European Journal of Biology and Medical Science Research, 14(1)1-11, 2026
Print ISSN: ISSN 2053-406X,
Online ISSN: ISSN 2053-4078
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development -UK

The Role and Classification of CVICU-Trained Cardiac Intensivists in Advancing Saudi Vision 2030

Saud Khalid AlSamadani[1,2]; Ali Breek Alharthi[3,4]; Abdulrahman Abdullah Albloushi[4]; Talal Hassan Alsawyan [4]; Ahmad Abdulrahman Almaghrabi [5]; Abdullah Hussain Khan[1]; Mohammed Hasan Alsharif [1]; Abdulrahman Sami Mirza [4]; Abdullah Ali Alkahtani [2;] Ghassan Abdullah Bagazi [2]; Waleed Farhan Alanazi [2]; Khalid Yahya Alzahrani [2]; Abdullah Aljasser [2]; Abdullah AlSharif [2]; Sultan AlShanbari [2]; Ramiz Baabdullah [6]; Jehad Almutib [2]; Mohammed Alpakistani[1]; Waleed Mohammad Alshehri[7]; Mustafa Yasawy[6]; Abdulrauf Malibary [8]; Muaz Zafer Alquarny [9]; Abdulrahman Asiri [10]

1 King Faisal Hospital, Makkah, Saudi Arabia
2 King Fahad Medical City (KFMC), Riyadh, Saudi Arabia
3 King Abdullah Hospital, Bisha, Saudi Arabia
4 King Faisal Specialist Hospital and Research Centre (KFSHRC), Riyadh, Saudi Arabia
5 King Abdullah Medical City, Makkah, Saudi Arabia
6 Habib Medical Group (HMG), Jeddah, Saudi Arabia
7 Scholarship to North America
8 Prince Sultan Military Medical City, Saudi Arabia
9 Diriyah Hospital, Ministry of Health, Riyadh, Saudi Arabia
10 King Khalid University, Abha, Saudi Arabia

Corresponding author:
Saud Khalid AlSamadani, MBBS, SB-ACCM – Senior Registrar, Adult Critical Care Medicine, King Faisal Hospital, Makkah, Saudi Arabia; Cardiac Critical Care Medicine Fellow, King Fahad Medical City (KFMC), Riyadh, Saudi Arabia.
Email: salsamadani@kfmc.med.sa – ORCID: 0009-0008-1007-4616

doi: https://doi.org/10.37745/ejbmsr.2013/vol14n1111 Published January 03, 2025

Citation: AlSamadani S.K., Alharthi A.B., Albloushi A.A., Alsawyan T.H., Almaghrabi A.A., Khan A.H., Alsharif M.H., Mirza A.S., Alkahtani A.A., Bagazi G.A., Alanazi W.F.,Alzahrani K.Y., Aljasser A., AlSharif A., AlShanbari S., Baabdullah R., Almutib J., Alpakistani M., Alshehri W.M., Yasawy M., Malibary A., Alquarny M.Z., Asiri A. (2026) The Role and Classification of CVICU-Trained Cardiac Intensivists in Advancing Saudi Vision 2030, *European Journal of Biology and Medical Science Research*, 14(1)1-11

European Journal of Biology and Medical Science Research, 14(1)1-11, 2026
Print ISSN: ISSN 2053-406X,
Online ISSN: ISSN 2053-4078
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development -UK

