

AI-Driven Decision Support Systems: Transforming Hospital Management Strategies

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1. Abstract

Introduction

The healthcare sector faces many challenges, including more patients, rising costs, and the need for high-quality care. AI-driven decision support systems (AI-DSS) can enhance hospital management by improving workflows, cutting administrative errors, and better allocating resources to improve patient outcomes.

Aim

The aim of this study is to evaluate the impact of AI-DSS on hospital management efficiency, patient outcomes, and operational strategies. It explores the factors influencing successful AI-DSS implementation and examines healthcare professionals' perceptions of these systems in clinical decision-making. The study seeks to provide evidence on the role of AI-DSS in enhancing both operational and patient care outcomes in healthcare settings.

Methodology

This survey focused on healthcare professionals from private and government hospitals, including doctors, nurses, administrators, and allied health staff. We collected data through an online questionnaire that covered demographics, AI usage, perceived effects, challenges, and overall satisfaction. We used Likert-scale and multiple-choice questions for quantitative data.

Results

The study found that only 9.4% of hospitals currently use AI-DSS, showing that adoption is still in its early stages. Respondents noted several benefits, with 59.6% stating that AI helps with clinical decision-making and 63% saying it improves operational efficiency and resource use. However, opinions about AI's impact on diagnostic accuracy were mixed, with 48.8% disagreeing that AI significantly enhances diagnostic processes. Key barriers to adoption included cost (50.7%), staff resistance (40.4%), and lack of training (35%). Despite these issues, many respondents felt that AI boosts staff confidence in clinical decisions and allows for timely interventions, which positively affects patient outcomes.

Conclusion

AI-DSS shows great potential to improve hospital management by enhancing decision-making and efficiency. However, to increase adoption, we need to tackle barriers like costs, training issues, and staff resistance. Future efforts should focus on strong training programs, affordable solutions, and strategies for better integration of AI in healthcare settings.

Introduction

The healthcare sector faces numerous challenges, such as increasing patient volumes, escalating operational costs, and heightened expectations for high-quality patient care.(1,2) Hospitals are constantly pressured to enhance operational efficiency in this dynamic environment. The pursuit of efficiency has evolved beyond a mere objective; it has become essential for the sector's sustainability.(1–3)

Effective decision-making in hospital management—encompassing resource allocation, scheduling, and administrative workflows—is vital for achieving these efficiency goals. However, human error, limited resources, and a lack of real-time data integration often hinder traditional decision-making approaches.(4,5) The abovementioned challenges underscore the urgent need for innovative strategies and technologies to improve decision-making processes and enhance patient outcomes.(4)

Recent advancements in artificial intelligence (AI) have profoundly impacted numerous industries, with healthcare experiencing some of the most transformative changes.(6,7) AI-powered technologies provide innovative solutions to longstanding challenges that healthcare systems face today. Specifically, AI-driven decision support systems leverage sophisticated algorithms and advanced machine learning techniques to analyze vast and complex datasets.(6–8)

These systems excel at identifying intricate patterns within patient data, treatment histories, and resource utilization metrics, enabling healthcare professionals to make informed decisions with greater precision.(8,9) By optimizing hospital workflows, they significantly reduce administrative errors that can lead to inefficiencies, miscommunications, and, ultimately, compromised patient care. For instance, AI tools can automate routine tasks such as scheduling and billing, freeing up valuable time for healthcare staff to focus on direct patient interactions.(6,8,9)

Moreover, the operational advantages of these AI systems extend into clinical settings, where they can enhance the quality of patient care. By facilitating quicker and more accurate diagnoses through analyzing symptoms and lab results, AI empowers healthcare providers to implement timely treatments. Additionally, these systems improve treatment planning by analyzing historical data and predicting patient outcomes, allowing for more personalized healthcare strategies.(6–8) Furthermore, the proactive approach fostered by AI technologies promotes preventive care, encouraging patients to engage in healthier behaviors based on predictive analytics. This improves individual patient outcomes and contributes to overall public health by reducing the incidence of chronic diseases.(6–9)

This study hypothesizes that implementing AI-driven decision support systems in hospital management can significantly enhance operational efficiency and improve patient care quality. Specifically, the research aims to investigate the measurable impact of these tools on reducing administrative errors and resource misallocation. Additionally, the study explores the relationship between healthcare professionals' training in AI technologies and their acceptance of these systems. By addressing these hypotheses, this research seeks to provide empirical evidence supporting the integration of AI-driven decision support systems in hospital management and offer practical recommendations for successful implementation.

2. Literature Review

3.1 The Role of Artificial Intelligence in Healthcare and AI-driven decision support application

AI is changing healthcare by bringing new ideas like diagnosis, personalized medicine, and hospital management. Using advanced techniques such as machine learning (ML) and natural language processing (NLP), AI can effectively handle large and complicated data sets. This ability shows great promise for improving healthcare now and in the future.(10,11)

Clinical Decision Support Systems (CDSS)

In diagnostics, AI provides accurate, efficient, and scalable solutions. For example, a study conducted by Esteva et al. (2017) showed that AI trained on skin disease data helps improve laboratory diagnostics.(12) ML tools can analyze electronic health records (EHR) data to predict disease risks, allowing for early intervention and better patient outcomes.(9) A systematic review by Khalifa et al. (2024) discusses how AI is changing diagnostic imaging in healthcare. It highlights four main uses for AI in this field: better image analysis, improved operational efficiency, predictive healthcare, and support for clinical decisions.(13) The review stresses AI's importance in detecting diseases early and personalizing care, reassuring us of its positive effect on patient outcomes. (13)

CDSS are advanced tools that help healthcare professionals make accurate and timely decisions by analyzing patient data and providing evidence-based recommendations. These systems significantly impact healthcare, especially improving diagnosis, treatment plans, and patient safety.(14–16)

Kawamoto et al. (2005) noted that CDSS can lower diagnostic errors by giving real-time, evidence-based suggestions.(14) They are instrumental in identifying rare diseases or unusual symptoms, where mistakes can happen due to biases or lack of experience.(14) A study by Semigran et al. (2015) found that using CDSS in everyday practice improved diagnostic accuracy for primary care doctors by 15%.(17)

Personalized Medicine

Personalized medicine aims to customize treatments based on individual patient needs. AI plays a crucial role in this area by helping to predict how genetic differences affect medication responses. A book by Topol et al. (2019) states that "This allows doctors to prescribe the most effective drugs with fewer side effects." (18) Moreover, AI supports cancer care by forecasting tumor growth and assessing treatment effectiveness.(12) An example is IBM Watson for Oncology, which uses AI to recommend evidence-based treatments tailored to individual patients.(10)

