Journal of Taibah University Medical Sciences (2024) 19(6), 1202–1211

Taibah University

Journal of Taibah University Medical Sciences

www.sciencedirect.com

Original Article

Revolutionizing healthcare in KSA: A deep dive into clinical practice guideline development and implementation☆

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Received 11 February 2024; revised 29 October 2024; accepted 22 November 2024; Available online 6 December 2024

الملخص

تعمل المملكة العربية السعودية على تحويل نظام الرعاية الصحية الخاص بها من خلال تطوير وتطبيق الأدلة الإرشادية السريرية (Clinical Practice Guidelines)، وهي أداة مصممة لتحسين نتائج المرضى وتوحيد الرعاية الصحية المساعدة في اتخاذ القرارات المبنية على الأدلة. لإرشادات الممارسة السريرية دور جوهري في معالجة التفاوت في الرعاية الصحية وتعزيز العدالة في تقديم الرعاية الصحية وتحسين تجربة المريض. وهي عنصر أساسي من أجندة برنامج تحول القطاع الصحي في المملكة العربية السعودية. تتضمن عملية التطوير اختيار الموضوع، وجمع الأدلة، وتطوير التوصيات السريرية ونشرها ، ويكون المركز الوطني للطب المبني على البراهين هو المسؤول عن تقييم ونشر أدلة إرشادية سريرية عالية الجودة. وفي الوقت الحالي، تواجه عملية تطوير الأدلة الإرشادية السريرية تحديات مثل تضارب المصالح، عدم اشراك أصحاب المصلحة الرئيسيين وعدم وضوح المنهجية المتبعة وعدم ملاءمة مقاييس الأداء وضعف التغذية الراجعة.

وفي هذه المقالة سنناقش كيف يمكننا مواجهة تلك المشكلات. ومن على سبيل المثال ، يمكن لمؤسسات الرعاية الصحية توفير الموارد وتكامل الأدلة الإرشادية السريرية مع السجلات الصحية الإلكترونية ، وإنشاء ثقافة تثمن الممارسة السريرية المبنية على البراهين والتحسين المستمر للجودة. وتلعب التكنولوجيا دورًا محوريًا في التطبيق الناجح للأدلة السريرية، حيث تعمل السجلات الصحية الإلكترونية والتطبيب عن بعد والذكاء الاصطناعي على إعادة تشكيل تقديم الرعاية الصحية في جميع أنحاء العالم.

تشمل الآفاق المستقبلية للرعاية الصحية في المملكة العربية السعودية الاستخدام المتزايد للتكنولوجيا والرعاية التي تتمحور حول المريض واعتماد تقنيات الرعاية الصحية الرقمية. ومن خلال تبني الابتكار وتعزيز التعاون وإعطاء الأولوية للرعاية التي تركز على المريض، تمهد المملكة العربية السعودية الطريق لعصر جديد من التميز في مجال الرعاية الصحية.

الكلمات المفتاحية: المملكة العربية السعودية؛ تحول الرعاية الصحية؛ إرشادات الممارسة السريرية؛ التنفيذ؛ الذكاء الاصطناعي؛ تقنيات الرعاية الصحية الرقمي؛ ة

Abstract

KSA is transforming its healthcare system by developing and implementing Clinical Practice Guidelines (CPGs), a tool designed to improve patient outcomes, standardize care, and facilitate evidence-based decision-making. CPGs are crucial in addressing healthcare disparities, thereby promoting health equity and patient experience. They are integral to KSA's healthcare transformation agenda. The development process involves topic selection, evidence gathering, and guideline development and dissemination, with the National Centre for Evidence-Based Medicine (NCEBM) responsible for the appraisal and publication of quality CPGs. However, the current guideline landscape faces challenges such as conflicts of interest, lack of key stakeholder groups involved, methodological rigor, and inadequate monitoring as well as feedback loop.

In this article, we discuss how we can overcome these issues. For instance, healthcare organizations can provide resources, integrate CPGs into electronic health records

This article is part of a special issue entitled: JTUMED_SI_ Healthcare transformation published in Journal of Taibah University Medical Sciences.