Abstract: *Saudi Vision 2030 is a national transformation plan aimed at strengthening healthcare quality, workforce development and multidisciplinary collaboration. Cardiovascular Intensive Care Units (CVICUs) and fellowship-trained cardiac intensivists play a pivotal role in this transformation. These specialists possess advanced expertise to manage complex cardiac cases and lead collaborative care teams. However, to maximise their impact there is a need for clear role definition, robust training pathways and integration into multidisciplinary teams. Methods: A comprehensive literature search was conducted using an AI-assisted tool designed for English language organisation and global database searches. Eight search strategies combined terms related to CVICU roles, cardiac intensivist classification, multidisciplinary teams, leadership, digital health and Vision 2030. From 945 records, 599 were screened, 189 underwent full-text review and 20 studies met inclusion criteria. Figure 1 summarises the study selection process. Data were extracted on workforce challenges, training models, team dynamics and technological innovations relevant to cardiac intensive care in Saudi Arabia. Evidence indicates that clearly defined scopes of practice and specialised training programmes are essential for cardiac intensivists [1][2]. Multidisciplinary team (MDT) collaboration is enhanced when CVICU-trained intensivists act as team leaders; they help streamline patient assessment, management and care transitions [3][9][10]. Transformational leadership development and workforce optimisation are critical: leadership skills improve collaboration and staff satisfaction [4][8][7], and national workforce policies stress aligning training with system needs [2]. Digital health technologies – including tele-ICU services and remote monitoring – offer promising tools for CVICU practice, yet digital competencies vary widely and require targeted training [5][6][11][12]. Table 1 summarises key studies informing these findings. In conclusion, CVICU-trained cardiac intensivists can drive the healthcare transformation envisioned in Vision 2030. Their impact is maximised when their roles are clearly defined, when advanced training and leadership development are prioritised and when they spearhead multidisciplinary collaboration and digital health innovation. Realising this potential requires addressing workforce shortages, establishing formal training programmes and developing supportive policies. Investing in these specialists will help achieve world-class, patient-centred cardiac care in Saudi Arabia.*

Keywords: Saudi Vision 2030, Cardiac intensivist, CVICU, multidisciplinary team; critical care; workforce development, leadership, digital health

INTRODUCTION

Saudi Vision 2030 is an ambitious strategic framework aimed at transforming the Kingdom's healthcare system through improved care quality, workforce development and multidisciplinary collaboration. In cardiac critical care, **Cardiovascular Intensive Care Units (CVICUs)** and the fellowship-trained physicians who lead them—cardiac intensivists—are poised to play a central role. These specialists bridge cardiology, cardiac surgery and critical care, delivering high-quality, patient-centred care to the most complex cardiac patients. Multidisciplinary collaboration is essential for optimal outcomes in acute and intensive care settings; systematic evidence shows that

MDTs involve numerous variables affecting performance and rely on clear roles and communication [3]. Despite their potential, the cardiac intensivist role in Saudi Arabia remains emergent. Studies on role clarification illustrate that unclear scopes of practice lead to confusion and resistance, whereas clearly defining professional roles and responsibilities improves collaboration and reduces conflict [1]. Workforce policy analyses emphasise that aligning education and human resource planning with health system needs is essential for sustainable development [2].

Another key aspect is the alignment of CVICU intensivists with **multidisciplinary team (MDT)** collaboration. High-acuity cardiac care requires coordinated input from multiple specialties, and MDT reviews improve process measures such as comprehensive patient assessment and timely intervention [3][10]. CVICU-trained intensivists can facilitate communication and decision-making, breaking down silos between departments. Leadership development and workforce optimisation are recurring themes in the Vision 2030 literature. Transformational leadership—characterised by inspiring a shared vision and empowering colleagues—enhances team cohesion and job satisfaction [4]. In Saudi Arabia, cultivating leadership among cardiac intensivists could accelerate improvements by empowering clinicians to act as change agents at both the bedside and institutional levels [8][7].

In summary, CVICU-trained cardiac intensivists have the potential to significantly advance the goals of Vision 2030 by elevating the standard of cardiac critical care. To realise this potential, persistent challenges such as workforce shortages, underdeveloped training pathways and lack of formal recognition must be addressed through targeted policies and investment.

METHODS

We conducted a comprehensive search of biomedical literature using an AI-powered research tool optimised for English language organisation and global database querying. Eight distinct search strategies were developed, combining keywords such as “CVICU” or “cardiac ICU,” “cardiac intensivist” or “cardiac critical care specialist,” “Saudi Vision 2030,” “multidisciplinary team,” “leadership,” “workforce development” and “digital health.” All study designs (reviews, original research, policy papers) were considered, reflecting the exploratory nature of this review.