CDSS also plays a crucial role in optimizing treatment plans by examining patient-specific factors and suggesting the best interventions.(14,16) Tools like IBM Watson for Oncology review clinical

data and treatment results to help doctors choose personalized cancer treatments.(6) These systems also reduce risks by warning healthcare providers about possible harmful drug interactions or contraindications, ensuring safer medication use.(17,19)

Predictive Analytics in Healthcare

Predictive analytics tools are essential in today's healthcare. They use advanced machine learning algorithms and statistical models to find patterns in patient data.(20) These tools help healthcare providers predict disease progression, identify possible complications, and offer proactive care. (20,21)This section discusses how predictive analytics is used in healthcare, focusing on early disease detection, risk assessment, resource management, and cost savings.(20–24)

These tools improve the early detection of diseases by examining historical patient data, medical records, and real-time health information. A study by Obermeyer et al. (2016) showed that predictive models accurately identify high-risk patients.(23) This allows timely interventions to stop disease progression and improve patient outcomes.(23) In critical care settings, predictive tools monitor patient vitals and spot early signs of severe conditions like sepsis or organ failure.(21)

Predictive analytics shifts healthcare from reactive to proactive care. In oncology, these tools analyze patient data and genetic markers to forecast tumor growth, helping doctors suggest the most effective therapies.(18,25) They are also used in monitoring drug safety to predict adverse drug reactions, which ensures safer medication practices. This reduces complications and leads to better patient outcomes.(24)

Overall, predictive analytics tools are transforming healthcare. They enable early disease detection, proactive care, and better resource use. Their ability to reduce complications, improve hospital processes, and save costs highlights their importance in modern healthcare systems.(20–24)

AI-Driven Imaging Analysis in Radiology

Artificial intelligence (AI) is changing the field of medical imaging, making radiology more accurate and efficient.(13,18,26) AI tools help analyze images, especially those using deep learning algorithms, to identify problems, assist radiologists, and improve patient care. This section discusses AI's advancements, uses, and challenges in imaging.(10,13,18)

AI imaging tools can find minor issues that human observers might miss. A McKinney et al. (2020) study found that AI algorithms were better than radiologists at detecting breast cancer in mammograms, showing higher accuracy.(27) AI models also effectively diagnose fractures, heart diseases, and brain disorders. These systems decrease differences in interpretation and lessen mistakes caused by fatigue or oversight, leading to more reliable diagnoses.(28)

One significant benefit of AI in imaging is its ability to improve workflows. AI processes and analyzes imaging data quickly, speeding up how fast doctors can make decisions after an image is taken.(29) For instance, in stroke treatment, AI-powered tools can quickly assess CT scans to identify types of strokes, allowing for faster treatment and better outcomes.(29)

AI does not replace radiologists; it works alongside them as a second opinion. It offers initial interpretations, highlights essential areas, and helps with clinical decisions.(30) This teamwork between AI and radiologists boosts confidence and decreases the chances of mistakes. Research shows that AI-supported radiologists achieve better results than using only human or AI analysis alone.(31,32)

AI imaging analysis marks a significant improvement in radiology. It enhances accuracy, speeds up processes, and aids early disease detection.(27,29,33) By helping radiologists understand complex imaging data, AI tools raise the quality and efficiency of medical care. However, to fully

realize the benefits of AI in medical imaging, we must address issues like data privacy, algorithm testing, and doctor training.(31,32,34)

Natural language processing

Natural Language Processing (NLP) systems have emerged as transformative tools in healthcare, addressing the complexities of unstructured data such as doctors' notes, patient feedback, and clinical guidelines.(35) These AI-based systems extract and process text information, converting it into valuable insights. This transformation is enhancing clinical decision-making and operational efficiency. This review delves into the profound impact of NLP in healthcare, particularly in clinical documentation, decision support, and electronic health records (EHRs).(35–39)

NLP systems significantly improve the accuracy and efficiency of clinical documentation, a vital aspect of healthcare. A study by Wang et al. (2020) demonstrated that NLP enhanced the completeness and consistency of medical records, leading to fewer errors in patient information.(11) Importantly, NLP also lightens the documentation workload for healthcare providers, allowing them to dedicate more time to patient care. Features like automatic transcription and summarization streamline processes and enhance the quality of clinical notes.(36,37)

In real-time scenarios, NLP systems are proving to be powerful tools in identifying health issues early, offering hope for better patient outcomes. A study by Lee et al. (2021) found that NLP systems could identify sepsis early by examining real-time clinical notes. This early identification led to timely interventions and improved patient outcomes, showcasing the potential of NLP in healthcare.(38)

One significant application of NLP is its connection with EHR systems. Tools like IBM Watson Health can extract insights from EHRs, helping with patient risk assessment and personalized care planning (Raghavan et al., 2019).(35,37) NLP systems also play a key role in analyzing patient feedback, a crucial aspect of healthcare. By examining qualitative data from surveys, reviews, and social media, NLP can detect trends and sentiments that inform hospital policies and enhance patient experiences. This analysis, as shown in studies by Liu et al. (2021), connects patient feedback to service improvements, ultimately improving healthcare quality.(38)

In summary, integrating AI tools such as CDSS, predictive analytics, NLP, and imaging analysis has transformed healthcare practices. These innovations improve clinical decision-making, patient safety, and overall care quality while promoting operational efficiency and cost-effectiveness. As AI continues to evolve, its potential to further revolutionize healthcare remains boundless.

3.2 Operational Efficiency in Hospital Management with AI

AI is revolutionizing hospital management, enhancing patient care and resource utilization. By automating tasks, optimizing resource allocation, and resolving common issues, AI is reshaping how hospitals function, improving efficiency and quality of care.(29,35,40–44)

AI systems help make hospital workflows smoother. Machine learning (ML) models can predict when patients will arrive or leave, which helps with staff scheduling and bed management. For example, research by Ingole et al. (2024) shows that these tools can identify busy times, ensuring that hospitals have enough staff and resources, which helps prevent service delays.(40) AI also improves supply chain management by predicting inventory needs and reducing the waste of medical supplies.(20) Predictive models can look for patterns in how resources are used, helping hospital staff avoid overstocking or running out of supplies, which can interrupt patient care.(20) NLP tools automate regular tasks like data entry, appointment scheduling, and paperwork, providing much-needed relief from manual tasks for healthcare staff.(42) This reduction in workload allows healthcare providers to dedicate more time to patient care.(42) Maleki et al.

