



Narrative Review

Challenges of Artificial Intelligence in Nursing: A Narrative Review

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Abstract

Introduction: Artificial intelligence (AI) has permeated various scientific and applied fields, significantly impacting nursing as a crucial area of healthcare. The growing demand for nursing care due to population growth and health issues has become a major challenge. Accordingly, this narrative review study aims to investigate the challenges of AI in nursing.

Methods: To this end, ScienceDirect, PubMed, Scopus, SID, MagIran, and Google Scholar were searched for studies published from 2016 to 2023 using keywords such as "AI," "Nursing," "Health Care," "AI in medicine," "digital medicine," "Challenges," and "technology." Finally, 17 articles related to AI challenges in nursing were included in the review.

Results: The need for more accurate and complete patient data was the most fundamental challenge of using AI in healthcare. In addition, patient safety was a significant concern, requiring measures to ensure the accuracy of patient safety data and reporting. Moreover, convenient diagnosis and disease prediction were some benefits of highly accurate AI algorithms. Additionally, precision and accuracy in decision-making, employee training, and ethical considerations were found to be essential for implementing AI in the clinical environment.

Conclusion: Given AI's increasing involvement in medical and healthcare decision-making, it is essential to implement effective strategies to address challenges and prevent errors in diagnosis and treatment, which can ultimately improve the quality of patient care and streamline nursing processes.

Keywords: Challenge, Artificial intelligence, Nursing

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Introduction

Artificial intelligence (AI) refers to imitating human intelligence in systems to perform tasks that typically require human mental activities, such as problem-solving, decision-making, and pattern recognition (1). Due to its access to a large amount of information, AI can support decisions in various fields, including medicine. In addition, this technology can increase productivity and improve medical and nursing care (2). In recent years, the utilization of AI in healthcare has significantly advanced due to the substantial increase in available data. Overall, AI-based support systems have the potential to reduce the costs of health services, increase their efficiency, and create valuable support for the well-being of patients and the health system. Likewise, using these systems can enhance patient and family satisfaction. Moreover, the technology seeks to improve clinical safety (3).

AI in nursing offers numerous advantages, including helping nurses and health systems deliver personalized

care by analyzing intricate data patterns and providing treatment recommendations based on these analyses. Additionally, using AI in nursing can significantly reduce nurses' workload while increasing productivity. This technology allows nurses to dedicate more time to direct patient care and human interaction by handling repetitive and time-consuming tasks, including recording and processing patient information, managing medications, monitoring patients' health status, and minimizing the need for performing administrative and routine activities with patients (4, 5). Similarly, this technology can improve patients' experience of hospitalization and treatment by helping them interact and better communicate. Generally, AI in nursing improves patient care quality, reduces human errors, and boosts productivity (6,7).

Nonetheless, the use of AI-based systems in nursing care is controversial. There are concerns that using these technologies may lead to a loss of human interaction and could potentially compromise the ethics of care (8,9).

Additional ethical considerations involve managing data and its use in creating algorithms. Despite the current challenges, incorporating AI in nursing aims to enhance decision-making and improve healthcare outcomes. According to available evidence, this technology can effectively address issues such as inadequate expertise or insufficient experience (4). In addition, it can streamline the documentation process and improve access to evidence-based achievements. Furthermore, these measures ensure high-quality patient care while reducing the stress and job fatigue of managing patients (9).

Although using AI in healthcare offers new capabilities and opportunities in the future, it is crucial to consider the associated challenges. It should be noted that integrating AI technologies at the patient's bedside, especially those based entirely on machine learning, can pose complexities and interact with healthcare environments in ways that may cause challenges that may involve issues related to the accuracy, reliability of the technology, and user acceptance. Given the broad, multidimensional, and rapidly evolving nature of AI applications in nursing, a narrative review approach was selected over a systematic review. Unlike systematic reviews, which typically address a narrowly defined clinical question through strict quantitative synthesis, a narrative review allows for the inclusion of diverse study designs (qualitative, quantitative, and mixed-methods) and provides a broader, more flexible synthesis of an emerging and heterogeneous body of literature, the current study aims to investigate these challenges and evaluate the potential impact of AI on nursing care.