The search yielded **945 records**. After removing duplicates and screening titles and abstracts, **599 records** remained for full-text review. Inclusion criteria were: (1) relevance to cardiac intensive care or critical care workforce; (2) discussion of role classification, training or workforce issues; (3) applicability to healthcare systems similar to Saudi Arabia or explicit mention of Vision 2030; and (4) publication in English. Exclusion criteria included paediatric ICU studies and articles unrelated to workforce or intensive care. Ultimately, **20 papers** were included in our narrative synthesis. Figure 1 shows the study selection process. Data extraction focused on themes such as professional classification, fellowship training, multidisciplinary collaboration, leadership development, digital health integration and workforce policy. Table 1 provides a comparative summary of the key studies.

RESULTS

Classification and Professional Development of Cardiac Intensivists

The literature underscores the need for **clear classification and specialised training** for cardiac intensivists. In many health systems the role is filled by physicians from varied backgrounds—cardiology, cardiac anaesthesia or general critical care—leading to scope overlap and uncertainty. Establishing formal certification and defining competencies helps delineate responsibilities and expectations. A multiple-case study on role clarification showed that unclear practice scopes breed confusion and resistance among team members, whereas clear definitions improve cooperation and integration [1]. Policy analyses suggest that health workforce development requires coordinated action across leadership, finance, policy, education and human resources [2].

Fellowship training programmes form the backbone of professional development. Advanced fellowships beyond general critical care training equip intensivists to manage postoperative cardiac surgery patients, mechanical circulatory support devices and complex haemodynamics. At present, dedicated cardiac critical care fellowships in Saudi Arabia are scarce. Creating local programmes will reduce reliance on expatriate staff, foster local expertise and support workforce localisation. Establishing clear career pathways—such as junior cardiac intensivist, consultant and CVICU director—will enhance professional identity and retention. Investment in research and academic training is also necessary to generate local evidence and innovation. Stakeholders must align education and workforce planning with health system needs to ensure adequate supply of specialists [2][7].

Multidisciplinary Teamwork and Collaboration

Effective MDTs underpin high-quality acute and critical care. CVICUs operate optimally when cardiologists, surgeons, intensivists, nurses, pharmacists, therapists and rehabilitation specialists work seamlessly together. A meta-synthesis of MDT working in acute care settings identified 36 variables across organisational, individual, collaborative and role factors that influence performance [3]. Regular MDT meetings and rounds enhance comprehensive patient assessment, care planning and discharge coordination [10]. However, evidence on direct patient outcomes is mixed: some systematic reviews report improvements in process measures but no clear mortality benefit [9][10].

CVICU-trained intensivists can serve as MDT leaders or facilitators. Their cross-disciplinary training allows them to coordinate input from all specialties and maintain clear communication. By clarifying roles, fostering a culture of respect and advocating for institutional support, intensivists can address many barriers identified in MDT studies [3]. High-functioning teams also require administrative support for adequate staffing and protected time for meetings.

Workforce Development and Leadership

Workforce development and leadership training are critical to achieving Vision 2030 goals. Transformational leadership has been linked to improved teamwork, job satisfaction and patient safety [4]. Rapid reviews of leadership development programmes demonstrate that targeted training improves participants' communication skills, conflict resolution and confidence, which translates into better interprofessional collaboration [8]. To build a resilient CVICU workforce, Saudi institutions must invest in leadership training as part of both fellowship programmes and continuing professional development.

Workforce optimisation also requires addressing shortages of specialised staff and clarifying professional scopes. Studies from nursing and critical care contexts highlight that unclear roles lead to tension and hinder collaboration [1][7]. Mitigating shortages involves establishing local fellowship training, offering scholarships for international training, cross-training physicians from related specialties and providing mentorship and career progression. Health workforce policies should integrate leadership, education and human resource management to align training outputs with healthcare needs [2][7][8].