(2019) found that AI systems make it easier to maintain accurate patient records, ensuring that crucial information is readily available. By automating these tasks, AI also reduces the chances of administrative errors, leading to smoother operations and increased patient satisfaction.(41)

Traditional hospital management often needs help with problems like scheduling conflicts, wasted resources, and delays. AI helps solve these issues by providing valuable insights and recommendations.(45) ML algorithms can analyze past scheduling data to create better staff shifts, avoiding too many or too few workers. AI also improves bed management, ensuring enough beds are available during busy times.(45) Ingole et al. (2024) state that AI systems help save costs by reducing waste and delays. These systems make hospitals work better and ensure fair resource use for all patients.(40)

AI tools are revolutionizing hospital management by streamlining workflows, automating tasks, and enhancing decision-making. They effectively address common issues like waste and scheduling conflicts, significantly improving overall efficiency.(46) Despite the challenges, the increasing adoption of AI in hospitals is a promising sign for the future of healthcare. With its potential to enhance operations and the quality of patient care, AI is set to transform the healthcare landscape.(46,47)

3.3 Healthcare Professionals' Training and Acceptance of AI

The successful implementation of AI-driven tools in healthcare heavily relies on healthcare professionals' acceptance and active participation. Training has been identified as a pivotal factor influencing this acceptance. Clinicians and other hospital staff are less likely to trust or integrate AI systems into their daily workflows without adequate knowledge and familiarity.(48–50)

Studies highlight a direct correlation between structured training programs and healthcare professionals' acceptance of AI technologies. Lambert et al. (2023) found that training improves understanding of AI functionalities and fosters confidence in its reliability and utility. This suggests that investments in comprehensive training initiatives can significantly ease the transition to AI-integrated systems in healthcare settings.(49)

Effective training programs must be tailored to the specific needs of various healthcare professionals, addressing their distinct roles and concerns.(51) For example, radiologists might require in-depth knowledge of AI in imaging analysis. At the same time, administrative staff may need training on AI-driven resource management tools. Structured programs should focus on demystifying AI technologies, demonstrating their practical benefits, and addressing common fears, such as over-reliance on technology or potential job displacement.(52,53)

Beyond operational familiarity, training plays a role in shaping attitudes toward ethical AI deployment. Recommendations from the review *AI in Diagnostic Imaging: Revolutionising Accuracy and Efficiency* emphasize the need for training programs to align with ethical guidelines and patient-centered care principles. This holistic approach ensures that AI is used responsibly, promoting equitable outcomes and maintaining trust in healthcare systems.(13)

Hospitals can facilitate smoother adoption, improve patient outcomes, and optimize operational efficiency by equipping healthcare professionals with the knowledge and tools to effectively use AI-driven systems.

3.4 Challenges in AI Implementation in Healthcare

AI has immense potential to revolutionize healthcare, but its implementation in hospitals and clinics is not challenging. These hurdles, ranging from technical issues to ethical concerns and human factors, underscore the complexity of integrating AI into real-life healthcare scenarios.(6,7,46,54,55)

One major challenge is resistance from healthcare workers. Many doctors worry that AI could disrupt their workflows or make them too dependent on technology, seeing it as a threat to their expertise.(56,57) According to a study, this hesitance often comes from a lack of familiarity with AI systems and doubts about their reliability.(57) Training and education showing AI's real benefits can help reduce this resistance by building trust.(56)

Another hurdle is the demand for enhanced technical skills for effective AI utilization. Hospitals require proficient individuals who can comprehend intricate algorithms and sustain these systems for successful AI tool implementation.(57) Morley et al. (2020) underscore the significance of collaborative teams, comprising healthcare providers, data scientists, and IT specialists, to bridge this knowledge gap. Regular training and professional development programs equip staff with the requisite skills.(58)

AI tools' efficacy heavily relies on the quality of the data they utilize. Issues like malfunctioning EHRs, inconsistent clinical notes, and outdated guidelines can lead to subpar AI performance.(37) Garg et al. (2005) underscore the necessity of standardizing data and enhancing data-sharing practices to ensure accurate AI recommendations. Addressing these issues necessitates a significant investment in improved infrastructure.(15)

Ethical issues, such as biased algorithms and protecting patient privacy, are significant challenges.(55,58) For example, predictive analytics tools might unintentionally reflect biases present in past data, which can result in unfair treatment. Keeping patient information safe is also a significant concern, especially when using AI under strict data protection laws like GDPR and HIPAA.(58)

Implementing AI systems, including software, hardware, and training, can be expensive, making it hard for some healthcare settings to afford.(57) Many hospitals need clear proof of benefits to justify these expenses. Finding affordable and scalable AI solutions is crucial to overcoming this challenge.

Despite these obstacles, addressing issues like resistance to change, skill gaps, data quality, and ethical concerns can lead to successful AI integration. Possible solutions include investing in training, infrastructure, and user-friendly design while encouraging teamwork between healthcare workers and AI developers. By tackling these challenges, AI can reach its full potential to change healthcare and enhance patient care.

3.5 Research Gap

AI-DSS has the potential to improve healthcare significantly. However, more research is needed on how they affect hospital management and the quality of patient care. Most studies focus on AI's use in clinical settings, such as diagnostics and personalized medicine. It is essential to recognize that AI can also improve operational efficiency, reduce administrative errors, and help better allocate hospital resources.

Additionally, there is need for more investigation into how healthcare professionals' training in AI technologies affects their acceptance of AI-DSS. Some studies indicate that training may lead to better adoption, but we need more solid evidence to confirm this across different hospitals and job roles.

This study is critical because it aims to fill these gaps in AI-DSS research. It seeks to understand how AI-DSS impacts hospital management and the quality of patient care. The study will look at how AI-DSS affects hospital operations, such as patient wait times, staff productivity, and resource use, as well as the quality of patient care. It will also explore how targeted training programs can help healthcare professionals accept and effectively use AI-DSS in public and private hospitals.

By addressing these issues, this research hopes to give healthcare administrators and policymakers valuable insights, helping them make the most of AI technologies in hospital management.

Methodology

4.1 Study Design

This research employed a cross-sectional survey design to examine the perceptions, usage, and impact of AI-driven decision support systems (AI-DSS) among healthcare workers in both private and government hospitals. This design was chosen as it provides a snapshot of the current state of knowledge, attitudes, and practices related to AI-DSS across various healthcare settings and professional categories.

4.2 Aim

The aim of this study is to evaluate the impact of AI-DSS on hospital management efficiency, patient outcomes, and operational strategies. It explores the factors influencing successful AI-DSS implementation and examines healthcare professionals' perceptions of these systems in clinical decision-making. The study seeks to provide evidence on the role of AI-DSS in enhancing both operational and patient care outcomes in healthcare settings.

4.3 Research Questions:

The following questions are utilized for the study purpose,

1. How do AI-driven decision support systems impact the efficiency of hospital management strategies?
2. What are the key factors influencing the successful implementation of AI-driven decision support systems in hospitals?
3. In what ways do AI decision support tools enhance patient outcomes and operational management within healthcare settings?
4. How do healthcare professionals perceive the effectiveness of AI-driven decision support systems in their decision-making processes?

4.4 Study Population and Sampling

The study targeted healthcare workers, including doctors, nurses, administrators, and allied health professionals, employed in private and government hospitals. A convenience sampling method was utilized.