☆ Peer review under responsibility of Taibah University.

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Peer review under responsibility of Taibah University.

ELSEVIER Production and hosting by Elsevier

 https://doi.org/10.1016/j.jtumed.2024.11.010

(EHRs), and create a culture that values evidence-based practice and continuous quality improvement. Technology plays a pivotal role in the successful implementation of CPGs, with EHRs, telemedicine, and artificial intelligence reshaping healthcare delivery across the globe.

Future prospects for healthcare in KSA include the increasing use of technology, patient-centric care, and the adoption of digital healthcare technologies. By embracing innovation, fostering collaboration, and prioritizing patient-centric care, Saudi Arabi is paving the way for a new era of excellence in healthcare.

Keywords: Artificial intelligence; Clinical practice guidelines; Digital healthcare technologies; Healthcare transformation; Implementation; KSA

Introduction

Healthcare transformation: clinical practice guidelines

In an era where healthcare is rapidly evolving, KSA stands at the forefront of redefining and revolutionizing its medical landscape.[1] One of the most significant steps in this transformation is the development and implementation of Clinical Practice Guidelines (CPGs) − a powerful tool designed to improve patient outcomes, standardize care, and facilitate evidence-based decision-making across the nation.[2] This comprehensive deep dive into the CPG development and implementation process unveils the driving forces behind KSA's healthcare revolution, exploring the challenges, successes, and future prospects of this ambitious endeavor. By embracing innovative approaches, fostering collaboration, and prioritizing patient-centric care, the Kingdom of Saudi Arabia (KSA) is paving the way for a new era of excellence in healthcare − not just within its borders, but as an inspiring regional and global leader.[3,4] This paper examines the complexities of this transformative movement and analyzes its impact on the evolution of healthcare in KSA.

Changing healthcare context in the KSA

The KSA is facing a new set of challenges overloading the healthcare system, which flag the need for a health transformation.

Some of the healthcare challenges are[1,5]*:*

- **Unhealthy lifestyle:** Up to 75% of the population do not undergo regular check-ups, and 60% are overweight or obese.[6]
- **Spiraling costs:** The average increase in government health care budget has been +7% YoY since 2010.[7,8]
- **Increasing chronic conditions:** Currently there are more than 5 million people diagnosed with chronic conditions, and it is estimated that this number will increase to 8−10 million by 2030.[9]
- **Premature deaths:** Forty-six percent of deaths due to non-communicable diseases in the KSA are premature (in people younger than 70 years old), compared to under 25% in Western Europe.[10,11]

Importance of CPGs

CPGs are essential tools in modern healthcare, serving as systematically developed recommendations that assist healthcare professionals in making informed decisions about patient care.[12] These evidence-based guidelines not only promote the standardization of care but also ensure that patients receive the most up-to-date and effective treatments available. By incorporating the latest scientific evidence and expert consensus, CPGs enable healthcare providers to deliver consistent, high-quality care across diverse settings and patient populations. This adaptability requires intentional design and consideration of local contexts. For example, while CPGs for vaccinations can often be generalized globally, more specific guidelines, such as those for managing birth asphyxia, need to be tailored to the unique healthcare environments and population characteristics of each region. This highlights the importance of both specificity and flexibility in the development of CPGs to ensure they are applicable and effective across diverse patient populations.[13]

In KSA, the development and implementation of CPGs are integral to the KSA's ambitious healthcare transformation agenda.[14] With a rapidly growing population and increasing prevalence of chronic diseases, the nation recognizes the need to continuously enhance its healthcare system to provide timely, efficient, and effective care for its citizens. A change in the culture of implementing CPGs is a critical step towards achieving this goal, as these guidelines establish a framework for evidence-based practice, promote interdisciplinary collaboration, and ultimately, improve patient outcomes.[15]

Furthermore, CPGs also play a crucial role in addressing healthcare disparities and promoting health equity.[16] While CPGs are instrumental in standardizing care and potentially reducing disparities, they are not a panacea for achieving health equity. CPGs must be part of a broader strategy that includes rational policies and informed regulations to ensure equitable access to quality care. This comprehensive approach should consider social determinants of health, resource allocation, and the removal of systemic barriers that hinder access to care. By integrating CPGs within a framework of supportive policies and regulations, we can more effectively address healthcare disparities and promote health equity.[17,18] By identifying best practices and standardizing care, guidelines can help bridge gaps in knowledge and ensure that all patients, regardless of their socioeconomic background or location, have access to the same high-quality care. In this way, the ongoing development and implementation of CPGs in KSA contribute to a more equitable and inclusive

healthcare system, which is essential for the overall well-being and prosperity of the nation.

