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The Effectiveness of Using Electronic Medical Records for Disease Registries in Saudi Arabia: A Systematic Review

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Abstract

Background: Disease registries are essential in healthcare systems because they make gathering, analyzing, and managing patient data for specific diseases or disorders easier. The introduction of electronic medical records (EMRs) has transformed how healthcare information is captured, stored, and shared. This study looks into the efficacy of EMRs for disease registries, focusing on the benefits, obstacles, and possible results of their use. ***Methods:*** A thorough systematic review was undertaken to assess the usefulness of EMRs for illness registries, which included papers, publications, and reports from various scholarly sources and healthcare databases. The study provides numerous critical findings that shed light on the benefits and drawbacks of using EMRs in disease registries. ***Results:*** The use of EMRs in illness registries has various advantages. The electronic format improves data quality and completeness by decreasing human and transcription errors frequent in paper-based systems. EMRs also make data collecting, integration, and sharing more efficient among healthcare practitioners, academics, and public health authorities, fostering collaboration and supporting evidence-based practices. Furthermore, EMRs provide real-time data processing and reporting, allowing for the early detection of illness patterns, the monitoring of patient outcomes, and the evaluation of treatment efficacy. ***Conclusion:*** When deploying EMRs for illness registries, however, numerous issues must be considered. Because of the sensitivity of patient health information, privacy, and security concerns emerge as important factors. To protect patient confidentiality, adequate precautions such as robust data encryption, access restrictions, and specific privacy rules must be in place. Furthermore, standardization of data items and coding methods across various healthcare systems and organizations is essential for easy data interchange and interoperability.

Keywords: ***electronic medical records, Disease registries, healthcare information, interoperability, privacy, confidentiality*.**

Introduction

Effective patient data administration and analysis are critical to the growth of healthcare systems globally (Ludwick & Doucette, 2009).[1] Disease registries, which collect and organize data on people diagnosed with specific diseases or conditions, are critical for understanding disease prevalence, treatment results, and general public health trends (de Ridder et al., 2013).[2] The introduction of electronic medical records (EMRs) has changed how healthcare information is recorded, kept, and shared, opening up new potential for disease registries to improve their usefulness. Historically, illness registries depended on manual, paper-based data collection and maintenance methods (Pine et al., 2016).[3] These systems face inadequate or erroneous data, data integration difficulties, and limited accessibility. As EMRs become more widely used in healthcare settings, there is a rising interest in harnessing their potential to improve disease registries and overcome the constraints of old techniques.

Electronic medical records have several benefits, making them an appealing tool for disease registry maintenance. To begin with, EMRs provide a digital format that increases data quality and completeness by decreasing errors caused by illegible handwriting or transcription errors (Chaudhry et al., 2006).[4] Structured data input in EMRs guarantees uniform information gathering, allowing for improved comparison and analysis across patient groups and healthcare providers (Pine et al., 2016).3 Furthermore, EMRs promote effective data gathering and exchange across disease registry stakeholders such as healthcare providers, researchers, and public health authorities (Jaffe & Lee, 2016).[5] The digital nature of EMRs allows for smooth data transmission and integration, removing the need for manual data entry and reducing the likelihood of data loss or duplication. This expanded data interchange, and collaboration may result in better care coordination, better research outcomes, and a more thorough understanding of illness trends.

Another critical advantage of EMRs in illness registries is real-time data processing and reporting. Healthcare practitioners and researchers can use EMRs to obtain up-to-date data on patient demographics, clinical features, treatment methods, and results (Jaffe & Lee, 2016).[5] This allows for faster identification of illness patterns, faster detection and response to disease outbreaks, and faster evaluation of therapy efficacy and safety. Such timely insights from EMR-enabled disease registries can help influence evidence-based decision-making, change public health policies, and enhance patient outcomes. However, using EMRs in illness registries successfully is challenging.

Privacy and security considerations are crucial when dealing with sensitive patient health information (Jaffe & Lee, 2016).[5] To earn public trust and maintain compliance, it is critical to ensure the confidentiality and safety of patient data through rigorous security measures, access restrictions, and adherence to privacy legislation. Furthermore, maintaining interoperability and standardization across different EMR systems and healthcare organizations is a significant challenge (Ludwick & Doucette, 2009).[1] The absence of consistency in data items, coding schemes, and terminologies makes it challenging to interchange information effectively between various systems, impeding data integration from multiple sources and limiting the potential of disease registries.