Digital Health and Innovation

Digital health technologies are transforming critical care. **Tele-ICU** systems, remote monitoring and electronic health records extend the reach of intensivists and facilitate data sharing. A systematic review found that tele-ICU programmes can reduce ICU mortality and length of stay, though cost and implementation heterogeneity remain challenges [6]. Digital competency among healthcare professionals is variable; many clinicians feel unprepared to adopt new technologies [5]. Barriers include limited training, technical issues and workflow disruptions. To fully realise the benefits of digital health, training programmes must integrate digital literacy and e-health competencies [5].

Connected healthcare technologies, such as wearable sensors and teleconsultation platforms, show promise for improving patient care [11]. Similarly, emerging evidence underscores the role of digital health for aging populations and chronic disease management [12], which is relevant to cardiac intensive care. CVICU intensivists should be involved in selecting and implementing digital solutions to ensure alignment with clinical workflows and patient needs. Investment in digital infrastructure must be accompanied by training and support to avoid adding to clinicians' workload.

Frequent Contributors and Key Journals

The literature revealed several prolific contributors in the field of CVICU roles and healthcare transformation. Authors such as Al-Dossary, Bornman, Louw and Cometto produced influential papers on workforce development, leadership and policy. Major journals publishing relevant work include *International Nursing Review, BMJ Open, Journal of Healthcare Leadership, Journal of*

Medical Internet Research and *Journal of Intensive Care Medicine*. These sources combine local (Saudi) context with global evidence, highlighting the value of cross-fertilisation of ideas.

DISCUSSION

Our synthesis highlights both the promise and the challenges associated with integrating CVICU-trained cardiac intensivists into Saudi Arabia's healthcare system. The evidence supports the view that these specialists can significantly enhance care quality, foster multidisciplinary collaboration and contribute to workforce capacity building. However, success hinges on deliberate actions in several domains.

Role classification and training: Clear role definition and advanced fellowship training underpin the effectiveness of cardiac intensivists. A lack of role clarity leads to confusion and resistance, while formal certification and defined competencies strengthen professional identity and streamline teamwork [1][7]. Health workforce policy frameworks emphasise the need for coordinated action across education, leadership and human resource management [2], and training programmes should incorporate research, leadership and digital health components.

Multidisciplinary collaboration: Evidence shows that MDTs improve process measures such as comprehensive assessment and care coordination, although direct survival benefits remain uncertain [3][9][10]. Cardiac intensivists can serve as MDT leaders, facilitating communication and ensuring adherence to evidence-based protocols. To maximise impact, MDT initiatives should be paired with quality improvement projects and supported by adequate staffing and resources.

Leadership and workforce development: Transformational leadership training is vital for equipping intensivists to inspire and manage interdisciplinary teams [4][8]. Building a robust CVICU workforce requires addressing shortages through local training programmes, scholarships, mentorship and structured career pathways. Integrating leadership and interprofessional skills into training will prepare intensivists to drive change and support Vision 2030's objectives.

Digital health: Tele-ICU programmes, remote monitoring and connected healthcare technologies offer tools to extend the reach of cardiac intensivists, especially to underserved regions [6][11][12]. However, digital integration is often limited by skill gaps and organisational barriers. Training must include digital literacy, and clinicians should be involved in choosing and implementing technology to ensure user-friendly solutions. Evidence on digital health efficacy remains sparse; local research evaluating tele-ICU and digital interventions in Saudi CVICUs is needed.

Table 2 summarises key claims derived from our review, the strength of evidence and the supporting references. Overall, while the literature provides compelling conceptual and qualitative support for the role of CVICU-trained intensivists, empirical data on their impact in Saudi Arabia is limited. Further research is required to quantify improvements in patient outcomes, staff retention and health system efficiency.