Process of developing CPGs

The development of CPGs is a complex, multi-step process that involves several stages including topic selection, evidence gathering, guideline development, and dissemination.[19] In the KSA, the process of developing guidelines in alignment with international best practices and standards was initially supervised by the Vision Realization Office of the Health Holding Company under the Ministry of Health (MOH).[20] However, after extensive Responsible, Accountable, Consulted, and Informed (RACI) assessment and review of all stakeholders who could lead this initiative nationally, its leadership was transferred to the National Center for Evidence-Based Medicine (NCEBM), a body under the aegis of the Saudi Health Council established by a royal decree in 2019. The transition of leadership to the NCEBM underscores KSA's commitment to aligning its health policies with global standards. While the NCEBM does not directly develop CPGs, it plays a pivotal role in appraising and setting standards for these guidelines based on international best practices.

Through its appraisal process, the NCEBM ensures that existing CPGs align with the latest scientific evidence and global benchmarks. This process helps identify and address any gaps, ensuring that healthcare practices are both evidence-based and effective. By developing standards for CPGs, the NCEBM also provides healthcare providers with consistent and reliable guidelines. This standardization is crucial for maintaining high-quality care across diverse settings.

Furthermore, the NCEBM collaborates with international organizations (GIN-McMaster University, GRADE-Pro, and Elsevier) to integrate global best practices into local healthcare policies. This collaboration supports the adoption of innovative healthcare solutions, thereby enhancing the quality and equity of healthcare in KSA.

Topic selection is the first and most critical step in the process of CPG development, as it determines which areas of clinical practice will be addressed by the guidelines. Typically, topics are chosen based on factors such as disease prevalence (global burden of disease), clinical relevance, potential impact on patient outcomes, and the availability of high-quality evidence.[21,22] Once topics are selected, related to the heath issue consistent with the global burden of disease markers, a multidisciplinary panel of experts is assembled to spearhead the guideline development process. This panel typically includes healthcare professionals, researchers, and methodologists, as well as representatives from patient advocacy groups and other relevant stakeholders.[23]

The next stage in the process involves searching, gathering, and evaluating the available evidence by conducting systematic reviews of the literature, assessing the quality of the evidence, and synthesizing the findings to inform the development of the guidelines. During this process, the expert panel also identifies any gaps in the evidence and may recommend areas for further research.[24,25]

Once the evidence has been gathered and appraised, the expert panel develops the guideline recommendations, which are based on the best available evidence and expert consensus. These recommendations are then subjected to a rigorous peer-review process, involving the public and both internal and external reviewers, to ensure their validity and reliability.[26] After the guidelines have been finalized, they are disseminated to healthcare professionals through various channels, including publication in medical journals,

