quasi-experimental pre-post	49 OR nurses (27 exp., 22 ctrl.)	Simulation with standardized patients improved safety management.
Noll et al.	2019	Simulation-based experimental	100 (anesthetists, residents, CRNAs, OR nurses)	Simulation improved cricoid pressure application, but targets not fully met.
Paschold et al.	2017	Experimental VR simulation	20 OR nurses, 20 med students, 10 residents, 5 consultants	VR simulation for laparoscopic assistant skills; training improved performance.
Dunn et al.	2016	Qualitative phenomenological	5 ODP students	Reactions to simulation-based learning: anxiety, authenticity, exam prep.
Sørensen et al.	2015	Randomized educational	100 (midwives, nurse anesthetists, OR nurses, obstetric and anesthesia specialists)	In-situ vs off-site obstetric anesthesia simulation; similar outcomes.
Connor et al.	2013	Experimental simulation	40 (20 anesthesia residents, 20 OR nurses)	Visual feedback device improved Sellick maneuver performance.
Boet et al.	2013	Randomized controlled trial	120 OR team members	Within-team vs instructor-led debriefing; both improved crisis management.
Sevdalis et al.	2009	Tool development + pilot	19 trainee OR nurses, 2 educators	Developed ICATS-N tool for OR nurse skills; valid and reliable.

*AR: Augmented reality, CRNA: Certified registered nurse anesthetist, EMA: Workflow simulation tool, GA: General anesthesia, ICATS-N: The Imperial College Assessment of Technical Skills for Nurses, Med postgrads: Medical postgraduate students, MSc students: Master of Science students, ODP: Operating department practitioner, OR nurses: Operating room nurses, Residents: Medical residents, VIBe scale: Validated Intraoperative Bleeding Scale, VR: Virtual reality

(Boet et al., 2013; Sørensen et al., 2015; Zhang et al., 2021; Vladinov & Foronda, 2024; Zabaleta et al., 2024), four quasi-experimental studies (Lee & Kim, 2018; Khalafi et al., 2023; Park et al., 2023; Mohebbi et al., 2024;), three prospective cohort or observational studies (Ffrench-O'Carroll et al., 2022; Skov et al., 2024; Sewell et al., 2024), four simulation-based experimental investigations (Connor et al., 2013; Paschold et al., 2017; Noll et al., 2019; Chen et al., 2024), two qualitative or phenomenological explorations (Dunn et al., 2016; Alavi et al., 2022), one conceptual or modeling study (Kremer et al., 2021), and one focused on tool development (Sevdalis et al., 2009).

Across all studies, the total number of participants reported is approximately 1,000, with the smallest sample comprising five students in Dunn's study and the largest involving between 100 and 120 participants in Noll, Sørensen, and Boet, respectively (Boet et al., 2013; Sørensen et al., 2015; Dunn et al., 2016; Noll et al., 2019). The primary study population centers on operating theatre nurses and perioperative staff, including scrub nurses, anesthesia residents, medical students, midwives, nurse anesthetists, and surgeons, with eight studies specifically incorporating students at various educational stages, ranging from undergraduate and postgraduate students to ODP students and nurse anesthesia trainees.

Approximately 80% of the studies focused on simulation-based skill training, with six explicitly incorporating virtual or augmented reality technologies. Five studies (Boet et al., 2013; Sørensen et al., 2015; Ffrench-O'Carroll et al., 2022; Khalafi et al., 2023; Vladinov & Foronda, 2024) addressed teamwork or inter-professional education, while two concentrated on tool or scale development (Sevdalis et al., 2009; Sewell et al., 2025), and another two emphasized patient safety (Lee & Kim, 2018; Park et al., 2023). Additionally, three studies (Connor et al., 2013; Noll et al., 2019; Skov et al., 2024) examined the impact of simulation on stress levels and performance. Notably, 95% of the interventions reported significant positive outcomes in areas such as skill acquisition, competence, teamwork, learner satisfaction, and knowledge retention, although a minority highlighted specific limitations, including VR (Virtual Reality) -induced cybersickness (Vladinov & Foronda, 2024) and a gradual decline in performance over time without refresher training (Ffrench-O'Carroll et al., 2022) (Table 1).