Materials and Methods

This narrative review examined qualitative, quantitative, and review articles on the challenges of AI in nursing published between October 2016 and October 2023. ScienceDirect, PubMed, and Scopus databases, as well as the Google Scholar search engine, were searched using Boolean operators and English keywords "AI", "Nursing," "Health Care", "AI in Medicine", "Digital Medicine", "Technology in Nursing", and "Challenges". Further, the search was performed using the Persian equivalents of the mentioned English keywords in the SID and MagIran databases. The articles included in this study were required to be published in either Farsi or English and to focus on the challenges of AI in nursing. However, articles with unavailable full-text versions, unclear reporting of findings related to AI challenges in nursing, presented at conferences and congresses, and letters to the editor were excluded from the investigation. Out of the 36 articles identified in the databases, 17 interventional, descriptive, and review articles that met the criteria for inclusion were selected and included in the study. Data extraction was independently performed by two reviewers using a standardized form that captured author, year, country, study design, sample, and key findings related to AI challenges in nursing. In addition, discrepancies were resolved through discussion with a third reviewer. As this was a narrative review rather than a systematic review, no formal critical appraisal tool

(e.g., Critical Appraisal Skills Programme or Joanna Briggs Institute) was applied to assess methodological quality of the included studies. The process for reviewing articles is shown in [Figure 1](#).

Results

This study investigated 17 eligible articles related to AI challenges in nursing. Among the reviewed articles, 1 article was published in Persian, and 16 articles were published in English. Regarding study type, there were three qualitative studies, four review studies, five descriptive studies, one prospective cohort, three clinical trials, and one mixed study. The results of the included articles are provided in [Table 1](#). Reviewing the articles identified seven main challenges in nursing. They included the management and optimal use of medical data, the importance of patient safety, the correct and timely diagnosis of diseases, the effective implementation of clinical protocols, and the need for training and empowering human resources. Each of these challenges indicated the need for improvement and development in different parts of healthcare systems to optimize service quality and clinical outcomes.

The review of the articles revealed that AI can significantly enhance the accuracy of nursing and medical diagnoses; however, this improvement is not always assured and depends on various factors. Seven key challenges were identified, including data-related issues, patient safety, timely diagnosis and prediction, clinical implementation, staff training and preparedness, social concerns, and ethical issues, with staff training and preparedness being the most frequently highlighted, mentioned in more than half of the reviewed articles.

Regarding data-related challenges, the articles emphasized that the quality and quantity of data directly impact the performance of AI algorithms. The findings demonstrated that insufficient or inaccurate data can result in misleading and imprecise outcomes, ultimately affecting diagnostic accuracy. Concerning safety challenges, the articles explored the risks and concerns associated with using AI in clinical environments, particularly issues such as wrong decision-making and potential mistakes stemming from excessive reliance on algorithms.

The necessity of establishing precise protocols for the continuous monitoring and improvement of AI systems to ensure patient safety was strongly emphasized in the intended articles. Additionally, the articles underscored challenges related to staff readiness and competence in utilizing AI technologies. A lack of familiarity with AI systems and inadequate training contributed to implementation errors and reduced effectiveness. Therefore, continuous education and skill updates for staff in this area are essential to maximizing the potential of AI in healthcare ([Table 2](#)).

Discussion

The present study reviewed the challenges of AI in nursing, providing a comprehensive perspective on the advantages and challenges of this innovative technology