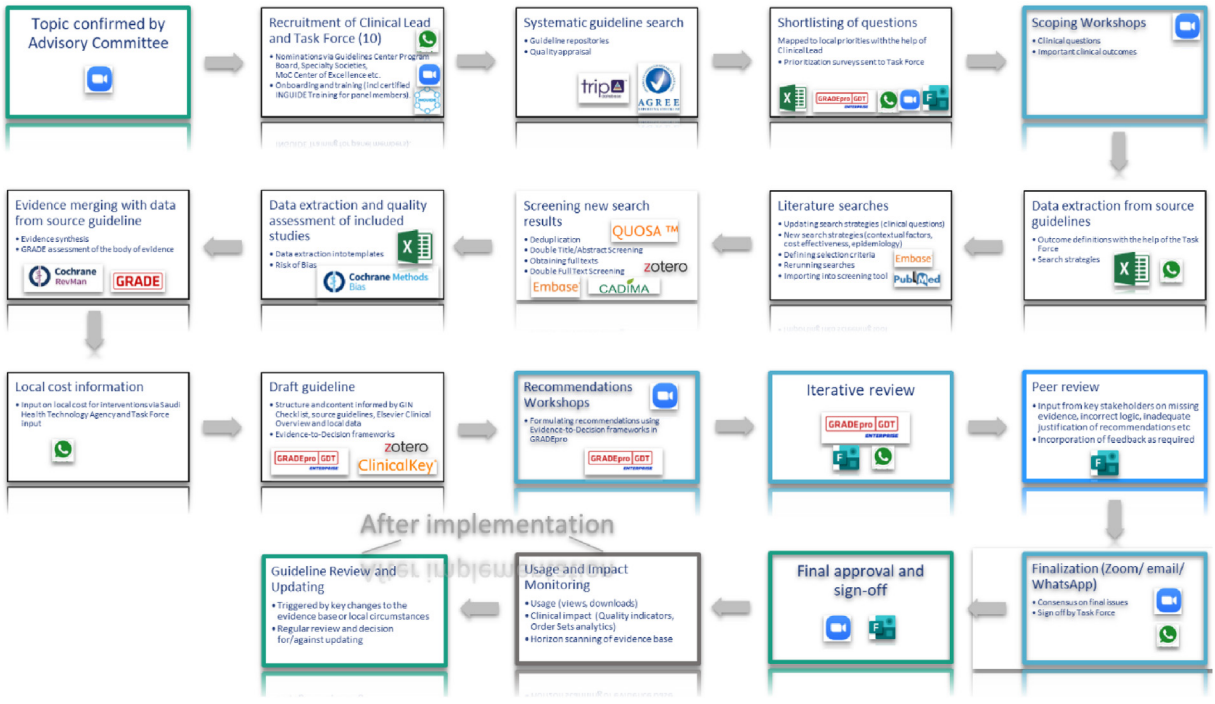

Figure 1: Guidelines lifecycle.

presentations at conferences, and targeted educational initiatives.[27] These steps are summarized in Figure 1.

Key stakeholders involved in guideline development

The development and implementation of CPGs involve a collaborative effort from a diverse array of stakeholders. While entities such as the MOH, Public Health Authority, Saudi Food and Drug Authority, Council of Health Insurance, Saudi Central Board for Accreditation of Healthcare Institutions, and the NCEBM do not directly develop these guidelines, they play crucial roles in their approval, acceptance, and implementation. This process also involves professional societies, academic institutions, healthcare providers from various specialties, and patient advocacy groups, ensuring that the guidelines are comprehensive and widely accepted.[28,29]

Amidst this collaborative landscape, the NCEBM's guiding principles are instrumental in steering the process. These principles include promoting evidence-based medicine, driving value-based care, enhancing patient and health outcomes, leveraging local and international data-driven clinical guidance, operating inclusively and collaboratively within the ecosystem, and focusing on both curative and preventive health. By adhering to these principles, the NCEBM ensures that the CPGs not only meet international standards but also address local healthcare needs, thereby enhancing the overall effectiveness and equity of the healthcare system.

The MOH is responsible for setting the strategic direction for CPG development, establishing the necessary infrastructure and resources, and fostering collaboration among stakeholders. The MOH also plays a critical role in ensuring that the guidelines are aligned with the nation's healthcare priorities and are responsive to the needs of the Saudi population.[30]

Professional societies and academic institutions contribute their expertise and resources to the guideline development process, both in terms of developing the guidelines themselves and in disseminating them to healthcare professionals. These organizations also play a crucial role in promoting the adoption of CPGs among their members, through continuing education initiatives and other targeted interventions.