Research Gaps and Future Directions

This review identifies several areas where evidence is lacking:

1. **Outcome-oriented research:** Few studies quantify the impact of cardiac intensivists on patient outcomes such as mortality, complications and length of stay. Comparative studies, including before-and-after designs and multi-centre analyses, are needed.
2. **Digital health efficacy:** There is limited evidence on the effectiveness and cost-effectiveness of tele-ICU and other digital solutions in CVICUs within Saudi Arabia. Research should evaluate user experience, adoption, workflow integration and patient outcomes.
3. **Optimal training models:** The best structure and curriculum for cardiac intensivist training programmes remain uncertain. Evaluations comparing different fellowship models, leadership modules and digital health training would inform programme development.
4. **Interprofessional dynamics:** Qualitative research exploring the relationships between cardiac intensivists and other team members could reveal barriers and facilitators to collaboration.
5. **Patient and family perspectives:** Understanding patient and family experiences with CVICU care and dedicated intensivists may highlight areas for improvement in communication and care satisfaction.

CONCLUSION

CVICU-trained cardiac intensivists are integral to Saudi Arabia's journey toward achieving Vision 2030's healthcare goals. When their roles are clearly defined, supported by specialised training and leadership development, and integrated into multidisciplinary teams with digital health innovation, they can elevate care quality and workforce resilience. Overcoming current challenges—workforce shortages, training infrastructure gaps and digital skills deficits—will require coordinated policy actions and investment. By addressing these issues, Saudi Arabia can ensure that its healthcare system delivers world-class, patient-centred cardiac critical care and serves as a model for healthcare transformation.

Figures

Figure 1. Study selection process. Diagram illustrating the flow of studies through the review: 945 papers were identified, 599 were screened at the abstract stage, 189 were assessed for eligibility and 20 were included in the final synthesis.

European Journal of Biology and Medical Science Research, 14(1)1-11, 2026
Print ISSN: ISSN 2053-406X,
Online ISSN: ISSN 2053-4078
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development -UK

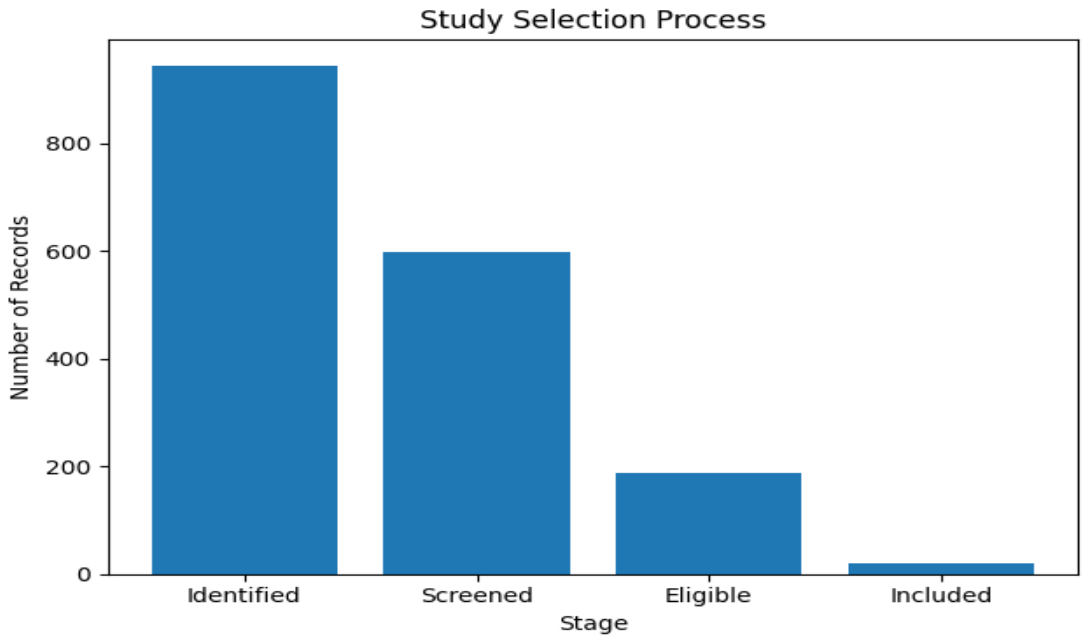

Figure 2. Research gaps matrix

Heatmap showing the distribution of research topics (rows) versus attributes (columns). Darker cells indicate areas with richer literature, while lighter cells highlight research gaps.