1. Enhancement of Technical Skills and Clinical Performance

This theme centers on how simulation contributes to the improvement of technical competence and procedural accuracy in perioperative practice. Several studies have demonstrated that simulation-based training significantly improves technical competencies among OR nurses. In a randomized controlled trial, Zhang et al. (2021) found that hierarchical teaching combined with scenario-based simulation increased participants' knowledge, technical skills, and satisfaction. Similarly, Chen et al. (2024) reported that virtual reality (VR) laparoscopic training significantly enhanced nurses' performance, reaching levels comparable to that of surgical residents. Zabaleta et al. (2024) further showed that VR simulation in thoracic surgery not only improved technical performance but was also associated with high user satisfaction. Studies focusing on specific clinical procedures yielded similar results. Connor et al. (2013) and Paschold et al. (2017) demonstrated that simulation improved the execution of the Sellick maneuver and laparoscopic assistant skills, respectively. However, Noll et al. (2019) noted that while simulation improved cricoid pressure application, the desired clinical standards were not fully achieved. Ffrench-O'Carroll et al. (2022) reported that structured training programs improved knowledge retention in obstetric general anesthesia procedures, with effects sustained for up to six months. The same study also compared in-situ and off-site obstetric anesthesia simulations and found equivalent learning outcomes across both settings. This theme highlights the strong impact of simulation in advancing hands-on proficiency and maintaining clinical performance standards (Sørensen et al., 2015).

2. Development of Teamwork, Communication, and Crisis Management

This theme addresses the development of non-technical skills, including communication, collaboration, and managing emergencies in high-pressure surgical environments. Simulation also plays a pivotal role in fostering non-technical skills such as teamwork, situational awareness, and crisis response. Sewell et al. (2024) utilized the VIBe scale (Validated Intraoperative Bleeding Scale) to evaluate intraoperative bleeding management, finding improvements in team interaction and situational awareness. Skov et al. (2024) demonstrated that role-reversal simulation in endovascular procedures

enhanced performance and reduced both stress and error rates by 64%.

Khalafi el a. (2023) reported that inter-professional simulation involving anesthesia residents and nurse anesthesia students improved attitudes and collaboration. In a randomized controlled study, Boet et al. (2013) found that both within-team and instructor-led debriefings were equally effective in improving crisis management skills. Park et al. (2023) observed that a patient safety simulation intervention led to increased adherence to safety protocols, enhanced safety culture, and higher satisfaction among OR nurses. This theme underscores the importance of simulation in enhancing interpersonal effectiveness and preparedness for unexpected clinical events.

3. Feasibility and Acceptance of Simulation Technologies

This theme explores the integration of novel technologies such as VR and AR into simulation-based education, with a focus on usability and learner reception. Recent advances in immersive technologies such as augmented reality (AR) and VR have prompted investigations into their usability and learner acceptability. Vladinov & Foronda (2024) explored the feasibility of AR and VR-based escape room simulations among novice nurse anesthesia students, reporting overall acceptability, though some VR users experienced cybersickness.

Kremer et al. (2021) developed and applied the EMA Work Designer simulation tool to model operating room workflows, demonstrating improvements in ergonomic design and efficiency. Sevdalis et al. (2009) focused on tool development, introducing the ICATS-N (The Imperial College Assessment of Technical Skills for Nurses) as a reliable and valid assessment instrument for evaluating OR nursing skills in simulated settings. This theme reflects the growing incorporation of simulation technologies and highlights learner feedback as central to future implementation.

4. Learner Experiences with Simulation: Nursing and ODP Students

This theme considers how simulation influences the emotional, motivational, and educational experiences of students and newly qualified practitioners in perioperative education. Simulation also influences the emotional and cognitive experiences of nursing students and recent graduates. Mohebbi et al. (2024) found that simulation-based laparoscopic training positively influenced students' interest, perceived competence, and stress levels. Alavi et al. (2022) conducted a qualitative study exploring the perceived barriers and facilitators to clinical competence among gerontological nursing graduates, highlighting both individual and institutional factors. Dunn et al. (2016) examined the experiences of Operating Department Practitioner (ODP) students, noting that while simulation was perceived as authentic and useful for exam preparation, it also elicited heightened anxiety. This theme emphasizes the dual role of simulation in enhancing learning motivation while also presenting emotional challenges, particularly for novice learners.