Healthcare providers are important stakeholders in the CPG development process, as they are ultimately responsible for implementing the guidelines in clinical practice. By providing feedback on the guidelines and participating in their development, healthcare providers can help ensure that the recommendations are relevant, practical, and feasible to implement. Patient advocacy groups also play an essential role in the process, by representing the interests of patients and ensuring that their perspectives are considered throughout the guideline development process.[31] They ensure that guidelines are culturally and socially appropriate, which is vital in a diverse society such as KSA. The Saudi Patient Safety Center has established Patient and Family Advisory Councils to empower patients and involve them in healthcare decision-making processes. These groups help tailor healthcare practices to local needs and values, making them more effective and patient-centric. This involvement is part of a broader effort to support the nation's healthcare transformation goals under Vision 2030.[11,31,32]

Key guideline stakeholders

Figure 2 lists the key organizations presently involved in (starting at 12 o'clock clockwise) guideline funding; strategic decisions including topic selection; methodology regulation and capacity building; horizon scanning, development and updating; and review, third-party accreditation and endorsement. The last four circles represent functions utilizing and building on guideline outputs (starting at 6 o'clock) with dissemination; implementation and creation of guideline derivatives; adoption by end users; and finally impact evaluation.

Current guideline landscape

Many clinical guidelines have been developed by governmental entities and medical societies over the last decade for use by Saudi clinicians. Despite the dedication and hard work of the involved experts, these largely disjointed efforts have been hampered by factors such as:

- Undeclared conflicts of interest within expert panels;
- Lack of involvement of key stakeholder groups such as patients, nurses or allied health professionals;
- Lack of methodological rigor when identifying, assessing, synthesizing, and documenting the underlying evidence base, and for reaching and formulating recommendations;
- Underuse of increasingly sophisticated digital tools for the development of systematic reviews and clinical guidelines;
- Absence of a timely dissemination and implementation strategy;
- Insufficient monitoring of and feedback loop about clinical adoption; and
- Lack of appropriate updating of available recommendations driven by new evidence or novel diagnostic or therapeutic interventions.[33–36,68]

Figure 3 highlights the areas of concern across all aspects of the guideline development life cycle, as introduced in Figure 2.

These issues have resulted in a lack of reliable, clinically credible, accessible, locally applicable, and nationally adopted guidelines, ultimately impacting the overall healthcare objectives of the KSA's Vision 2030.

Challenges in implementing CPGs

While the development and dissemination of CPGs are essential steps in improving healthcare quality, their ultimate success depends on their effective implementation in clinical practice. However, implementing CPGs can be a complex and challenging process due to various barriers that can impede their adoption and use.[31,33]

One of the most significant challenges in implementing CPGs is the need to change established patterns of practice among healthcare providers.[37,38] This can be difficult, as clinicians may be resistant to change, particularly if they perceive the guidelines as a threat to their autonomy or clinical judgment.[39,40] Additionally, healthcare providers may lack the necessary knowledge, skills, or resources to