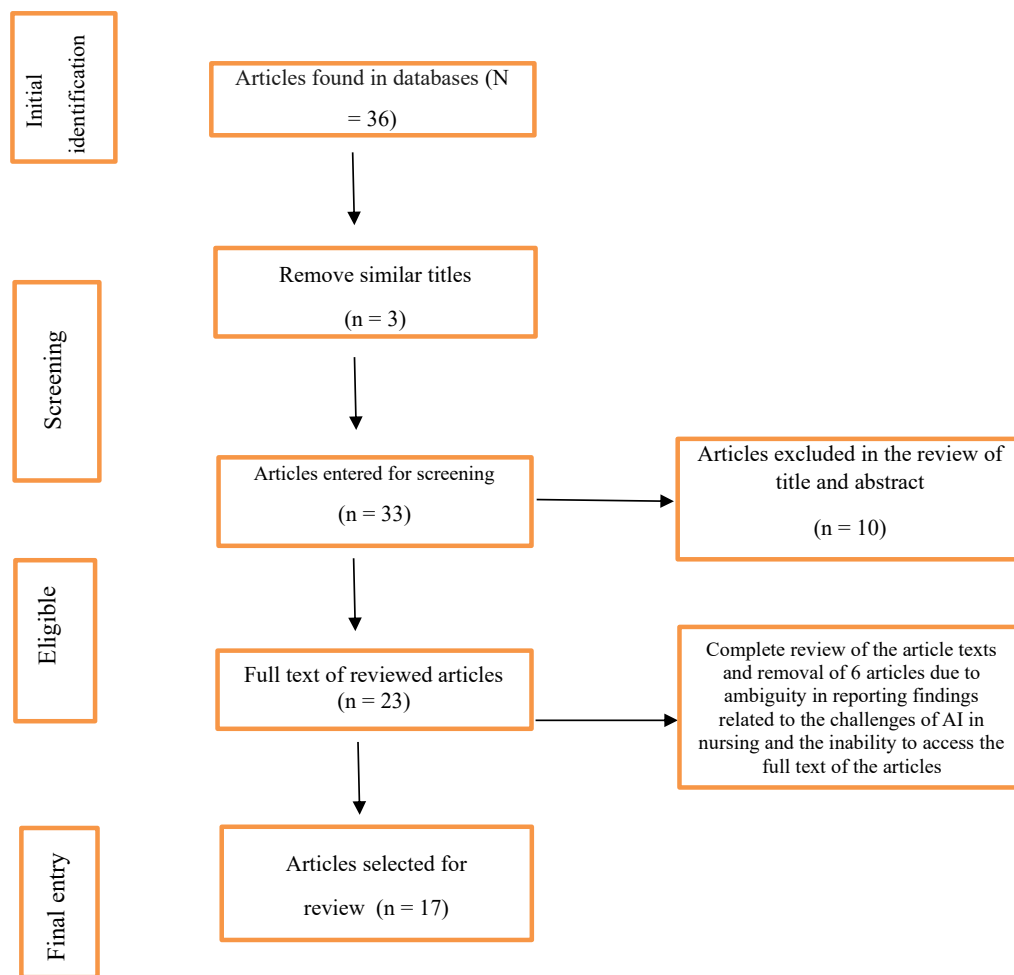


Figure 1. The Process of Reviewing Articles. Note. AI: Artificial intelligence

in nursing practice. Overall, the findings demonstrated that AI has significant potential to enhance the accuracy, efficiency, and implementation of nursing processes. However, critical challenges were identified alongside these achievements. Key challenges such as data-related issues, patient safety, and clinical implementation were reported to significantly impact the adoption and utilization of AI. Notably, the reviewed studies originated from a diverse range of countries and healthcare contexts, including the United States (17), Germany (18,21,22), Sweden (14), Indonesia (13), the United Arab Emirates (15), and Iran. In high-resource settings with established digital health infrastructure (e.g., the United States, Germany, and Sweden), the predominant concerns centered on systemic and professional transformation challenges, including change management and staff readiness (14,18). In contrast, studies from lower-resource or developing-country settings (e.g., Indonesia), more frequently highlighted negative attitudes, cultural acceptance, and resource limitations as primary barriers (13). These cross-context differences suggest that AI implementation strategies in nursing should be tailored to the digital maturity and cultural context of each healthcare system rather than following a uniform approach.

Based on the findings, the education and staff preparedness challenge emerged as a significant concern,

appearing in more than half of the reviewed articles. Integrating advanced AI technologies into healthcare requires nursing staff to adapt to new tools and methods, which demand specialized knowledge and skills. Likewise, healthcare professionals must grasp the fundamentals of AI and how it can be applied in the healthcare sector. Additionally, they must cultivate practical skills to effectively utilize these technologies (6,13). Inadequate or insufficient training can result in resistance to change, reduced productivity, and even nursing and medical errors (6). Moreover, the rapid pace of AI advancements necessitates continuous updates in staff knowledge, making ongoing education a perpetual challenge. Practical experience and hands-on training for nurses and physicians in utilizing AI in virtual environments or dedicated training facilities have proven effective. Such initiatives familiarize healthcare professionals with new tools and technologies, thereby enabling their practical application. This approach not only enhances the quality of patient care but also reduces errors and improves the overall performance of healthcare systems (4,26).