In light of these issues, the primary goal of this research is to evaluate the efficacy of adopting EMRs for disease registries in Saudi Arabia. This study attempts to give insights into the advantages, obstacles, and prospective consequences of integrating EMRs in disease registries by thoroughly assessing relevant literature, analyzing case studies, and exploring real-world implementations.

The project intends explicitly to:

1. Assess the influence of electronic disease registries on patient outcomes in Saudi Arabia.
2. Examine the influence of computerized disease registries on Saudi healthcare expenses.
3. Determine best practices for establishing and utilizing electronic illness registries in Saudi Arabia.
4. Investigate the elements that influence the success and efficacy of electronic illness registries in Saudi Arabian healthcare.

The findings of this study will add to the body of knowledge and provide practical advice for healthcare policymakers, administrators, and researchers looking to optimize the use of electronic medical records for disease monitoring and research. The study will give vital insights into the usefulness of electronic medical records for disease registries in Saudi Arabia by answering these research issues, contributing to the current knowledge base, and guiding future policy choices and healthcare practices in the nation.

Materials and methods

Research Design

The suggested study methodology would include thoroughly examining the available literature on the efficacy of using electronic medical records for disease registries in Saudi Arabia. We searched MEDLINE/PubMed, EMBASE, and Scopus for relevant research. The search terms were carefully chosen to ensure the topic was well covered.

After discovering the relevant research, we conducted a screening procedure utilizing predetermined inclusion and exclusion criteria. This process ensures that the systematic review only contains reliable and pertinent research. The chosen studies then thoroughly have been evaluated for their quality and bias risk following the screening procedure. This stage is essential for assessing the reliability and robustness of the data used in the investigations.

The included research has been methodically retrieved and synthesized once critically reviewed. The primary conclusions of the research have been summarized, the results of the studies compared and contrasted, and patterns or themes in the literature have been highlighted.

Instrument

We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol to verify the quality and trustworthiness of the collected data. This flowchart assists in identifying the most relevant research that fits the requirements for further investigation. The basic CASP (Critical Appraisal Skills Program) checklists are valuable tools for critically assessing research publications in various fields. The primary goal of the CASP Systematic Reviews checklist is to evaluate systematic reviews and meta-analyses. Systematic reviews aim to accurately gather and assess the information currently accessible on a particular subject (Alzahrani et al. 2021).[6] Eight questions make up the checklist, and they touch on key points for systematic reviews, such as publication bias consideration, research selection criteria, search strategy, data extraction, and study appraisal. By evaluating the internal validity and methodological rigor, the checklist aids researchers and reviewers in determining the caliber of the evidence presented.

Sampling Strategy and Setting

This study's sample included all relevant research on electronic medical records and illness registries in Saudi Arabia that meet the inclusion criteria. Studies published in peer-reviewed journals in English and Arabic and grey literature such as government reports, conference proceedings, and dissertations will be considered for inclusion. Studies undertaken outside of Saudi Arabia's geographical limits will be excluded. There has been a limited timeline for the searched published papers which must be released within the last ten years to help in obtaining more information and having a deeper understanding.

Results

The systematic review uncovered 20 papers that met the criteria for inclusion and provided relevant information on the value of electronic medical records for Saudi Arabia's disease registries. These studies examined various disease registries for rare illnesses, cancer, diabetes, and cardiovascular disease. The chosen study revealed various results that explained the usefulness and potential benefits of adopting electronic medical data for disease registries in Saudi Arabia.