4.5 Data Collection Instrument

A web-based questionnaire served as the primary data collection tool, comprising five sections:

1. **Demographic Characteristics:** Gathered details on participants' age, gender, job role, managerial level, years of experience, hospital type (private or public), and hospital size.
2. **AI Usage:** Assessed familiarity with and current use of AI-DSS tools, including CDSS, predictive analytics, NLP systems, imaging analysis software, and others.
3. **Perceived Impact:** Explored perceptions of AI-DSS benefits, such as improved diagnostic accuracy, enhanced clinical decision-making, timely interventions, better resource allocation, and increased staff confidence in decision-making.
4. **Challenges and Barriers:** Identified obstacles to AI-DSS implementation, including cost, training availability, staff resistance, and perceived challenges in adoption.
5. **Overall Satisfaction:** Measured overall satisfaction with AI-DSS and willingness to recommend further investments in such technologies for improving hospital management.

The questionnaire included multiple-choice questions, Likert scale items, and open-ended responses to capture both quantitative data and qualitative insights.

3. Results

5.1 Introduction

This chapter presents the study's findings, organized into two main sections. First, we discuss the demographic characteristics of the participants, including aspects such as gender, age, role in the hospital, managerial level, Years of experience in healthcare, Type of hospital, and Size of the hospital. Next, insights into the usage, perceived impact, challenges, and overall satisfaction with AI-driven decision support systems (DSS) in hospitals. The collected data will be displayed in tables and thoroughly interpreted. The chapter concludes with a discussion of the findings, study limitations, and final conclusions.

5.2 Demographic Characteristics

The demographic profile of the participants is summarized in the following table, covering variables like gender, age, role in the hospital, managerial level, Years of experience in healthcare, Type of hospital, and Size of the hospital.

Table 1: Demographic characteristics

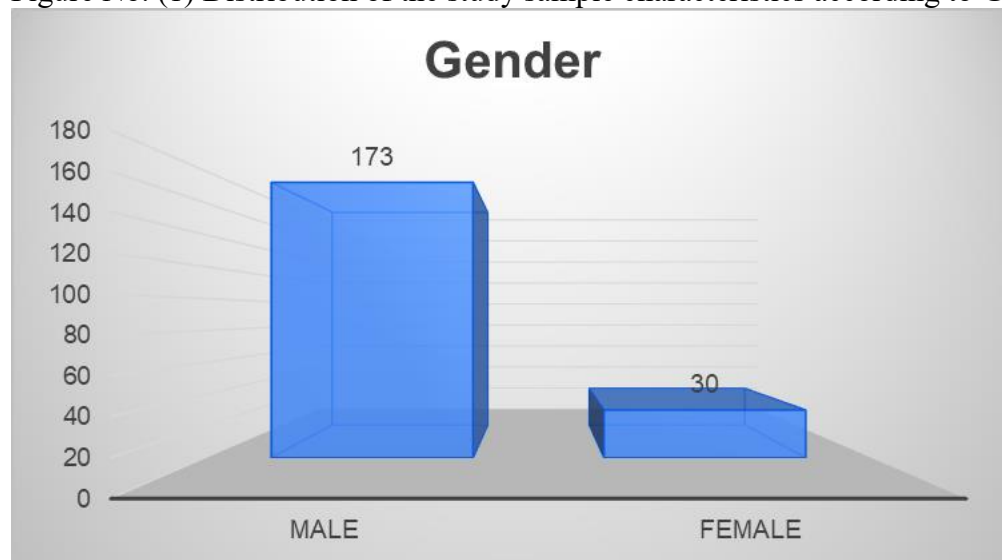
question		Count	Table N %
Gender	Male	173	85.2%
	Female	30	14.8%
Age	30-40	180	88.7%
	41-50	23	11.3%
What is your role in the hospital	Medicine	6	3.0%
	Dentistry	16	7.9%
	Pharmacy	17	8.4%
	Radiological Science	14	6.9%
	Optometry Science	23	11.3%
	Health informatic	14	6.9%
	Public Health	21	10.3%
	Clinical laboratory	18	8.9%
	Health administration	11	5.4%
	Physiotherapy	13	6.4%
	Nutrition	6	3.0%
	Biomedical engineering	6	3.0%
	Health economics	10	4.9%
	Nursing	14	6.9%
	Psychology	6	3.0%
	Paramedic	8	3.9%
managerial level	Top Level (CEO-VP)	30	14.8%
	Middle Level (Director-Head of Department)	111	54.7%
	Lower Level (Supervisor-Team leader)	59	29.1%
	None	3	1.5%

Years of experience in healthcare	0-5 years	16	7.9%
	6-10 years	104	51.2%
	11-15 years	62	30.5%
	16+ years	21	10.3%
Type of hospital	Public	30	14.8%
	Private	173	85.2%
Size of the hospital	Small (<50 beds)	82	40.4%
	Medium (50-150 beds)	112	55.2%
	Large (>150 beds)	9	4.4%

The table provides an overview of the demographic and professional characteristics of the participants involved in the study.

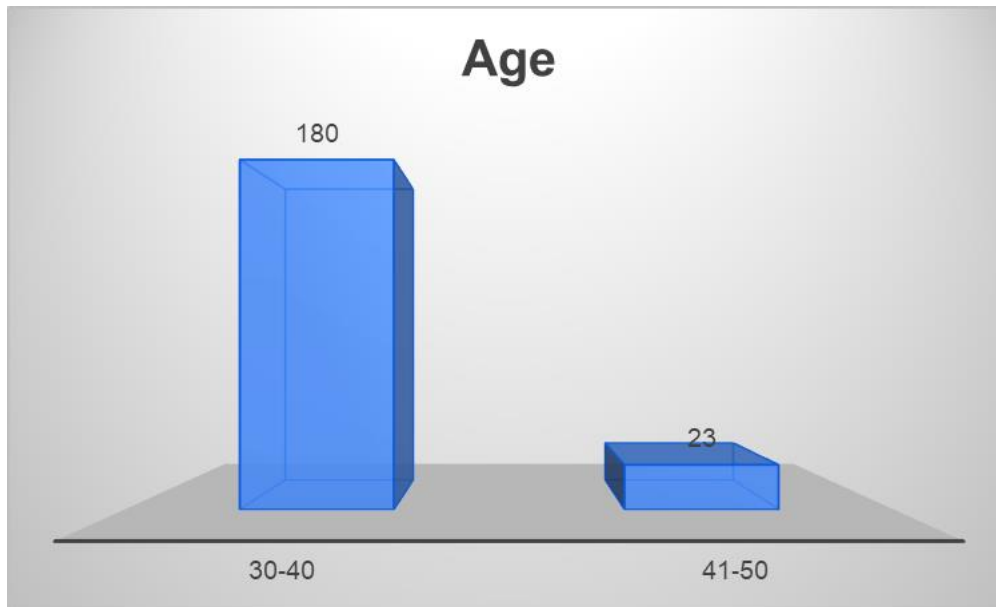
- The majority of the participants are male, with (173) individuals representing (85.2%) of the sample, while females constitute only (14.8%) with (30) individuals. This indicates a significant gender imbalance in the sample, with males being the predominant group. And the following figure illustrates that:

Figure No. (1) Distribution of the study sample characteristics according to Gender



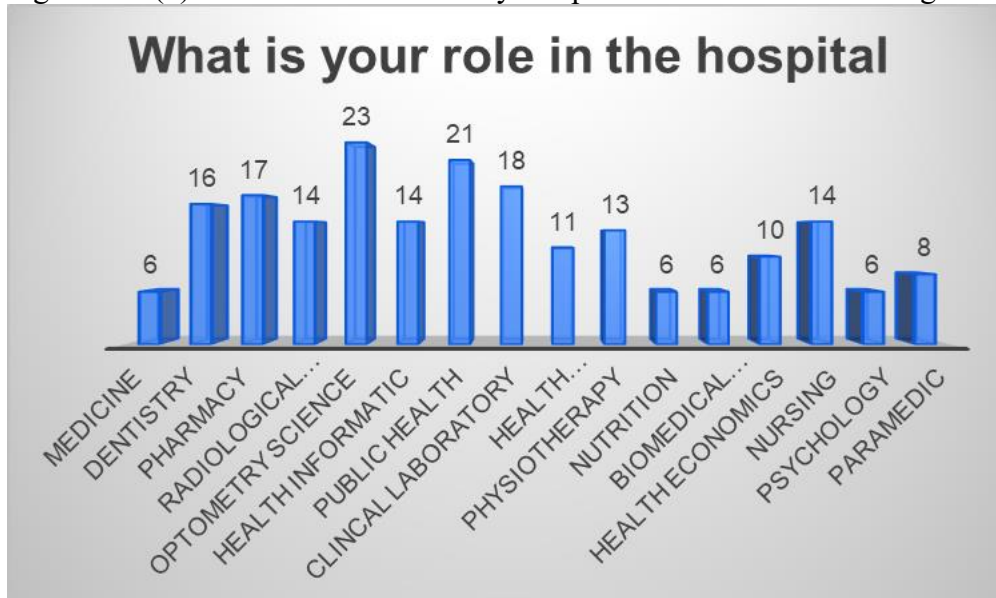
- Most participants fall within the age range of 30-40 years with (180) individuals (88.7%), while a smaller group is aged 41-50 years with (23) individuals (11.3%). The data suggests that the majority of the respondents are relatively young professionals. And the following figure illustrates that:

Figure No. (2) Distribution of the study sample characteristics according to Age



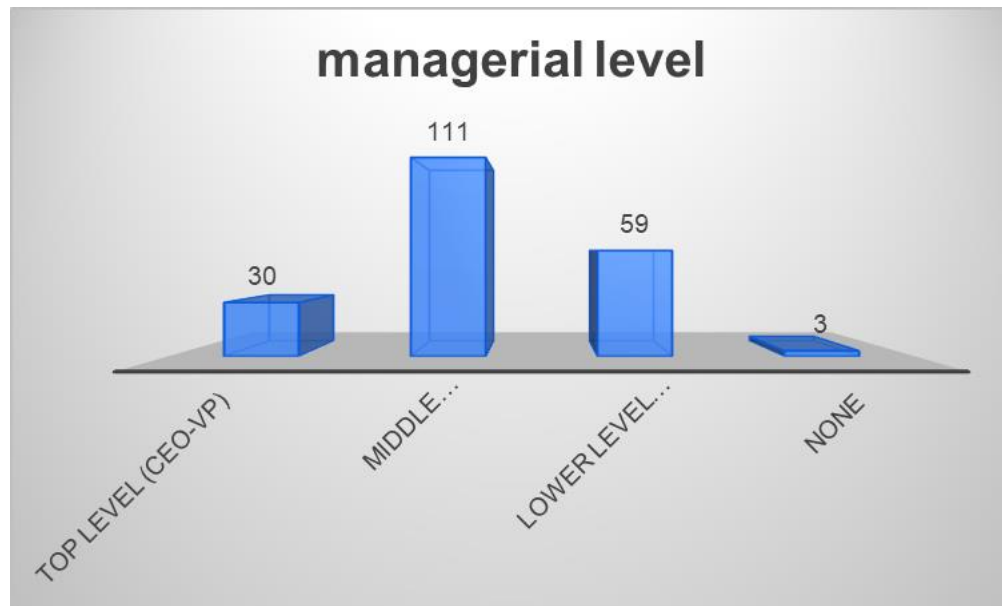
- The largest groups include Optometry Science with (23) individuals (11.3%), Public Health with (21) individuals (10.3%), and Clinical Laboratory with (18) individuals (8.9%). Smaller groups are represented in areas such as Pharmacy with (17) individuals (8.4%), Dentistry with (16) individuals (7.9%), health informatic, nursing and Radiological Science each having (14) individuals (6.9%). Physiotherapy with (13) individuals (6.4%), health administration with (11) individuals (5.4%), health economics with (10) individuals (4.9%), %, paramedic with (8) individuals (3.9%). The least represented fields include Medicine, Nutrition, psychology, and Biomedical Engineering, each having only (3.0%) of the participants, which is (6) individuals in each field. This reflects a broad distribution of roles, although some fields have much smaller representation. And the following figure illustrates that:

Figure No. (3) Distribution of the study sample characteristics according to Role in the hospital