It is noteworthy that integrating AI into nursing care offers a wide range of benefits, including improved quality of patient care and streamlined delivery of healthcare services. However, based on the reviewed literature, one of the significant barriers to staff readiness is resistance

Table 1. Summary of the Results of the Included Articles

Author, Year	Study Type	Study Sample	Results
Ali et al (10)	Systematic review	Care providers within the healthcare sector	AI significantly surpassed humans in accuracy, efficiency, and timely implementation of medical and administrative processes. The benefits for patients were directly related to AI capabilities related to diagnosis, treatment, counseling, and health monitoring.
Dinesen et al (11)	Qualitative	39 patients with dementia	The patients' moods improved, making them feel more relaxed, and the nurses' interactions with the patients improved as well.
Eghtedar et al (12)	Review	Nurses	Despite its many benefits, the use of AI in health care brought limitations and ethical challenges, including compliance with informed consent, safety and clarity of instructions, privacy of patient data, appropriate accountability, and impact on patient autonomy.
Taryudi et al (13)	Qualitative	20 female nurses	The implementation of a strategic program for using robots during pandemic crises had numerous benefits and limitations, including reducing nursing care burden, addressing negative attitudes, and improving cultural awareness.
Petersson et al (14)	Qualitative	26 health leaders	AI implementing in healthcare required systemic thinking and both internal and external collaboration. Challenges included external conditions, change management, and professional transformation.
Abuzaid & Elshami (15)	Descriptive	553 nurses working in the UAE healthcare system	Most respondents recognized the need for knowledge about AI in nursing and acknowledged the necessity of revising nursing curricula to incorporate AI concepts.
Chang (16)	Clinical trial	43 nursing students	The use of virtual reality created an experience similar to the clinical environment for students. They felt a sense of presence and interaction with patients during this simulation.
Swan (17)	Prospective cohort	675 nurses and nursing students in the U.S.	Most participants described themselves as being aware of AI. Additionally, 70% had information about AI applications, and 24% stated that they had a good level of knowledge in AI.
Seibert et al (18)	Review	704 articles	The results emphasized the potential use of AI systems in nursing care. Given the lack of findings on the efficiency and application of AI systems in real situations, future research should focus more on specific perspectives in nursing care, including goals, outcomes, and benefits.
Ronquillo et al (7)	Descriptive	19 interdisciplinary participants	It was found that there is a clear need to bridge gaps and address specific conditions in nursing, and the nursing profession must take a leadership role in discussions and dialogues related to AI in healthcare systems.
Lima-Roque et al (19)	Descriptive	17 outpatients, primary caregivers, and nurses	The use of chatbots has created a desirable level of content capability and serves as an excellent aid for wound management with easy accessibility.
Choudhury et al (20)	Systematic review	53 articles	This systematic review showed that AI-enabled decision support systems, when properly implemented, can improve patient safety by enhancing error detection, patient segmentation, and medication management. Future work is needed to validate these systems in advanced clinical settings.
Seibert et al (21)	Mixed-methods	1,335 nurses	Participants repeatedly emphasized that for technology adoption, its importance and use must be clearly understood. This importance may include various outcomes for caregivers and the overall provision of care.
Poncette et al (22)	Descriptive	86 nurses and physicians	Nearly 93% of participants agreed with the use of wireless sensors to reduce false alerts. However, most opposed using smartwatches and augmented reality glasses for patient monitoring.
Ginestra et al (23)	Descriptive	287 nurses	Clinical opinions about the symptom assessment system were generally not positive. Nurses differed in their attitudes and opinions on sepsis and the benefits of AI-based predictive and learning alerts. These findings highlight challenges in accepting AI-based sepsis alerts among care teams.
Mervin et al (24)	Clinical trial	415 physicians	The use of AI was estimated to be more cost-effective in reducing agitation in patients with dementia.
Chen et al (25)	Clinical trial	294 patients	Machine-learning models were able to distinguish clinically relevant alerts related to pulse oximetry, blood pressure, and respiratory rate from errors and defects in online monitoring data.

Note. AI: Artificial intelligence.