Studies have demonstrated that the collection and upkeep of illness registry data are more accurate and efficient when electronic medical records are used.[7-9] The computerized recording of patient information, which also sped up registration and reduced data input errors, made it simpler for healthcare professionals and researchers to interchange data.[7] Electronic medical records in disease registries demonstrated enhanced access to patient data, enabling healthcare professionals to obtain comprehensive medical histories, assess treatment outcomes, and track the progression of illnesses. This accessibility has enhanced both patient care and professional judgment.[10]

Studies have shown how electronic medical records might enhance the completeness and quality of the information in disease registries [8,11-13]. The organization of electronic records made it simpler to collect uniform data and decreased the number of missing or inadequate data. As a result, the validity and reliability of disease registry data increased, making them a valuable tool for epidemiological research and healthcare planning. It has been demonstrated that integrating electronic medical records and decision support systems enhances the upkeep of disease registries [9-18]. These technologies give doctors immediate reminders, insights, and evidence-based advice, which promotes the use of the best practices and improves patient outcomes. Electronic medical records have the potential to simplify population-based disease surveillance and research, as has been demonstrated [7,10,15-17]. By merging information from diverse healthcare settings, sickness registries enabled extensive analyses of illness patterns, risk factors, and treatment effectiveness. This aided in advancing evidence-based public health initiatives.

There were issues with data security and privacy in the selected research.11-16 Protecting patient privacy and limiting unauthorized access to electronic medical records were essential for constructing and effectively using disease registries.

Table 1

Research question	**Key finding**
How do computerized disease registries affect patient outcomes in Saudi Arabia?	Computerized disease registries have improved illness management, decreased hospitalization rates, and increased adherence to treatment regimens, all of which have a favorable effect on patient outcomes in Saudi Arabia. Computerized disease registries' patients had greater levels of satisfaction with their medical care.
How do computerized disease registries influence Saudi healthcare costs?	By enabling more effective resource allocation, avoiding needless hospital admissions, and supporting cost-effective therapies based on evidence-based practices, computerized disease registries have the potential to save healthcare expenditures in Saudi Arabia. Computerized illness registries have been proven in studies to enable cost savings by optimizing drug use and lowering healthcare consumption due to disease consequences.
What are the best practices for creating and utilizing computerized disease registries in the Saudi medical system?	For computerized disease registries to be implemented successfully in Saudi Arabia, there must be clear governance structures, stakeholder involvement, and sufficient training and support for medical personnel. The efficient administration of disease registries depends on the use of interoperable electronic health records, standardized data gathering technologies, and secure data exchange systems.
What variables contribute to the success and efficacy of Saudi electronic disease registries?	Strong leadership and governance, cooperation across healthcare institutions, active clinician engagement, constant monitoring and assessment of registry performance are important elements that contribute to the success of Saudi Arabia's electronic disease registries. The sustained growth and long-term viability of electronic disease registries depend on adequate financial resources, technological infrastructure, and supporting legislation.

Precision and efficiency

Compared to traditional paper-based systems, the usage of electronic illness registries was consistently related to increased accuracy and efficiency. Electronic records decreased mistakes, ensured data correctness, and reduced data loss risk [13,17,20]. These advantages were ascribed to features such as automated data entry, consistent data gathering, and error-checking procedures integrated into the system.

Real-time Monitoring

Electronic disease registries made real-time monitoring of illness trends and patterns possible [12,18-21]. This allows for the early diagnosis of illness epidemics and rapid public health actions. The capacity to track illness incidence and prevalence through time offered policymakers and healthcare practitioners valuable insights into resource allocation and planning.

Patient Care and Results

Electronic disease registries have improved patient treatment and outcomes. They made it easier for healthcare practitioners to communicate and coordinate their efforts, resulting in more prompt and effective care. The availability of detailed patient data enabled tailored treatment programs that took individual traits and medical history into consideration. Improved patient follow-up and monitoring via electronic records lead to improved disease management and fewer adverse occurrences [15-18].

Public Health Research

Electronic disease registries are a helpful resource for public health research. Researchers have access to a large pool of data for epidemiological studies, clinical trials, and outcomes research [8,9,12,17]. The availability of longitudinal data inside illness registries aided in assessing treatment efficacy, disease progression, and healthcare interventions.

Technical Challenges

Several studies have identified technological issues connected with computerized illness registries. Interoperability concerns have been documented between various electronic systems and healthcare organizations, making data sharing and integration challenging [10,12,15-18]. Inconsistencies hampered data gathering and analysis in data standards and formats. Concerns were also expressed concerning data security and privacy, underlining the importance of solid data protection procedures.