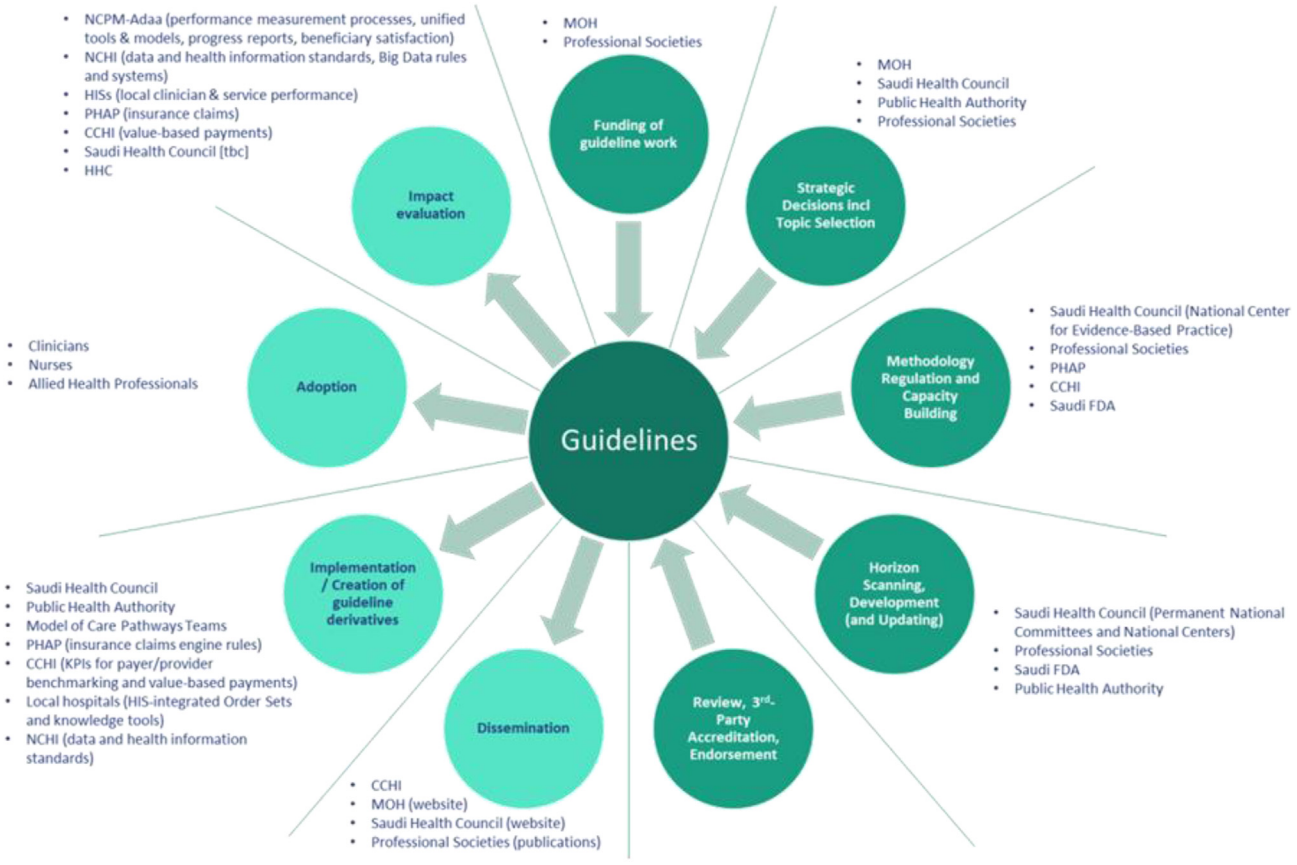

Figure 2: Current KSA guideline landscape: stakeholders.