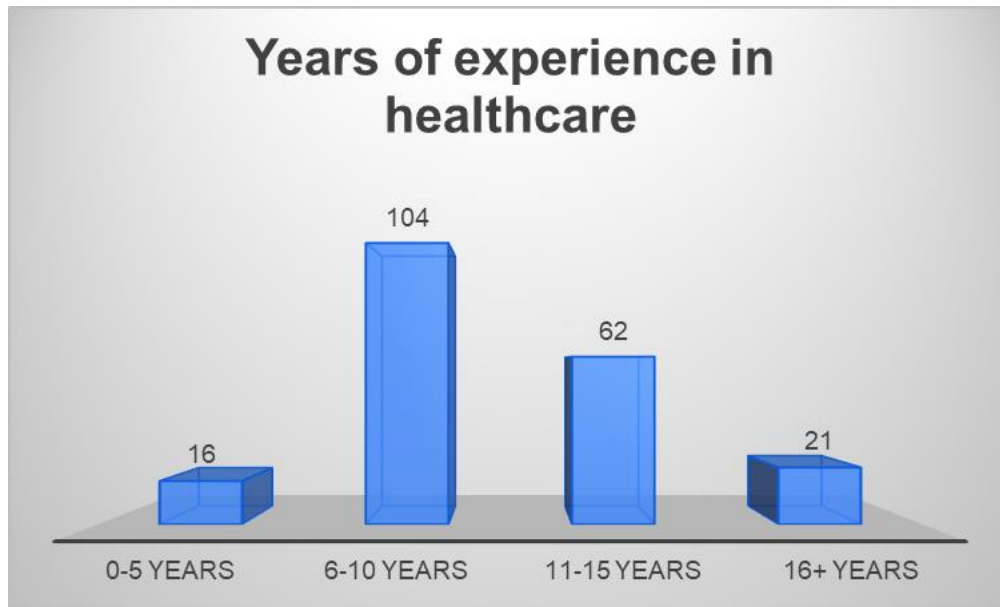
- The majority of participants hold **Middle Level** positions (Director or Head of Department), with **(54.7%)** (111) individuals, followed by those at the **Lower Level** (Supervisor or Team leader), making up **(29.1%)** (59) individuals. A smaller group occupies **Top Level** positions (CEO or VP) with **(14.8%)** (30) individuals, while only **(1.5%)** (3) individuals hold no managerial role. This shows a concentration of participants in middle management positions. And the following figure illustrates that:

Figure No. (4) Distribution of the study sample characteristics according to managerial level



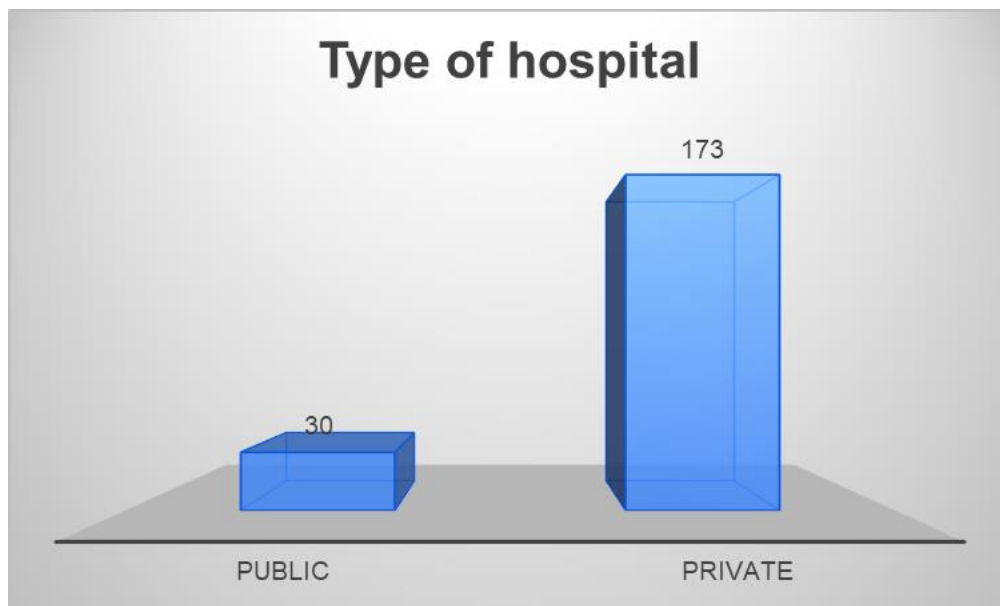
- More than half of the participants have **6-10 years** of experience (104) individuals **(51.2%)**. **(30.5%)** of the sample, which is (62) individuals, have **11-15 years** of experience, while fewer participants have **0-5 years** (16) individuals **(7.9%)** or **16+ years** (21) individuals **(10.3%)**. The data suggests that the majority of respondents are experienced professionals with more than 5 years in the field.

Figure No. (5) Distribution of the study sample characteristics according to Years of experience in healthcare



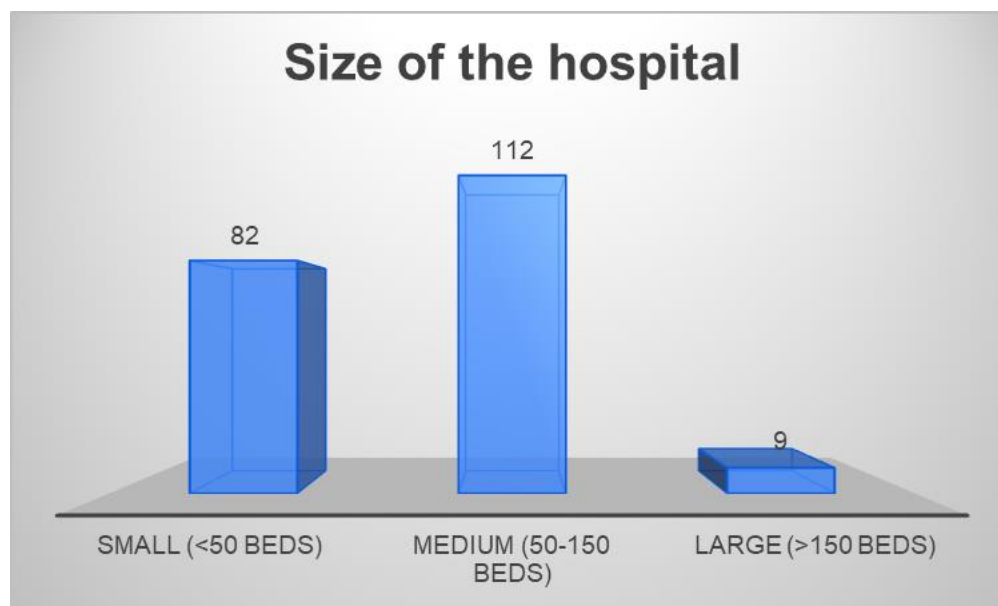
- significant portion of the participants work in **Private hospitals** with (173) individuals (**85.2%**), whereas only (**14.8%**) with (30) individuals work in **Public hospitals**. This indicates a strong representation of the private sector in this study.

Figure No. (6) Distribution of the study sample characteristics according to Type of hospital



- The largest proportion of participants work in **Medium-sized hospitals** (50-150 beds), with (**55.2%**) (112) individuals, followed by those in **Small hospitals** (<50 beds), making up (**40.4%**) (82) individuals. Only (**4.4%**) (9) individuals work in **Large hospitals** (>150 beds). This shows that most respondents come from small to medium-sized healthcare facilities.

Figure No. (7) Distribution of the study sample characteristics according to Size of the hospital



In summary, the data reflects a predominantly male, mid-career, middle-management sample working in private, medium-sized hospitals. The participants come from a range of healthcare professions, with a notable concentration in public health, optometry, and clinical laboratory roles.