Cultural and organizational constraints

Cultural and organizational constraints are significant hurdles in implementing electronic disease registries. The implementation of electronic systems has been hampered by resistance to change by both healthcare practitioners and patients. Limited digital literacy and the requirement for electronic record system training were both mentioned as impediments to efficient adoption [20,21].

Generalizability

It is crucial to emphasize that the systematic review's conclusions are limited to the Saudi setting. Due to the different healthcare systems, cultural variables, and infrastructure, the results may be limited to other nations or areas. Future studies will be required to investigate the applicability and efficiency of electronic illness registries in various situations.

Finally, the systematic review indicated that electronic medical records for disease registries provide considerable benefits in Saudi Arabia regarding the accuracy, efficiency, real-time monitoring, and improved patient care outcomes. However, technological issues, cultural attitudes, and organizational hurdles must be addressed for successful deployment. The findings emphasize the potential of electronic illness registries in Saudi Arabia for enhancing healthcare delivery and influencing public health policy. More study is needed better to understand electronic disease registries in various healthcare settings and devise solutions for overcoming implementation issues.

Discussion

The findings of this systematic study give detailed insights into the efficacy of electronic medical records for disease registries in Saudi Arabia. The following discussion expands on the preliminary results, their consequences, and the more significant implications for healthcare practice and research.

The data from the research reviewed shows that electronic illness registries surpass traditional paper-based systems in terms of accuracy and efficiency. The automated data input, standardized data collecting templates, and built-in error-checking procedures of electronic systems are responsible for decreasing mistakes and improving data completeness [9-15]. The findings highlight the necessity of using electronic records to assure data quality and integrity, which is critical for evidence-based decision-making and illness management.

The capacity of electronic disease registries to track illness trends and patterns in real time is a crucial advantage. The findings emphasize the importance of timely and reliable monitoring data in detecting disease outbreaks and implementing appropriate public health measures.8,11,18-20 Electronic disease registries' real-time monitoring capabilities have the potential to significantly improve public health preparedness and response operations in Saudi Arabia.

The main conclusion of this systematic study is the favorable influence of electronic disease registries on patient care and outcomes. Electronic records offer enhanced communication and coordination among healthcare practitioners, resulting in more prompt and effective treatment delivery.15,18 The availability of detailed patient data in electronic registries allows for more tailored treatment strategies, which leads to better disease control and fewer adverse events. These findings demonstrate the potential for electronic disease registries to improve patient outcomes and healthcare quality in Saudi Arabia.

Electronic disease registries are an essential source of information for public health researchers. The availability of longitudinal data inside illness registries enables the assessment of treatment efficacy, disease progression, and healthcare interventions.[20] The vast amount of data made available by electronic systems facilitates epidemiological studies, clinical trials, and outcomes research. The findings highlight the necessity of electronic disease registries for evidence creation, policy formation, and innovation in healthcare practice.

The investigation uncovered technical issues with computerized illness registries in Saudi Arabia. Interoperability concerns across various electronic systems and healthcare organizations have emerged as a significant impediment to successful data exchange and integration. Inconsistencies hampered data gathering and analysis in data standards and formats [9-12]. To address these technological issues, stakeholders such as legislators, healthcare providers, and health information technology professionals must work together. The effective adoption of electronic illness registries requires data format standardization, increased interoperability, and robust data security measures.

Cultural and organizational constraints were major elements impacting electronic disease registry implementation and usage [18,20]. Change resistance from healthcare providers and patients was identified as a critical problem. To overcome this reluctance, focused initiatives such as education and training programs are required to improve digital literacy and foster a culture of technology acceptance. Furthermore, organizational support and leadership are needed to transition to electronic disease registries successfully.

Recognizing the findings' contextual constraints is critical, as the studies included in this analysis were all centered on Saudi Arabia. Saudi Arabia's distinct healthcare system, cultural values, and infrastructure may impact the deployment and success of electronic disease registries. As a result, caution should be used when extrapolating the findings to other nations or locations. Future study is needed to investigate the applicability and usefulness of electronic disease registries in various healthcare contexts, considering contextual factors and the unique obstacles that different healthcare systems confront.

In summary, this systematic study provides strong evidence that electronic medical records benefit disease registries in Saudi Arabia. The findings highlight the necessity of using electronic systems to increase accuracy, efficiency, real-time monitoring, patient care, and outcomes and to allow public health research. However, various problems must be overcome to improve the adoption and use of electronic disease registries.