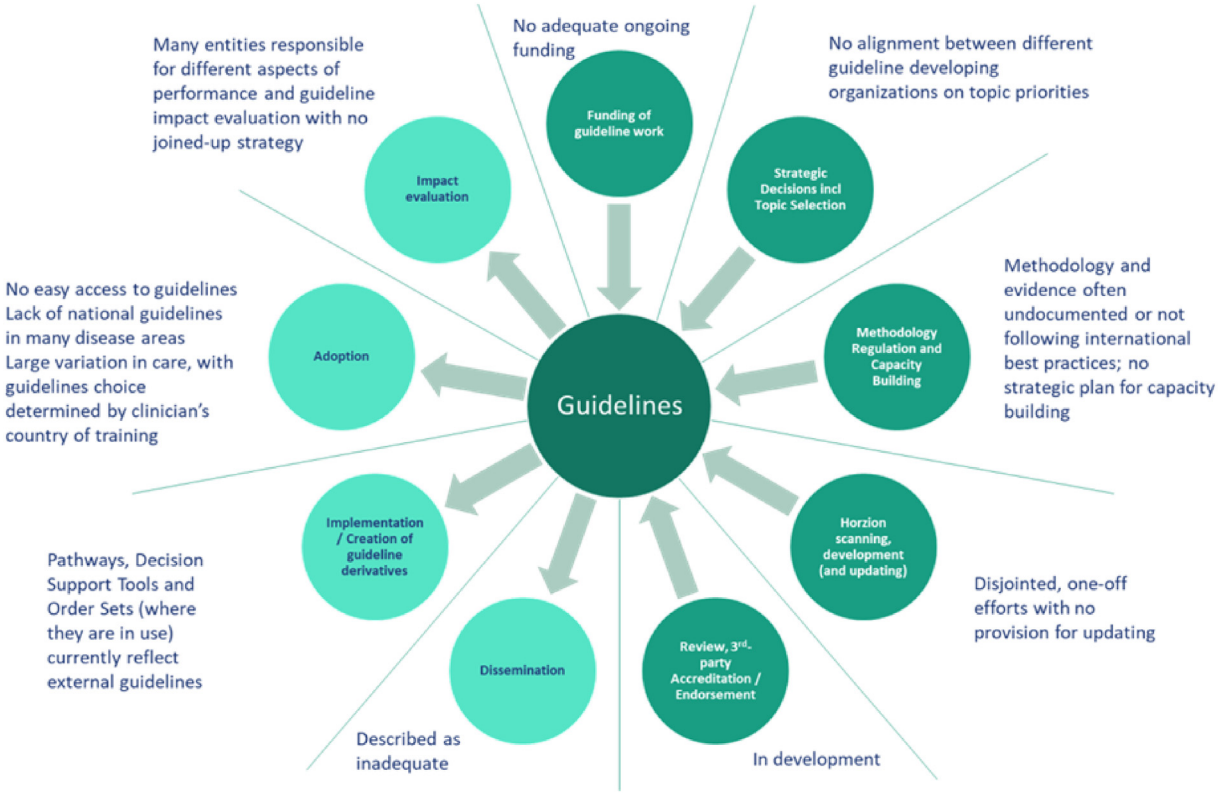

Figure 3: Current KSA guideline landscape: gaps and limitations.

implement the guidelines effectively, particularly in resource-constrained settings.[38]

Another challenge in implementing CPGs is the need to engage and coordinate the efforts of multiple stakeholders, including healthcare providers, administrators, policymakers, and patients. This can be particularly challenging in large, complex healthcare systems, where communication and coordination can be difficult. Additionally, the implementation of CPGs may be hindered by organizational barriers such as inadequate infrastructure, limited resources, or competing priorities.[41]

Furthermore, in healthcare systems with predominantly paternalistic practices, patient involvement in CPG development and implementation is often limited. This approach concentrates decision-making with healthcare providers, reducing patient input and engagement. As a result, patient empowerment and compliance with CPGs are diminished, highlighting the need for more patient-centered care models that promote collaboration and shared decision-making.

Challenges in CPG adoption

Apart from the challenges in implementing CPGs, there are also several barriers to their adoption by healthcare providers.[42] The adoption of CPGs in KSA faces several specific challenges, including lack of awareness, cultural misalignment, resource constraints, resistance to change, lack of incentives, and technological barriers. Addressing these challenges requires a multifaceted approach that includes education, stakeholder engagement, resource investment, and technological integration. By overcoming these barriers, the Saudi healthcare system can enhance the effectiveness of CPGs, ultimately leading to improved patient care and outcomes.[39,43] These barriers can be broadly categorized into knowledge-related, attitude-related, and behavior-related factors.

Knowledge-related barriers include a lack of awareness or familiarity with the guidelines, as well as a perceived lack of evidence to support their recommendations. This can be particularly problematic in rapidly evolving fields, where new evidence may emerge faster than the guidelines can be updated. To address this issue, it is essential to ensure that healthcare providers have access to up-to-date, high-quality information about the guidelines and the evidence that underpins them.[44]

Attitude-related barriers include skepticism or resistance to change among healthcare providers, as well as a perceived lack of relevance or applicability of the guidelines to their specific clinical context. To overcome these barriers, it is crucial to involve healthcare providers in the guideline development process, to ensure that their perspectives and concerns are taken into account. Additionally, targeted educational interventions and other strategies can be employed to address misconceptions to foster a positive attitude towards the guidelines among clinicians.[45] Moreover, many practitioners perceive international guidelines as irrelevant to the local healthcare context, which can be attributed to differences in disease prevalence, healthcare infrastructure, and cultural factors. This perception reduces the motivation to adopt CPGs unless they are adapted to reflect local realities.[46]

