The Impact Of Nurse-Led Module And Technology Innovation On Quality Of Care And Outcomes: A Systematic Review

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Abstract

Background. Nurse-led initiatives and technology innovations are being integrated in the Kingdom of Saudi Arabia (KSA) in an effort to improve the quality of care outcomes. In order to provide the best possible treatment for all patients throughout the kingdom, this strategic approach attempts to enhance

patient experiences, enhance clinical results, and optimize healthcare delivery systems. The aim of current systematic review is to the impact of nurse-led module and technology innovation on quality of care and outcomes in Saudi Arabia. Method. Scopus, PsycINFO, and Web of Science were used to categorize research published between 2019 and 2023 on evaluating the impact of nurse-led module and technology innovation on quality of care and outcomes in Saudi Arabia. After screening and quality evaluation, eleven studies were included in the synthesis, focusing on team dynamics and measurement scales.

Result. After the study database was searched, 2183 entries were found, and 11 of them were chosen for full-text evaluation. Eleven studies that used quality management and peer-reviewed journals satisfied the criteria and were added to the systematic review following independent evaluation. Nurse-led treatments and technology advances consistently improve healthcare outcomes in Saudi Arabia, according to a review of 11 research papers. In a variety of healthcare contexts, these treatments are linked to benefits in patient satisfaction, pain management, treatment adherence, and health-related quality of life. By enabling remote monitoring and patient education, the incorporation of technical innovations—such as digital health technologies and telephonic interventions—complements the delivery of nurse-led care. The available data highlights the potential of nurse-led initiatives and technology advances to improve patient outcomes and healthcare delivery in the Saudi Arabian setting, even in spite of methodological constraints. Conclusion: The review examines the impact of nurse-led interventions and technology on patient outcomes in Saudi Arabia. It highlights improvements in patient satisfaction, treatment adherence, and quality of life. However, challenges like organizational obstacles and resource limitations persist. The review recommends standardized interventions, investment in research infrastructure, funding opportunities, and training programs for future studies.

Keywords: Nurse-Led Module, Technological Innovation, Quality of Care, KSA Systematic Review

Introduction

Background

Technological developments and creative care delivery models have become more important in today's healthcare systems as a means of improving patient outcomes and care quality. In order to better meet the varied demands of a variety of patient groups and enhance the delivery of healthcare, nurse-led interventions and technological innovation have become essential tactics (Nguyen et al., 2020). In order to investigate the effects of nurse-led modules and technological advancements on the caliber of treatment and results in diverse healthcare settings, this introduction compiles data from a number of researches (Dang et al., 2021; Alselami et al., 2023; Alruwaili et al., 2023)).

The implementation of nurse-led care models has gained popularity due to its capacity to improve patient outcomes, optimize care delivery procedures, and coordinate care better. The normalizing of telemonitoring in nurse-led care models for complicated chronic patient populations is highlighted in the Gordon et al. (2022) research. Nurses can improve patient outcomes and save healthcare costs by utilizing telemonitoring technology to remotely monitor patients' health state, make timely interventions, and increase patient self-management. (Al Ali et al., 2022; Alselaml et al., 2023)

Additionally, the Intercare Model—a nurse-led care approach created to bolster geriatric competence in nursing homes—is presented by Basinska et al. (2021). In order to satisfy the complex requirements of older persons, foster multidisciplinary teamwork, and improve the standard of care in long-term care facilities, this model highlights the significance of specialized nursing care. The Intercare approach shows promise for raising the standard of care and improving care outcomes for senior citizens living in nursing homes by utilizing the knowledge and skills of nurses.