The technological obstacles mentioned in this analysis, such as interoperability and data standards, necessitate joint efforts by healthcare institutions and technology professionals. Standardizing data formats and implementing solid data-sharing protocols can improve electronic system interoperability, enabling easy data interchange and integration. Furthermore, investing in secure infrastructure and putting strong data protection safeguards in place is critical to ensure the confidentiality and integrity of patient information.

Cultural and organizational impediments should be addressed by focused interventions that raise awareness, improve digital literacy, and develop a favorable attitude toward technology adoption. Education and training programs can provide healthcare practitioners with the skills they need to use electronic disease registries successfully. Involving essential stakeholders in the implementation process, such as hospital administrators and policymakers, may also assist in overcoming opposition to change and building a supportive workplace culture.

While the findings of this research give helpful information about the usefulness of electronic illness registries in Saudi Arabia, it is vital to recognize their limitations. The findings' applicability to other nations or areas with different healthcare systems, cultural backgrounds, and infrastructure may differ. As a result, more study is required to investigate the applicability and effectiveness of electronic disease registries in diverse settings.

Future research should look at electronic illness registries' long-term viability and cost-effectiveness. The economic effect of installing and sustaining these systems and their potential to lower healthcare costs through improved disease management and preventative measures would be helpful information for healthcare decision-makers.

Finally, the findings of this systematic study emphasize the significant advantages of electronic medical records for disease registries in Saudi Arabia. Electronic systems enhance accuracy, efficiency, real-time monitoring, and patient care results. Addressing technological, cultural, and organizational barriers, on the other hand, is critical for effective adoption. By addressing these obstacles, healthcare systems can fully utilize the potential of electronic disease registries to promote public health research, guide evidence-based decision-making, and improve healthcare delivery. Future research and collaborative efforts are required to maximize the installation and usage of electronic disease registries while considering the differences between healthcare settings.

Limitation

Certain limitations to this study should be mentioned. The search will be restricted to publications published in English and Arabic journals, potentially excluding relevant research in other languages. Second, the study will be confined to Saudi Arabian disease registries, which may limit the findings' application to other countries or localities. Finally, the quality and rigor of the research included in the review may vary, altering the overall quality and reliability of the findings.

Conclusion

Finally, this systematic review thoroughly examines the efficacy of electronic medical records for disease registries in Saudi Arabia. The findings show that electronic disease registries have various benefits, such as higher accuracy and efficiency, real-time monitoring capabilities, improved patient treatment and outcomes, and expanded potential for public health research (Smith et al., 2018; Jones & Ahmed, 2020). However, the establishment and use of electronic disease registries encounter technological, cultural, and organizational hurdles that must be overcome to realize their promise fully.

To overcome the technological hurdles associated with electronic disease registries, the evaluation emphasizes the significance of standardized data formats, increased interoperability, and effective data security mechanisms. Healthcare organizations and technology specialists must work together to achieve seamless data interchange and integration. Furthermore, addressing cultural and organizational hurdles through education and training programs and cultivating a supportive corporate culture can enhance the successful adoption and use of electronic disease registries.

While the findings of this analysis give valuable insights into the usefulness of electronic disease registries in Saudi Arabia, caution should be used when extrapolating these findings to other nations or locations. Contextual considerations such as healthcare systems, cultural norms, and infrastructure can all impact the deployment and success of electronic disease registries in various situations. As a result, future research should investigate the applicability and efficiency of electronic illness registries across multiple healthcare settings.

Further research should be conducted to assess electronic illness registries' long-term viability and cost-effectiveness. The economic effect of installing and sustaining these systems and their potential to lower healthcare costs through improved disease management and preventative measures would be helpful information for healthcare decision-makers.

Electronic disease registries have the potential to significantly improve healthcare delivery and public health research in Saudi Arabia. Healthcare systems may improve disease management, public health surveillance, and evidence-based decision-making by harnessing the benefits of electronic medical records, such as accuracy, efficiency, real-time monitoring, and better patient care outcomes. On the other hand, overcoming technological, cultural, and organizational barriers is crucial for effectively installing and using electronic disease registries. Healthcare stakeholders can leverage the full potential of these systems via collaborative efforts to enhance healthcare quality, patient outcomes, and public health outcomes in Saudi Arabia and abroad.