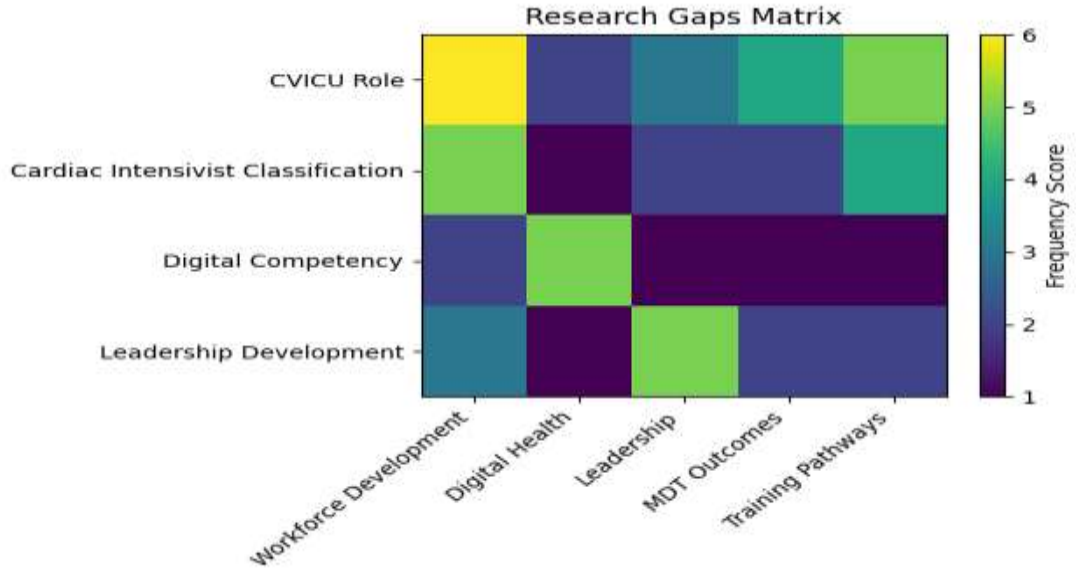

Table 1. Overview of key studies informing this review

Study (Author, Year)	Focus	Design	Key findings	Context
Brault et al., 2014 [1]	Role clarification in primary healthcare teams	Multiple-case study	Unclear roles cause conflict; role clarification improves collaboration	Canada
Cometto et al., 2019 [2]	Health workforce policy	Policy analysis	Identifies six action fields for workforce development	Global
Pradelli et al., 2025 [3]	MDT performance in acute care	Systematic review & meta-synthesis	Outlines 36 variables affecting MDT effectiveness	Global
Fischer, 2016 [4]	Transformational leadership in nursing	Concept analysis	Highlights leadership behaviours that improve team performance	Global
Longhini et al., 2022 [5]	Digital health competencies	Systematic review	Finds variability in digital skills and need for training	Global
Udeh et al., 2018 [6]	Tele-ICU and virtual ICU	Systematic review	Reports tele-ICU reduces mortality and length of stay but cost and heterogeneity remain	Global
Al-Dossary, 2018 [7]	Vision 2030 and nursing	Literature review	Notes workforce and education gaps; emphasises Vision 2030 opportunities	Saudi Arabia
Bornman & Louw, 2023 [8]	Leadership development strategies	Rapid review	Shows leadership programmes improve collaboration skills and confidence	Global
Hickman et al., 2015 [9]	MDT interventions in older adults	Systematic review	MDTs improve processes but show inconsistent outcome benefits	Global
Pillay et al., 2016 [10]	MDT meetings in oncology	Systematic review	MDT meetings improve patient assessment and management; outcome benefits vary	Global
Awad et al., 2021 [11]	Connected healthcare technologies	Review	Describes digital innovations for improving patient care	Global
Chen et al., 2023 [12]	Digital health for aging populations	Review	Highlights the role of digital health in managing chronic conditions	Global