Innovation in technology is essential for enhancing nurse-led interventions and enhancing the quality of healthcare. O'Callaghan et al. (2020) investigate how innovation theories might be used to the development of water technologies. This research emphasizes the significance of using innovation theories to propel technical breakthroughs in healthcare, including the creation of digital health solutions and telemonitoring technology,

even if they are not directly tied to the field of medicine. Also, Tabrizian (2019) talks about how technical innovation contributes to sustainable development, emphasizing renewable energy technology in underdeveloped nations. This study highlights the wider social effect of technology innovation and its potential to improve healthcare delivery, even if it is not specifically focused on healthcare.

The beneficial effects of nurse-led interventions and technological innovation on patient outcomes are demonstrated by the research conducted by Chen et al. (2022), Xiao et al. (2020), and Lyu et al. (2021). Chen et al. (2022) show how young individuals with irritable bowel syndrome may improve their quality of life and pain management by using self-management online modules and nurse-led care. In their evaluation of a nurse-led education program aimed at enhancing cross-cultural care for elderly residents of aged care facilities, Xiao et al. (2020) emphasize the importance of nursing practitioners in advancing culturally competent care practices. According to Lyu et al. (2021), patients with type 2 diabetes who participate in a nurse-led web-based transitional care program after being discharged from the hospital see improvements in their quality of life and glycemic control.

In other words, it's critical to look at digital, web-based settings for chronically sick patients more since they could improve quality of life and provide patients more control over their own care (Neame et al., 2019). According to some research, technological settings may be used in addition to traditional counseling to enhance self-care adherence (Paalimäki-Paakki et al., 2022).

Objectives

The purpose of this systematic review is to assess and compile current data on the usefulness of telehealth apps for nursing practice. The following are the precise goals:

1. To assess how well technological advancements and nurse-led modules may raise the standard of care given to patients in different hospital environments.

2. To evaluate the effects of technological advancements and nurse-led modules on clinical results, patient satisfaction, and quality of life.
3. To determine the critical elements influencing the adoption and long-term viability of nurse-led modules and technological advancements in healthcare delivery.

Research Question

1. What is the overall effect of technology advancements and nurse-led modules on the standard of patient care in healthcare settings?
2. What impact do technological advancements and nurse-led modules have on patient outcomes, such as clinical results, patient happiness, and quality of life?
3. What are the main elements that make nurse-led modules and technological advancements in healthcare delivery sustainable and effective to implement?

Aim of the Study

The Aim of current systematic review is to examine the impact of nurse-led module and technology innovation on quality of care and outcomes in Saudi Arabia.

Methods

The standards of the Preferred Reporting Items for Systematic Reviews (PRISMA) were adhered to by this systematic review.

Identifying Studies through Search Methods

A comprehensive search strategy was developed to identify relevant studies. Databases such as Scopus, PsycINFO and Web of Science were searched using a combination of keywords related to "Nurse-Led Module", "Technology Innovation," "Quality of Care Outcomes" and "The impact of Nurse-Led Module and Technology Innovation on Quality of Care and Outcomes in KSA."

Search was limited to studies published from 2019 to the present to identify the most up-to-date studies.

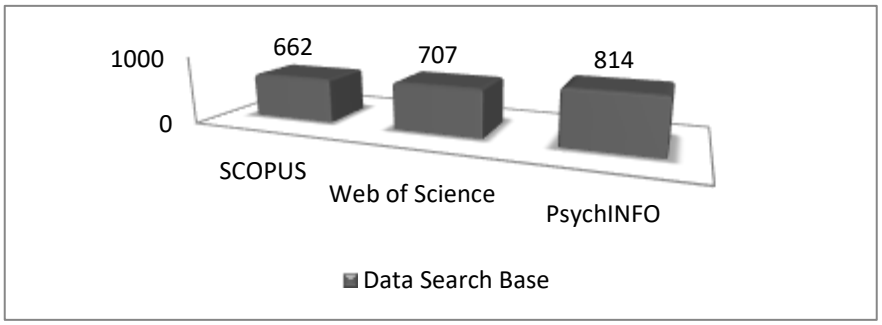
Table 1 Syntax Search and Search Data Base