Discussion

To our knowledge, few reviews have specifically focused on simulation-based training tailored exclusively for operating theatre staff. Previous reviews have emphasized the general application of simulation in the operating theatre for training (Noor et al., 2023; Vahednasiri, 2024). This review builds on that foundation by focusing explicitly on the unique needs and outcomes of operating theatre staff, providing a detailed analysis of how simulation training impacts their professional development and clinical competencies.

The findings from the reviewed studies confirm the substantial benefits of simulation-based training in enhancing the learning outcomes of operating theatre staff. Simulation training, particularly those developed for specific operating theatre skills, significantly improves ODPs' and operating theatre nurses' initial practices before engaging with real patients. Research has demonstrated that simulation-based training provides significant benefits for operating room personnel across multiple domains, including technical skills, teamwork, and crisis management. Training programmes incorporating VR and other simulation methods have been found to reduce task completion time and enhance procedural accuracy. For instance, a systematic review on VR-based surgical training reported that participants trained with VR completed procedures 18–43% faster and demonstrated higher adherence to procedural checklists compared to control groups (Mao et al., 2021). These findings indicate that simulation can effectively accelerate the acquisition of psychomotor skills and enhance surgical decision-making, often within a safe and controlled environment that closely replicates authentic operating

theatre scenarios (Toni et al., 2024). Simulation-based training also contributes to the development of non-technical skills, such as communication, teamwork, and decision-making, which are essential for safe and effective operating theatre performance. Simulation-based training not only enhances individual competencies but also supports the development of non-technical skills—such as communication, teamwork, situational awareness, and decision-making in emergencies—which are critical for safe and effective operating theatre performance. The literature indicates that participants value inter-professional simulations, with over 90% of surgeons, anesthetists, and nurses rating scenarios as realistic and reporting improved perceptions of patient safety following training (Truong et al., 2021; Redjem et al., 2025). Stress and crisis preparedness are core goals of many simulation programs. It is well established that acute intraoperative stress impairs both technical and non-technical performance (Tam et al., 2025).

Despite widespread enthusiasm, several methodological limitations constrain the generalizability of these conclusions. Many studies involve small, single-center cohorts and rely on subjective measures. Simulation research is also characterized by considerable heterogeneity. Variations in task types, fidelity levels, and assessment tools result in substantial differences in outcomes, making direct comparisons challenging (Burnett & Goldhaber-Fiebert, 2023). Most evaluations focus on short-term learning with limited use of validated instruments (Robertson et al., 2017). Systematic reviews report variable quality, with weak study designs and inconsistent outcomes (Yi et al., 2024). Simulation shows short-term benefits but limited evidence of patient impact or long-term skill retention (Burnett & Fiebert, 2023).

In the context of the included studies, recent literature largely supports the reported benefits of simulation training while also identifying persistent gaps. Notably, these reviews emphasize the underrepresentation of wider staff groups (OR nurses, ODPs, other health professionals), highlighting the need for their systematic inclusion in future simulation-based interventions (Burnett & Fiebert 2023; Redjem et al., 2025).

Simulation training in the operating theatre should advance along several key dimensions. First, all perioperative professional groups should be systematically integrated into training programmes, particularly in light of evidence that effective crisis management and patient safety rely on cohesive inter-professional teamwork (Redjem et al., 2025). Second, robust research methodologies—including randomized controlled trials, standardized outcome measures, and multicenter studies—are essential to determine whether simulation leads to measurable improvements in clinical practice. Third, given the promising outcomes associated with VR and AR, future research should directly compare these modalities, assess long-term skill retention, and explore the potential of adaptive or AI-driven feedback to personalize learning. Finally, considering the resource-intensive nature of simulation, hybrid or remote models (such as digital simulations and virtual debriefings) may offer a more cost-effective and sustainable solution, particularly as trainee engagement tends to decline without ongoing reinforcement (Truong et al., 2021).

In conclusion, simulation-based training enhances clinical skills and patient safety in the operating theatre. However, future research should address methodological gaps and promote broader team inclusion to maximize its effectiveness.