Recommendations

Several recommendations are made based on the findings of this systematic study to improve the deployment and usage of electronic disease registries in Saudi Arabia:

Collaboration efforts should focus on standardizing data formats and building effective data-sharing mechanisms across healthcare institutions, technological specialists, and regulatory agencies. This will allow for easy interoperability across multiple electronic systems and data sharing and integration. Furthermore, standardizing data items and terminology across registries helps enhance data quality and comparability.

Because patient information is so sensitive, investing in secure infrastructure and robust data security procedures is critical. Healthcare institutions should implement encryption mechanisms, access restrictions, and audit trails to secure patient data from unwanted access and breaches. It should be ensured that appropriate data privacy rules, such as the General Data Protection Regulation (GDPR), are followed.

Education and training initiatives should be implemented to improve healthcare practitioners' digital literacy. Data entry, retrieval, and interpretation within electronic disease registries should be included in training sessions. Healthcare practitioners should be prepared to browse and use the register efficiently, guaranteeing accurate and thorough data gathering.

Collaboration is essential for developing electronic disease registries among healthcare institutions, governments, technology suppliers, and researchers. These collaborations promote information exchange, resource pooling, and mutual assistance. Stakeholders should communicate and collaborate frequently to address difficulties, discuss best practices, and encourage innovation in the industry.

More study is needed to assess the long-term viability and cost-effectiveness of developing and maintaining electronic illness registries. Assessing the return on investment, cost savings, and possible decrease in healthcare costs connected with using registries can give healthcare decision-makers significant insights and support further investment in these systems.

Creating national rules and governance frameworks for electronic disease registries can result in standard procedures, processes, and quality indicators. These standards should cover data collection, management, analysis, and ethical and legal implications. A centralized governing body can manage registry installation, monitoring, and assessment, assuring best practices and continual quality improvement.

Encourage data exchange and research collaboration among healthcare facilities and academics to better understand illness patterns, treatment results, and public health trends. Establishing data-sharing methods that preserve patient privacy and confidentiality can encourage collaborative research and improve evidence-based decision-making.

The functioning and results of electronic disease registries must be continuously monitored and evaluated. Data completeness, correctness, timeliness, and usefulness should be assessed regularly. Feedback from healthcare practitioners and registry users should be collected to identify areas for development and tweak registry functionality as needed.

Best practices, success stories, and lessons gained from developing and using electronic disease registries must be shared. Sharing experiences and expertise through conferences, workshops, and publications can increase the acceptance and effectiveness of registries in Saudi Arabia and worldwide.

The evolution and optimization of electronic illness registries can be accelerated by fostering an environment of innovation and continual improvement inside healthcare facilities. Encouragement of feedback, promotion of multidisciplinary cooperation, and provision of resources for innovation can lead to developing sophisticated functions and including developing technologies into registers, such as artificial intelligence and machine learning.

By applying these guidelines, Saudi Arabia may maximize the benefits of electronic illness registries while overcoming the implementation hurdles. These guidelines aim to increase the accuracy, efficiency, and utility of registries, resulting in better healthcare delivery, improved patient outcomes, and advances in public health research. Policymakers, healthcare organizations, technological professionals, and researchers must work together and aggressively implement these proposals.

Furthermore, evaluating and updating these suggestions regularly is critical to keep up with technological improvements, changes in healthcare practices, and shifting regulatory frameworks. Continuous review and modification of electronic illness registries will help ensure their continued usefulness and relevance in Saudi healthcare.

Saudi Arabia can pioneer a more efficient, data-driven, and patient-centered healthcare system by embracing electronic disease registries and taking a systematic and collaborative approach to installation and usage. These registries have the potential to transform illness management, increase public health surveillance, and make evidence-based decision-making easier. All stakeholders must work together to fully realize the promise of electronic disease registries and create better healthcare outcomes for the Saudi population.

Declarations

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Conflict of interest

There is no conflict of interest to declare.

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Availability of Data

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Authors' contributions

The authors have read and approved the final manuscript

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