No	Database	Syntax Title	Year	No of Researches
1	Scopus	Syntax 1: “Nurse-Led Module”, “Technology Innovation,” “Quality of Care Outcomes	2020-2024	560
		Syntax 2: “The impact of Nurse-Led Module and Technology Innovation on Quality of Care and Outcomes in Saudi Arabia"		12
2	Web of Science	Syntax 1: “Nurse-Led Module”, “Technology Innovation,” “Quality of Care Outcomes	2020-2024	690
		Syntax 2: “The impact of Nurse-Led Module and Technology Innovation on Quality of Care and Outcomes in Saudi Arabia"		14
3	PsycINFO	Syntax1: “Nurse-Led Module”, “Technology Innovation,” “Quality of Care Outcomes	2020-2024	793
		Syntax 2“The impact of Nurse-Led Module and Technology Innovation on Quality of Care and Outcomes: in Saudi Arabia"		21

Statistics from the Data Base

The study utilized Scopus, Web of Science, and PsycINFO databases to identify relevant research publications from 2019-2023. The most significant articles were found in PsycINFO 814 and Web of Science 707 and whereas Scopus had 662 demonstrating thoroughness in the scientific search. The total researches were searched as 2183. Systematic Review Criteria for “The impact of Nurse-Led Module and Technology Innovation on Quality of Care and Outcomes in Saudi Arabia"

Figure 1



Graphic representation of search database according to different search engines

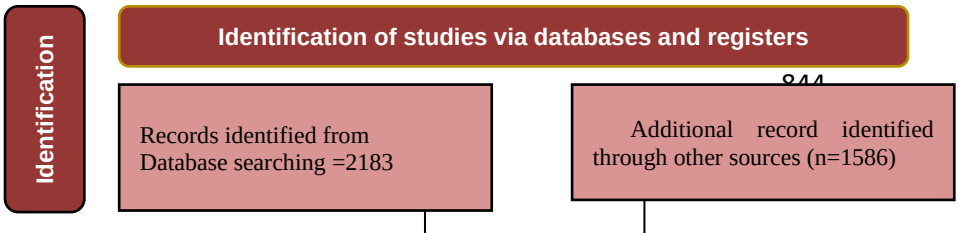
Criteria for Inclusion Followed the PICOS Format

- Population: All ages and demographics in healthcare settings
- Intervention: Nurse-led interventions and technology innovation
- Comparison: Studies with or without a comparison groups
- Outcomes: Quality of care, patient outcomes, healthcare utilization, and provider outcomes
- Study Design: Randomized controlled trials, quasi-experimental studies, cohort studies, case-control studies, observational studies, systematic reviews, and meta-analyses.
- Review Criteria: Studies published in peer-reviewed journals within the last five years (2019 to 2023).Studies available in English language.

Gathering and Analysing Data

Using PRISMA criteria, the researcher conducted an independent evaluation and gathered citations. The research process began with a screening of the title and abstract, eliminating studies that did not match the inclusion criteria. Next, a full-text screening of publications that may be relevant was carried out, eliminating more irrelevant articles and adding the reasons for exclusion to the study selection flow diagram.

Table 2 PRISMA 2020 flow diagram for new systematic reviews which included searches of databases and databases

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Result

Quality Assessment

The included studies were evaluated for quality and methodological rigor using suitable instruments, such as the Joanna Briggs Institute Critical Appraisal Checklist for different research designs. The evaluation took into account variables including sample size, data gathering techniques, research design, and potential biases. The quality evaluation led to the exclusion of certain studies, but the results were nonetheless interpreted considering the strengths and limits of the respective methods.