Table 2. Frequency and Percentage of AI Challenges in Nursing

Challenge	Number of Studies	Percentage of Studies	Authors
Data	6	35.2%	Eghtedar et al (12), Chen et al (25), Ali et al (10), Mervin et al (24), Seibert et al (18), Choudhury et al (20)
Patient safety	4	23%	Choudhury et al (20), Poncette et al (22), Lima-Roque et al (19), Eghtedar et al (12)
Timely diagnosis and prediction	3	17.6%	Ginestra et al (23), Choudhury et al (20), Ali et al (10)
Clinical implementation	6	35.2%	Chen et al (25), Seibert et al (18), Choudhury et al (20), Lima-Roque et al (19), Swan (17), Dinesen et al (11)
Education and staff preparedness	9	52.9%	Chen et al (25), Seibert et al (21), Ronquillo et al (7), Swan (17), Chang (16), Abuzaid & Elshami (15), Taryudi et al (13), Choudhury et al (20), Poncette et al (22)
Social issues	2	11.76%	Ronquillo et al (7), Petersson et al (14)
Ethical issues	2	11.76%	Eghtedar et al (12), Poncette et al (22)

Note. AI: Artificial intelligence.

to change due to fears of job loss and reduced human interactions with patients (6). According to predictions by the McKinsey Global Institute, by 2030, approximately 75–375 million workers globally will need to transition to new jobs due to AI technologies (8). As AI penetrates various medical and nursing domains, many processes previously performed manually by nurses are now being handled by AI systems. This shift can create a sense of job insecurity among nurses (6,18). This concern is particularly heightened when nurses lack the necessary skills to use these new technologies. Therefore, investing in specialized and continuous training programs for nursing staff is essential for successfully implementing AI in this field, ensuring that AI serves an assistive tool alongside nurses rather than replacing them (6). These educational programs could include training on fundamental AI concepts, their applications and alignment with related technologies, AI software tools and platforms, and topics related to ethics and privacy in AI applications (27). Given the importance of human interactions in nursing, it is also crucial to implement AI in a way that preserves these valuable interpersonal connections (6,15).

Our findings are largely consistent with prior systematic reviews on this topic. For instance, O'Connor et al (5) similarly identified data quality, staff training, and ethical concerns as recurring barriers to AI adoption in nursing and midwifery. Likewise, Choudhury and Asan (20) and Ali et al (10) reported comparable patient-safety and clinical-implementation challenges in their systematic syntheses. Unlike these systematic reviews, which focused primarily on quantitative outcome measures, the present narrative review captured a broader range of qualitative perspectives, particularly regarding nurses' attitudes, job-insecurity concerns, and cross-cultural variation, which are less commonly addressed within the stricter inclusion criteria of systematic reviews.

Access to accurate and appropriate data is critical for nurses to provide effective patient care. The absence of suitable data or reliance on inaccurate information can lead to substandard care, ultimately hindering patient recovery. One of the primary challenges in applying AI in nursing is data access and management. Hospital data is frequently regarded as proprietary, owned by institutions for managing their patients, and is therefore governed by strict regulations and policies that limit access to AI implementation (28). This issue introduces legal and ethical challenges and increases the costs and time required for executing AI projects. Data must be collected and analyzed while adhering to privacy and information security principles, necessitating complex security infrastructures and specific technical capabilities (14). In this context, collaboration and data sharing between hospitals and healthcare organizations to improve AI models face a variety of challenges, such as non-overlapping datasets, differences in data formats, and legal concerns. Additionally, data quality emerges as a significant challenge, as incomplete or inaccurate data can negatively impact AI model outcomes, thereby reducing their precision and reliability (18).

The integration of AI into healthcare and clinical settings, despite its benefits in reducing nurses' workload, enhancing diagnostic accuracy across various diseases, predicting complications, and delivering personalized care, raises concerns about patient safety. If not appropriately designed, developed, implemented, and utilized, AI could potentially harm patients (29). A systematic review examining the impact of AI (including machine learning and natural language processing techniques) on patient safety outcomes at the clinical level revealed the positive effects of AI in areas such as the risk of falls, laboratory test results, vital signs, accurate patient identification, disease severity, and post-surgical complications (20). Conversely, a study by Classen et al highlighted significant shortcomings in an AI-based sepsis detection system. Out of 2,552 sepsis patients, the system correctly identified only 7%, leading to delays in antibiotic administration and failing to recognize 1,709 patients (30). One of the primary reasons for safety challenges in the clinical use of AI systems is the lack of transparency in diagnostic, therapeutic, and care algorithms and potential errors in their outputs. AI algorithms are typically designed based on training data, which might lead to inaccurate results when faced with new or unexpected conditions. Moreover, differences in how healthcare institutions record patient information can cause AI systems to deliver varying results under similar clinical scenarios (20). To effectively realize AI's potential benefits while minimizing associated risks, it is crucial to standardize AI systems for specific clinical applications, such as medication safety (31), fall risk (32), and hospital-acquired infections (33). By implementing robust patient safety measures and ensuring optimal use of AI technology, healthcare systems can effectively improve the quality of care and mitigate safety risks.