Table 2. Claims, evidence strength and supporting references

Claim	Evidence strength*	Notes	Supporting references
CVICU-trained intensivists enhance multidisciplinary care and workforce capacity	Strong	Multiple studies report that specialists improve team function and address workforce gaps	[7], [3], [8], [2]
Clear role classification and advanced training improve professional identity and care quality	Moderate	Role clarification and fellowship training support professional development; direct outcome data limited	[1], [2], [8], [7]
Leadership development is essential for healthcare transformation	Moderate	Leadership programmes improve collaboration and staff satisfaction	[4], [8], [2], [7]
Digital health integration shows promise but is under-utilised	Moderate	Tele-ICU and connected health technologies can improve outcomes; skills gaps limit adoption	[5], [6], [11], [12]
MDTs improve care processes, but evidence for direct outcome benefit is mixed	Moderate	Reviews show process improvements but variable impact on mortality	[3], [9], [10]
Workforce shortages and unclear roles hinder progress	Weak	Reports note shortages and role ambiguity; quantitative evidence is limited	[7], [2], [8]

*Evidence strength was assessed qualitatively by considering the number of studies, their methodological quality and the consistency of findings across different contexts.

Acknowledgements

The authors thank the multidisciplinary teams at King Faisal Hospital, King Fahad Medical City and our partner institutions for their insights and support during the preparation of this manuscript. We also acknowledge the use of AI tools for organising English language content and searching global databases during the literature review.

REFERENCES

[1] Brault I., Kilpatrick K., D'Amour D., et al. Role clarification processes for better integration of nurse practitioners into primary healthcare teams: a multiple-case study. *Nursing Research and Practice*. 2014;2014:170514. doi:10.1155/2014/170514.
[2] Cometto G., Buchan J., Dussault G. Developing the health workforce for universal health coverage. *Bulletin of the World Health Organization*. 2019;98(2):109-116. doi:10.2471/BLT.19.234138.

[3] Pradelli L., Risoli C., Summer E., et al. Healthcare professional perspectives on barriers and facilitators of multidisciplinary team working in acute care settings: a systematic review and meta-synthesis. *BMJ Open*. 2025;15(3):e087268. doi:10.1136/bmjopen-2024-087268.
[4] Fischer S. Transformational leadership in nursing: a concept analysis. *Journal of Advanced Nursing*. 2016;72(11):2644-2653. doi:10.1111/jan.13049.
[5] Longhini J., Rossettini G., Palese A. Digital health competencies among health care professionals: systematic review. *Journal of Medical Internet Research*. 2022;24(8):e36414. doi:10.2196/36414.
[6] Udeh C.I., Udeh B.L., Gavrilovich I., et al. Telemedicine/Virtual ICU: A systematic review. *Journal of Intensive Care Medicine*. 2018;33(2):129-141. doi:10.1177/0885066616652546.
[7] Al-Dossary R. The Saudi Arabian 2030 Vision and the nursing profession: The way forward. *International Nursing Review*. 2018;65(4):484-490. doi:10.1111/inr.12458.
[8] Bornman J., Louw B. Leadership development strategies in interprofessional healthcare collaboration: a rapid review. *Journal of Healthcare Leadership*. 2023;15:175-192. doi:10.2147/JHL.S405983.
[9] Hickman L., Phillips J., Newton P., et al. Multidisciplinary team interventions to optimise health outcomes for older people in acute care settings: a systematic review. *Archives of Gerontology and Geriatrics*. 2015;61(3):322-329. doi:10.1016/j.archger.2015.06.021.
[10] Pillay B., Wootten A., Crowe H., et al. The impact of multidisciplinary team meetings on patient assessment, management and outcomes in oncology settings: a systematic review. *Cancer Treatment Reviews*. 2016;42:56-72. doi:10.1016/j.ctrv.2015.11.007.
[11] Awad A., Trenfield S., Pollard T., et al. Connected healthcare: Improving patient care using digital health technologies. *Advanced Drug Delivery Reviews*. 2021;178:113958. doi:10.1016/j.addr.2021.113958.
[12] Chen C., Ding S., Wang J. Digital health for aging populations. *Nature Medicine*. 2023;29:1623-1630. doi:10.1038/s41591-023-02391-8.