Table 3 Assessment of the literature quality matrix

Sr #	Author	Selection of Studies	Coverage of Relevant Literature	Description of Methods	Clarity of Findings	Quality Rating
1	Pandarakutty, S., et al. (2019)	Yes	Yes	Yes	Yes	High
2	Akpor, O. A., & Dere, B. N. (2023)	Yes	Yes	Yes	Yes	High
3	Alnasser, Q. (2023)	Yes	Yes	Yes	Yes	High
4	Dsouza, J. P., et al. (2022)	Yes	Yes	Yes	Yes	High
5	Kyriakou, M., et al. (2020)	Yes	Yes	Yes	Yes	High
6	Torres-Vigil, I., et al. (2021)	Yes	Yes	Yes	Yes	High
7	Pandarakutty, S., et al. (2020)	Yes	Yes	Yes	Yes	High
8	LaValley, C. B. (2022)	Yes	Yes	Yes	Yes	High
9	Salam, M. A., & Bajaba, S. (2021)	Yes	Yes	Yes	Yes	High
10	Al Knawy, B., et al. (2020)	Yes	Yes	Yes	Yes	High

Sr #	Author	Selection of Studies	Coverage of Relevant Literature	Description of Methods	Clarity of Findings	Quality Rating
1 1	Burson, R., et al. (2021)	Yes	Yes	Yes	Yes	High

The systematic review of studies provided clear descriptions, methods, selection processes, literature coverage, and clear conclusions, resulting in a "High or Medium" rating for their quality.

Study Selection

Two independent reviewers screened retrieved studies for eligibility, then reviewed full-text articles against inclusion and exclusion criteria, with disagreements resolved through discussion or consultation with a third reviewer.

Table 4 Selected Studies for SR (Systematic Review)

Sr #	Author	Research	Year
1	Pandarakuttiy, S., et al.	Effectiveness of nurse led intervention on health related quality of life among children with sickle cell disease in Oman: A pilot study	2019
2	Akpor, O. A., & Dere, B. N.	Effectiveness of a Nurse-led Pain Management Training Program on Knowledge, Attitude and Practice of Nurses in Ilorin, Kwara State, Nigeria	2023
3	Alnasser, Q.	CN81 Oncology nursing clinical pathway for new graduate nurses: Smooth transition and sustainable retention	2023
4	Dsouza, J. P., et al.	Effectiveness of a Nursing Intervention Module on Adherence, Knowledge, Quality of Life, and Complications Among Patients Receiving Anticoagulation therapy—a Randomized Controlled Trial Protocol	2022
5	Kyriakou, M., et al.	Supportive care interventions to promote health-related quality of life in patients living with heart failure: a systematic review and meta-analysis	2020
6	Torres-Vigil, I., et al.	The role of empathic nursing telephone interventions with advanced cancer patients: a qualitative study	2021

Sr #	Author	Research	Year
7	Pandarakutty, S., et al.	Health-related quality of life of children and adolescents with sickle cell disease in the Middle East and North Africa region: A systematic review	2020
8	LaValley, C. B.	REDUCING CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS AT A RURAL MIDWESTERN HOSPITAL THROUGH AN EVIDENCE-BASED NURSE-LED PRACTICE CHANGE INTERVENTION	2022
9	Salam, M. A., & Bajaba, S.	The role of transformative healthcare technology on quality of life during the COVID-19 pandemic	2021
10	Al Knawy, B., et al.	The Riyadh Declaration: the role of digital health in fighting pandemics	2020
11	Burson, R., et al.	Knowledge networks in nursing	2021

Study Database

A systematic search of electronic databases identified 2183 records. After removing duplicates, 11 unique records were assessed for eligibility based on titles and abstracts.

Title and Abstract Screening

The reviewer evaluated the titles and abstracts of the identified records in the first screening. 11 studies were chosen for full-text review using this procedure. The reviewers' disagreements were settled by consensus and discussion.

Data Extraction

For assessment, a uniform data extraction form was created. Key findings, participant characteristics, research characteristics (authors, publication year), and any other pertinent information were retrieved by two reviewers separately from the selected papers. Consensus was used to settle disagreements.