5.3 AI Usage

Table 2: Showing answers to questions about AI Usage

Question		Count	Table N %
Is your hospital currently using AI-driven decision support systems?	Yes	19	9.4%
	No	182	89.7%
	I Don't Know	2	1.0%
If yes, which AI-driven decision support applications are currently in use? (Select all that apply)	Clinical Decision Support Systems (CDSS)	4	2.0%
	Predictive analytics tools	5	2.5%
	Natural Language Processing (NLP) systems	2	1.0%
	Imaging analysis software (AI for radiology)	1	0.5%
	Other	191	94.1%

The table above provide insights into the usage of AI-driven decision support systems (DSS) in hospitals.

- **Current AI Usage:** A small percentage of hospitals are currently using AI-driven decision support systems, with only (9.4%) (19 individuals) reporting AI use. The majority of participants, (89.7%) (182 individuals), indicated that their hospitals are not using AI systems, while (1.0%) (2 individuals) were unsure.
- **AI Applications in Use:** Among those using AI, specific applications are minimally represented. Clinical Decision Support Systems (CDSS) are in use by (2.0%) (4 individuals), Predictive analytics tools by (2.5%) (5 individuals), Natural Language Processing (NLP) systems by (1.0%) (2 individuals), and Imaging analysis software for radiology by (0.5%) (1 individual). A large portion of respondents selected "Other" (94.1%), indicating either a lack of awareness or not using of AI applications.

5.4 Perceived Impact

Table 3: Showing answers to questions about Perceived Impact

Question about Perceived Impact		Count	Table N %
AI-driven decision support systems have improved the accuracy of diagnoses in my hospital	Strongly Disagree	6	3.0%
	Disagree	99	48.8%
	Neutral	19	9.4%
	Agree	67	33.0%
	Strongly Agree	12	5.9%
The use of AI systems has enhanced clinical decision-making processes among healthcare providers	Strongly Disagree	3	1.5%
	Disagree	22	10.8%
	Neutral	38	18.7%
	Agree	121	59.6%
	Strongly Agree	19	9.4%
AI-driven systems have led to timely interventions and improved patient outcomes in my hospital	Strongly Disagree	14	6.9%
	Disagree	35	17.2%
	Neutral	56	27.6%
	Agree	67	33.0%
	Strongly Agree	31	15.3%
The integration of AI has resulted in better resource allocation and operational efficiency	Strongly Disagree	10	4.9%
	Disagree	32	15.8%
	Neutral	33	16.3%
	Agree	79	38.9%
	Strongly Agree	49	24.1%
Staff confidence in making clinical decisions has increased since the implementation of AI-driven systems	Strongly Disagree	10	4.9%
	Disagree	42	20.7%
	Neutral	36	17.7%
	Agree	81	39.9%
	Strongly Agree	34	16.7%

The table above provide insights into the Perceived Impact of AI-driven decision support systems (DSS) in hospitals.

- **Accuracy of Diagnoses:** The responses regarding AI's impact on diagnostic accuracy are mixed. A significant proportion, (48.8%) (99 individuals), disagreed that AI has improved diagnostic accuracy, while (33.0%) (67 individuals) agreed and (5.9%) (12 individuals) strongly agreed. (9.4%) (19 individuals) remained neutral, and (3.0%) (6 individuals) strongly disagreed.
- **Enhanced Decision-Making:** Most participants agreed that AI has enhanced clinical decision-making, with (59.6%) (121 individuals) agreeing and (9.4%) (19 individuals) strongly agreeing. (18.7%) (38 individuals) were neutral, while only (10.8%) (22 individuals) disagreed and (1.5%) (3 individuals) strongly disagreed.
- **Timely Interventions and Patient Outcomes:** AI-driven systems were perceived to contribute to timely interventions and improved patient outcomes by (33.0%) (67 individuals) agreeing, with (15.3%) (31 individuals) strongly agreeing. (27.6%) (56 individuals) were neutral, while (17.2%) (35 individuals) disagreed and (6.9%) (14 individuals) strongly disagreed.
- **Resource Allocation and Operational Efficiency:** A majority, (38.9%) (79 individuals), agreed that AI improved resource allocation and operational efficiency, with (24.1%) (49 individuals) strongly agreeing. (16.3%) (33 individuals) were neutral, while (15.8%) (32 individuals) disagreed and (4.9%) (10 individuals) strongly disagreed.
- **Staff Confidence in Clinical Decisions:** The majority of respondents, (39.9%) (81 individuals), agreed that AI-driven systems increased staff confidence in clinical decisions, with (16.7%) (34 individuals) strongly agreeing. (17.7%) (36 individuals) were neutral, while (20.7%) (42 individuals) disagreed and (4.9%) (10 individuals) strongly disagreed.

5.5 Challenges and Barriers

Table 4: Showing answers to questions about Challenges and Barriers

Question		Count	Table N %
I believe that the implementation of AI-driven decision support systems poses significant challenges	Strongly Disagree	11	5.4%
	Disagree	71	35.0%
	Neutral	58	28.6%
	Agree	51	25.1%
	Strongly Agree	12	5.9%
Cost is a major barrier to the adoption and maintenance of AI technologies in my hospital	Strongly Disagree	2	1.0%
	Disagree	32	15.8%
	Neutral	39	19.2%
	Agree	103	50.7%
	Strongly Agree	27	13.3%
There is adequate training available for staff to effectively use AI-driven decision support tools	Strongly Disagree	12	5.9%
	Disagree	71	35.0%
	Neutral	47	23.2%
	Agree	52	25.6%
	Strongly Agree	21	10.3%
	Strongly Disagree	8	3.9%
	Disagree	51	25.1%

Resistance from healthcare staff is a significant obstacle to the integration of AI-driven systems	Neutral	43	21.2%
	Agree	82	40.4%
	Strongly Agree	19	9.4%

The table above provide insights into the Challenges and Barriers of AI-driven decision support systems (DSS) in hospitals.

- **Implementation Challenges:** While (35.0%) (71 individuals) disagreed that AI implementation poses significant challenges, (25.1%) (51 individuals) agreed, and (5.9%) (12 individuals) strongly agreed. (28.6%) (58 individuals) remained neutral, and (5.4%) (11 individuals) strongly disagreed, suggesting mixed opinions on this challenge.
- **Cost as a Barrier:** Cost is widely seen as a major barrier to AI adoption, with (50.7%) (103 individuals) agreeing and (13.3%) (27 individuals) strongly agreeing. (19.2%) (39 individuals) were neutral, while (15.8%) (32 individuals) disagreed and (1.0%) (2 individuals) strongly disagreed.
- **Training Availability:** A significant portion of respondents, (35.0%) (71 individuals), disagreed that adequate training is available for AI use, and (23.2%) (47 individuals) were neutral. Only (25.6%) (52 individuals) agreed, while (10.3%) (21 individuals) strongly agreed, indicating a need for better training programs.
- **Staff Resistance:** Staff resistance to AI was acknowledged by (40.4%) (82 individuals), with (9.4%) (19 individuals) strongly agreeing. (21.2%) (43 individuals) were neutral, while (25.1%) (51 individuals) disagreed and (3.9%) (8 individuals) strongly disagreed. This suggests that resistance remains a significant obstacle in AI adoption.