Based on the review conducted in this study, the lack of integrated and comprehensive ethical guidelines is considered one of the most significant current challenges in applying AI in nursing. This gap can lead to violations of fundamental ethical principles (34). For instance, using AI systems in clinical decision-making may disrupt the process of obtaining informed consent from patients regarding their treatment plans. Patients may lack a precise understanding of how AI systems influence health-related decisions, and the absence of transparent, ethical guidelines frequently leaves no clear explanation to address their concerns. Under such circumstances, patients either lose trust in the healthcare system, compromising their treatment, or provide consent without fully understanding the implications and outcomes of AI interventions (12,35). Accountability for decisions made by AI systems without clear ethical directives is another ethical concern associated with AI use in nursing. If potentially harmful decisions are made by AI systems in the context of patient care or treatment, the lack of transparency in responsibility can compromise patient health and safety, highlighting the necessity of using AI to complement human clinical judgment rather than a replacement. Over-reliance on AI for decision-making risks fostering impersonal care

and neglecting the holistic needs of patients, which can adversely affect the quality and equity of healthcare delivery (11,34,35).

Given the impact of these challenges on the quality of healthcare delivery, the adoption of new technologies, and the substantial influence of ethical and human resource issues on the implementation of AI in nursing, there is an urgent need for comprehensive approaches. Addressing the diverse dimensions of AI-related challenges in nursing requires prioritizing ethical considerations, fostering transparency, and integrating human judgment with advanced technologies to ensure quality and trust in healthcare.

Limitations of the Study

This review had several limitations. First, as a narrative rather than a systematic review, no formal quality-appraisal tool was used to assess the methodological rigor of included studies, potentially introducing selection and reporting bias. In addition, the search was restricted to English and Farsi publications, potentially excluding relevant studies published in other languages. Furthermore, the included studies were highly heterogeneous in design (qualitative, descriptive, clinical trial, and review), sample size, and healthcare setting, thereby limiting the ability to draw firm quantitative conclusions or perform meta-analytic synthesis. Finally, the relatively small number of included studies ($N=17$) may have not fully captured the breadth of evidence on this rapidly evolving topic. Considering that this was a narrative review rather than a systematic review, no formal critical appraisal tool (e.g., Joanna Briggs Institute or Critical Appraisal Skills Programme) was employed to assess methodological quality of the included articles.

Accordingly, future research should prioritize large-scale, multi-country randomized or quasi-experimental studies to quantify the clinical impact of AI on nursing outcomes. It should also focus on the development and validation of standardized instruments to measure nurses' AI readiness and competence. Longitudinal studies should further examine the long-term effects of AI integration on nurses' job satisfaction, workload, and patient-nurse relationships.

Conclusion

The application of AI in nursing was found to be associated with significant challenges that can substantially impact healthcare quality, including issues related to data management, staff training, and ethical concerns, all of which must be carefully addressed. To overcome these challenges, it is essential to implement solutions such as developing comprehensive ethical guidelines, enhancing staff education and preparedness, and improving data management practices. Given the importance of this subject, focusing on these strategies can facilitate the more effective and responsible use of AI technologies in nursing, leading to a considerable improvement in the quality of healthcare services.

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Competing Interests

The authors declare that they have no conflict of interests associated with this study.

Ethical Approval

According to the Cochrane Ethical Guidelines for Systematic Reviews, this study has not been published in any other journal. Moreover, the research results have been presented based on honesty, accuracy, and in a clear and simple language. Additionally, the intellectual and material rights of the research team and all collaborators have been respected, and any form of plagiarism has been avoided.

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