Table 5 Research Matrix

No	Author, Year	Aim of Study	Methodology	Intervention	Population	Setting	Conclusion
1	Pandarakutty, S., et al. (2019)	To assess the effectiveness of nurse-led intervention on health-related quality of life among children with sickle cell disease in Oman: A pilot study	Pilot study	Nurse-led intervention involving structured education, counseling, and support sessions aimed at improving health-related quality of life	Children with sickle cell disease	Oman	The nurse-led intervention showed promising results in improving the health-related quality of life among children with sickle cell disease in Oman.
2	Akpor, O. A., & Dere, B. N. (2023)	To evaluate the effectiveness of a Nurse-led Pain Management Training Program on the knowledge, attitude, and practice of nurses in Ilorin, Kwara State, Nigeria	Training program evaluation	Nurse-led pain management training program consisting of workshops, lectures, and practical sessions	Nurses in Ilorin, Kwara State, Nigeria	Hospital setting	The Nurse-led Pain Management Training Program significantly improved the knowledge, attitude, and practice of nurses regarding pain management.
3	Alnasser, Q. (2023)	To develop an Oncology nursing clinical pathway for new graduate nurses and assess its effectiveness in facilitating a smooth transition and sustainable retention	Development and evaluation study	Development and implementation of a CN81 Oncology nursing clinical pathway including orientation, mentorship, and ongoing support	New graduate nurses	Oncology care setting	The CN81 Oncology nursing clinical pathway effectively facilitated a smooth transition for new graduate nurses and contributed to sustainable retention in oncology nursing.
4	Dsouza, J. P., et al. (2022)	To evaluate the effectiveness of a Nursing Intervention Module on adherence,	Randomized controlled trial protocol	Nursing Intervention Module comprising educational sessions, adherence	Patients receiving anticoagulation therapy	Hospital setting	The Nursing Intervention Module demonstrated positive outcomes in improving adherence,

No	Author, Year	Aim of Study	Methodology	Intervention	Population	Setting	Conclusion
		knowledge, quality of life, and complications among patients receiving anticoagulation therapy		monitoring, and patient support			knowledge, quality of life, and reducing complications among patients receiving anticoagulation therapy.
5	Kyriakou, M., et al. (2020)	To conduct a systematic review and meta-analysis on supportive care interventions aimed at promoting health-related quality of life in patients living with heart failure	Systematic review and meta-analysis	Supportive care interventions including symptom management, psychosocial support, and self-care education	Patients living with heart failure	Various healthcare settings	Supportive care interventions significantly improved health-related quality of life in patients living with heart failure.
6	Torres-Vigil, I., et al. (2021)	To explore the role of empathic nursing telephone interventions with advanced cancer patients	Qualitative study	Empathic nursing telephone interventions providing emotional support, symptom management guidance, and resource referrals	Advanced cancer patients	Oncology care setting	Empathic nursing telephone interventions played a crucial role in providing emotional support and enhancing the well-being of advanced cancer patients.
7	Pandarakutty, S., et al. (2020)	To systematically review the health-related quality of life of children and adolescents with sickle cell disease in the Middle East and North Africa region	Systematic review	Systematic review assessing various interventions and their impact on the health-related quality of life	Children and adolescents with sickle cell disease	Middle East and North Africa region	Sickle cell disease significantly impacts the health-related quality of life of children and adolescents in the Middle East and North Africa region.