5.6 Overall Satisfaction

Table 5: Showing answers to questions about Overall Satisfaction

Question		Count	Table N %
Overall, I am satisfied with the impact of AI-driven decision support systems on hospital management strategies	Yes	194	95.6%
	No	9	4.4%
I would recommend further investments in AI-driven decision support technologies for hospital management improvement	Yes	194	95.6%
	No	9	4.4%

The table above provide insights into the Overall Satisfaction of AI-driven decision support systems (DSS) in hospitals.

- **Satisfaction with AI Impact:** A large majority, (95.6%) (194 individuals), expressed satisfaction with the impact of AI-driven decision support systems on hospital management strategies, while only (4.4%) (9 individuals) were dissatisfied.
- **Recommendation for Further Investment:** Similarly, (95.6%) (194 individuals) recommended further investment in AI technologies for improving hospital management, with only (4.4%) (9 individuals) not supporting this.

5.7. Discussion of Result.

The study on AI-Driven Decision Support Systems: Transforming Hospital Management Strategies highlights both the current usage and perceived impact of AI in healthcare settings. The findings show that the implementation of AI systems in hospitals is still in its early stages, with only a small percentage (9.4%) of hospitals currently using AI-driven decision support systems (DSS). Despite the limited adoption, the data suggests that hospitals using AI systems have begun to realize benefits in areas such as clinical decision-making, resource allocation, and operational efficiency.

However, the perceived impact of AI on improving diagnostic accuracy was mixed, with almost half of the respondents (48.8%) disagreeing that AI has significantly improved diagnostic processes. In contrast, the majority of participants agreed that AI systems have enhanced clinical decision-making (59.6%) and led to more timely interventions and improved patient outcomes (33.0%). These results suggest that while AI has made progress in certain areas, its impact on diagnostic accuracy may require further development and integration with clinical workflows.

One of the standout findings was the effect of AI on resource allocation and operational efficiency, where a combined 63% of respondents either agreed or strongly agreed that AI-driven systems have improved these aspects. This shows that AI is playing a key role in optimizing hospital management by facilitating better decision-making processes in non-clinical areas as well. Additionally, staff confidence in clinical decisions increased with the implementation of AI systems, indicating that AI not only supports decision-making but also improves the overall confidence of healthcare providers.

On the other hand, significant barriers to AI adoption remain, with cost being identified as the major hurdle (50.7% agreed). Furthermore, there was a strong indication of staff resistance to AI systems (40.4%), along with concerns about inadequate training, which was acknowledged by 35% of respondents. These challenges highlight the need for more robust training programs, cost-effective AI solutions, and strategies to manage change resistance among healthcare staff to ensure successful integration of AI in hospital settings.

4. Discussion

This study examines how AI-DSS can improve hospital management and the challenges to its use. It examines factors like demographics, professional backgrounds, and technology to provide a clear view of AI in healthcare today and suggest ways to move forward.

The data shows that most participants are male (85.2%) and mostly aged 30–40 (88.7%). This means the study represents mid-career professionals well. It also matches findings by Cutler and Ly (2011), which emphasize the need for strategies to engage men in healthcare roles.(3) The study includes professionals from public health, optometry, and clinical laboratories but lacks representation in medicine and engineering. This indicates a need for workforce development in these areas.(4)

Most participants work in private, medium-sized hospitals (85.2% and 55.2%, respectively) and hold middle management positions (54.7%) with over five years of experience (89.7%). This shows that experienced professionals play critical roles in improving healthcare quality, supporting views from Cascini et al. (2021). Hospitals can utilize this group's insights to develop new solutions and improve patient care.(5)

Although AI adoption is currently low, many are enthusiastic about its potential. Only 9.4% reported using AI, which reflects barriers noted by Yu et al. (2018), such as high costs, training gaps (60.2% mentioned this), and staff resistance (40.4% experienced resistance).(10) However,

many believe AI can improve decision-making (59.6%) and operational efficiency (38.9%), echoing insights from Davenport et al. (2019).(7)

Cost is the main barrier to implementing AI, with 64% citing it as a significant issue. This aligns with Berwick and Hackbarth's(2012) findings about financial challenges in healthcare technology.(4) Still, there is an intense desire for further investment in AI (95.6% support this), which reflects a shared belief in its potential, as noted by McKinney et al. (2020).(27)

The study suggests tailored interventions to bridge training gaps, reduce costs, and encourage staff acceptance of AI. Following Bates et al. (2003), creating user-friendly AI systems and involving users in the design and rollout could improve adoption rates.(16) Using medium-sized hospitals as testing grounds for AI might also help use resources effectively and maximize technology in patient care (Rajkomar et al., 2019).(26)

This study highlights the need for strategic investments and workforce development to integrate AI into healthcare, ultimately improving patient care and efficiency.

5. Limitations

This study has several limitations that need to be considered when interpreting the findings:

- The study was limited by a relatively small sample size of hospitals using AI, which may not fully represent the broader healthcare landscape. With only 9.4% of respondents reporting the use of AI systems, the findings may not be generalizable across all hospitals.
- The data in this study was based on self-reported responses, which can introduce bias, particularly in areas such as perceived impact and staff confidence. Participants may have either overstated or understated the actual effects of AI systems in their hospitals.
- The limited adoption of AI-driven DSS among hospitals makes it difficult to assess the full impact of these systems. As AI is not yet widely implemented, the study's findings primarily reflect early experiences and perceptions rather than a mature evaluation of AI's long-term effects.
- The study focuses exclusively on decision support systems and may not capture the broader scope of AI applications in healthcare, such as robotic surgery, patient engagement, or administrative automation, which could have a wider impact on hospital management strategies.
- The study may also be geographically and institutionally limited, reflecting only specific regions or types of hospitals, which could skew the results and reduce the applicability to other settings or hospital types.

6. Conclusion

In conclusion, this study highlights the transformative potential of AI-driven decision support systems in improving hospital management strategies. While adoption rates are still low, the findings suggest that AI can play a critical role in enhancing clinical decision-making, improving resource allocation, and increasing operational efficiency. Despite these positive outcomes, challenges such as cost, staff resistance, and inadequate training continue to hamper the broader adoption of AI in healthcare settings.

Hospitals that have integrated AI systems report improvements in the timeliness of interventions and overall patient outcomes, demonstrating the value of AI in critical clinical processes.

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