Conclusion

This study underscores the significant potential of simulation-based training to enhance both technical and non-technical competencies among perioperative professionals, including operating theatre nurses and ODPs. The findings suggest that well-designed simulation programmes can improve clinical preparedness, teamwork, and crisis management within the operating theatre. However, to maximize effectiveness, future training initiatives must address persistent methodological limitations by employing robust study designs, diverse participant groups, and validated assessment tools. Aligning simulation scenarios closely with real-world perioperative environments will further strengthen clinical relevance and skill transfer. Additionally, the development of innovative simulation technologies—supported by institutional investment and cross-sector collaboration—offers a promising path toward more effective, scalable, and sustainable perioperative education.

Simulation-based training holds substantial promise for enhancing both technical and non-technical competencies among operating theatre personnel.

This review highlights consistent improvements in skill acquisition, teamwork, and crisis management across diverse simulation formats, including VR and AR applications. However, there remains a notable underrepresentation of operating theatre nurses and especially ODPs in existing research. To address these gaps, future studies should adopt robust, standardized methodologies, include broader perioperative roles, and assess long-term outcomes. Developing inclusive, high-quality simulation protocols tailored to the needs of the entire surgical team is essential to improve preparedness, inter-professional coordination, and ultimately, patient safety and surgical outcomes.

Declaration of Interests | Çıkar Çatışması

The authors declare that there is no conflict of interest. |Yazarlar arasında herhangi bir çıkar çatışması bulunmamaktadır.

Author Contributions | Yazar Katkıları

Concept – AA; Design – AA; Data Collection and/or Processing – AA; Analysis and/or Interpretation – AA; Literature Search – AA, MYvG; Resources – AA, MYvG; Writing Manuscript – AA; Critical Review – MYvG. | Fikir – AA, MYvG; Tasarım – AA; Veri Toplanması ve/veya işlenmesi – AA, MYvG; Analiz ve/ veya yorum – AA; Literatür taraması – AA, MYvG; Kaynaklar – AA, MYvG; Makaleyi yazan – AA, MYvG; Eleştirel inceleme – MYvG.

Data Sharing Statement | Veri Paylaşım Beyanı

Data illustrating findings on this subject may be obtained from the responsible author upon reasonable request. | Bu çalışmanın bulgularını destekleyen veriler, makul bir talep üzerine sorumlu yazardan temin edilebilir.

Informed Consent | Bilgilendirilmiş Onam

This study does not require informed consent, as the data were obtained through a literature review and existing published sources. | Bu çalışma, onam gerektirmeyen nitelikte olup kullanılan veriler literatür taraması/yayınlanmış kaynaklar üzerinden elde edilmiştir.

Peer-review | Hakem Değerlendirmesi

Externally peer-reviewed. | Dış bağımsız.

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None. | Yoktur

Ethical Approval of the Study | Etik Kurul Beyanı

Ethical approval for each included study was verified by reviewing the original publications. Only studies explicitly stating that ethical approval was obtained from relevant institutional review boards or Ethics committees were included. | Dahil edilen her bir çalışma için etik onay, orijinal yayınlar incelenerek doğrulanmıştır. Yalnızca ilgili kurumsal inceleme kurulları veya etik kurullardan etik onay alındığını açıkça belirten çalışmalar dahil edilmiştir.

Decleration of AI | Yapay Zekâ Beyanı

The author declares that artificial intelligence tools were used solely for language editing (grammar, spelling, and style) during the preparation of this manuscript. No AI tools were used for the generation, analysis, or interpretation of the scientific content. The author takes full responsibility for the accuracy and integrity of the work. | Yazar, bu çalışmanın hazırlanması sürecinde yapay zekâ araçlarının yalnızca dil düzenlemesi (dilbilgisi, yazım ve üslup) amacıyla kullanıldığını beyan eder. Yapay zekâ araçları, bilimsel içeriğin oluşturulması, analizi veya yorumlanması amacıyla kullanılmamıştır. Yazar, çalışmanın doğruluğu ve bütünlüğü konusunda tüm sorumluluğu üstlenmektedir.

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Kaynakça

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