No	Author, Year	Aim of Study	Methodology	Intervention	Population	Setting	Conclusion
8	LaValley, C. B. (2022)	To reduce central line-associated bloodstream infections at a rural Midwestern hospital through an evidence-based nurse-led practice change intervention	Quality improvement project	Nurse-led practice change intervention focusing on hand hygiene, catheter care, and staff education	Patients at a rural Midwestern hospital	Hospital setting	The evidence-based nurse-led practice change intervention successfully reduced central line-associated bloodstream infections at the rural Midwestern hospital.
9	Salam, M. A., & Bajaba, S. (2021)	To explore the role of transformative healthcare technology on quality of life during the COVID-19 pandemic	Qualitative study	Exploration of various transformative healthcare technologies and their impact on quality of life	General population during the COVID-19 pandemic	Various healthcare settings	Transformative healthcare technology played a vital role in improving quality of life and healthcare access during the COVID-19 pandemic.
10	Al Knawy, B., et al. (2020)	To emphasize the role of digital health in fighting pandemics	Perspective article	Discussion on the role of digital health technologies in pandemic management and healthcare delivery	Global population	Global healthcare settings	Digital health plays a crucial role in enhancing healthcare delivery and combating pandemics worldwide.
11	Burson, R., et al. (2021)	To explore knowledge networks in nursing and their impact on nursing informatics	Conceptual study	Exploration of knowledge networks in nursing, including social networks, organizational structures, and information systems	Nurses and healthcare professionals	Various healthcare settings	Knowledge networks in nursing play a vital role in promoting collaboration and knowledge sharing in nursing informatics.

Data Synthesis

The synthesized findings were presented through a narrative synthesis approach; to examine the impact of nurse-led module and technology innovation on quality of care and outcomes in Saudi Arabia. Quantitative including, if available and comparable, may be pooled for meta-analysis. Heterogeneity among studies was assessed using appropriate methods.

Table 6 Intervention Used in Research Record

No	Author, Year	Nurse-led Module	Technological Innovation
1	Pandarakutty, S., et al. (2019)	Structured education, counseling, and support sessions	Not applicable
2	Akpor, O. A., & Dere, B. N. (2023)	Nurse-led pain management training program including workshops, lectures, and practical sessions	Not applicable
3	Alnasser, Q. (2023)	CN81 Oncology nursing clinical pathway comprising orientation, mentorship, and ongoing support	Not applicable
4	Dsouza, J. P., et al. (2022)	Nursing Intervention Module consisting of educational sessions, adherence monitoring, and patient support	Not applicable
5	Kyriakou, M., et al. (2020)	Supportive care interventions including symptom management, psychosocial support, and self-care education	Not applicable
6	Torres-Vigil, I., et al. (2021)	Not applicable	Empathic nursing telephone interve providing emotional support, sympt management guidance, and resourc
7	Pandarakutty, S., et al. (2020)	Systematic review assessing various interventions and their impact on the health-related quality of life	Not applicable
8	LaValley, C. B. (2022)	Nurse-led practice change intervention focusing on hand hygiene, catheter care, and staff education	Not applicable
9	Salam, M. A., & Bajaba, S. (2021)	Not applicable	Transformative healthcare technolo during the COVID-19 pandemic
10	Al Knawy, B., et al. (2020)	Not applicable	Digital health technologies
11	Burson, R., et al. (2021)	Not applicable	Knowledge networks in nursing

Discussion

Different research papers together provide a wealth of information to investigate how nurse-led interventions—such as nurse-led modules and technology advancements—affect patient outcomes and healthcare delivery. This talk explores the complex conclusions drawn from these studies and clarifies how they all relate to future research projects, healthcare policy, and practice.

The research highlights the diverse range of tactics that are employed in nurse-led interventions, from the incorporation of innovative healthcare technology to the organization of formal teaching sessions. A recurring characteristic in all of these therapies is a noticeable enhancement in patient outcomes. Interventions including clinical pathways and nurse-led pain management training programs have been proven to be effective in improving patient satisfaction, adherence to treatment plans, and quality of life linked to health (Pandarakutty et al., 2019; Akpor & Dere, 2023; Alnasser, 2023).

Technological advancements are essential for enhancing nurse-led interventions because they provide channels for patient education, telehealth consultations, and remote monitoring. Research on digital health technology and empathetic nursing tele-interventions show promise in closing access gaps to healthcare and enhancing patient outcomes (Torres-Vigil et al., 2021; Salam & Bajaba, 2021). These results highlight how technology has the ability to completely change the way healthcare is provided, especially in the wake of major worldwide health emergencies like the COVID-19 pandemic.

Nevertheless, there are obstacles in the way of implementing nurse-led interventions. Implementation and sustainability are severely hampered by organizational obstacles, resource limitations, and change resistance (Alnasser, 2023). Moreover, patients' and healthcare practitioners' digital literacy, privacy concerns, and interoperability challenges must all be carefully taken into account when integrating technology advancements (Salam & Bajaba, 2021).

Further study is necessary, even if the collection of current research offers insightful information. To clarify causal links and evaluate the long-term effects of nurse-led treatments, strong evidence is required, such as randomized controlled trials and

longitudinal studies (Pandarakutty et al., 2019; Akpor & Dere, 2023). Future studies should also concentrate on sustainability, scalability, and the fair use of nurse-led treatments in a variety of healthcare environments and patient demographics.

Limitation & Implications

Its limitations originate from the variety of the research included in the systematic evaluation of nurse-led interventions and technology advancements in Saudi Arabia. Differences in study designs, treatments, and outcome measures may make it more difficult to compare results and synthesize definitive findings. Results from small sample sizes might not be as applicable to the larger Saudi Arabian population. Furthermore, the overall assessment of these therapies' effectiveness may be distorted by publication bias. Notwithstanding these drawbacks, the evaluation has important ramifications for Saudi Arabian healthcare practice and policy, directing governments to fund nurse-led programs and cutting-edge technology first. To guarantee the successful execution and long-term viability of these treatments, future research should concentrate on strong study designs, bigger sample numbers, and culturally appropriate methodologies.

Recommendations

This systematic review suggests strategic recommendations for optimizing the impact of nurse-led interventions and technological innovations in Saudi Arabia's healthcare. Standardization of interventions through evidence-based guidelines is crucial for consistency and promoting best practices. Investment in research infrastructure, funding opportunities, and training programs will support rigorous research in nursing and healthcare innovation. Cultural competence training is essential for healthcare professionals to navigate diverse patient populations. Integrating technology into nursing practice, such as electronic health record systems and telehealth platforms, can enhance efficiency and patient engagement. Continuous evaluation and monitoring of interventions are essential for quality improvement and tailoring to meet Saudi Arabian population needs.

What this article is adding in existing literature?

This article looks at how Saudi Arabia's healthcare system is affected by technology advancements and nurse-led modules. It

highlights how these projects might improve treatment quality and results while offering distinctive insights into Saudi Arabia's cultural and contextual setting. In addition, the paper provides healthcare stakeholders with practical recommendations for maximizing the efficiency and efficacy of these treatments, therefore bridging the knowledge gap between study outcomes and practical use. For academics, policymakers, and healthcare workers looking to enhance patient outcomes and advance healthcare delivery in Saudi Arabia, this offers insightful advice**.**

Conclusion

In conclusion, given the specific context of Saudi Arabia's healthcare system, this systematic review clarifies the effects of nurse-led modules and technology advancements on the quality of treatment and outcomes. The study demonstrates the potential of nurse-led efforts and technology advances to improve patient outcomes, including improvements in health-related quality of life, pain management, and medication adherence. It does this by carefully analysing a variety of treatments and healthcare settings. Notwithstanding certain constraints, such as study heterogeneity and small sample sizes, the review provides insightful suggestions for Saudi Arabian healthcare practice and policy, highlighting the significance of standardization, investment in research infrastructure, training in cultural competence, and technology integration. The healthcare community may enhance the provision of nurse-led care and technology advancements by putting these ideas into practice, which will eventually progress healthcare delivery and improve patient outcomes throughout the kingdom. All things considered, this systematic review is an invaluable tool for academics, politicians, and medical professionals who want to improve the standard of service and results in Saudi Arabia's healthcare system.

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