Behavior-related barriers include factors such as time constraints due to the demanding nature of clinical work, characterized by high patient loads and numerous administrative tasks, which leaves healthcare providers with limited time to familiarize themselves with and implement new guidelines. Furthermore, without adequate support systems and incentives, such as financial rewards or professional recognition, there is little motivation for healthcare providers to adopt CPGs. Additionally, the absence of integrated systems, such as EHRs that incorporate CPGs, further complicates their implementation.[47] To address these challenges, healthcare organizations can implement strategies such as providing resources and support for guideline implementation, integrating the guidelines into EHRs and clinical decision support systems, and creating a culture that values evidence-based practice and continuous quality improvement.[48]

Strategies for effective CPG implementation

To ensure the successful implementation of CPGs in KSA, it is essential to adopt a multifaceted approach that addresses the various barriers to guideline adoption and use. Key strategies for effective guideline implementation include:[49,50]

1. Engaging and involving healthcare providers in the guideline development process, to ensure that their perspectives and concerns are taken into account.
2. Providing targeted educational interventions and training programs to increase healthcare providers' knowledge, skills, and confidence in using the guidelines.
3. Integrating the guidelines into EHRs and clinical decision support systems, to facilitate their use in clinical practice and reduce the burden on healthcare providers.
4. Implementing organizational and system-level interventions, such as performance measurement and feedback, to create a culture that values evidence-based practice and continuous quality improvement.
5. Fostering collaboration and communication among stakeholders, including healthcare providers, administrators, policymakers, and patients, to ensure the coordinated and effective implementation of the guidelines. For instance, the NCEBM Scientific Committee consists of representative members from the main 13 stakeholders in KSA such as: Public Health Authority, Saudi Food and Drug Authority, Council of Health Insurance, Saudi Central Board for Accreditation of Healthcare Institutions, Saudi Commission for Health Specialties, and Ministry of Education.
6. Regularly updating and refining the guidelines, to ensure that they remain responsive to the needs of the Saudi population and reflect the latest epidemiological data, evidence, and best practices.
7. Integrating cultural values and patient preferences into CPGs to enhance acceptance and compliance, supported by culturally aligned patient education campaigns.

By adopting these strategies, KSA can maximize the impact of its CPGs and bring about meaningful improvements in healthcare quality and patient outcomes.

Role of technology in revolutionizing healthcare

Technology plays a pivotal role in the successful implementation of CPGs and the broader transformation of healthcare in KSA. From EHRs and clinical decision support systems to telemedicine and artificial intelligence, technology is reshaping the way healthcare is delivered and improving the quality and efficiency of care.[51–53]

EHRs are a foundational technology that can facilitate the implementation of CPGs by providing healthcare providers with easy access to patient information and guideline recommendations. EHRs can also be integrated with clinical decision support systems, which can provide real-time, context-specific guidance to healthcare providers, based on the guidelines and the patient's individual characteristics.[54] However, despite their benefits, EHRs have been associated with increased rates of burnout among healthcare providers. The time required for data entry, system navigation, and dealing with technical issues can detract from patient care and contribute to stress and fatigue.[47]

Telemedicine is another promising technology that can help to overcome barriers to guideline implementation, particularly in remote or underserved areas. By enabling healthcare providers to consult with specialists or access expert advice remotely, telemedicine can help to bridge gaps in knowledge and ensure that patients receive the same high-quality care, regardless of their location.[55]

Artificial intelligence (AI) is also emerging as a game-changer in healthcare, by enabling the analysis of large volumes of data and the identification of patterns and trends that would be difficult or impossible for humans to detect. AI can be used to develop predictive models that can identify patients at risk of developing specific conditions, and to personalize treatment plans based on the patient's unique characteristics and medical history.[56–58] AI can offer personalized medicine by analyzing genetic, environmental and lifestyle factors to tailor treatment plans to individual patients, thus, enhancing the effectiveness of therapies and reducing adverse effects.[59] AI can also streamline administrative tasks, such as scheduling, billing and patient triage, allowing healthcare providers to focus more on patient care.[60] AI tools, such as image recognition software, have shown promise in improving diagnostic accuracy, particularly in radiology and pathology, by identifying anomalies that might be overlooked by human eyes.[61] However, the effectiveness of AI models heavily depends on the quality of the data they are trained on. Biased or incomplete datasets can lead to inaccurate predictions and perpetuate exiting healthcare disparities.[62,63] Many AI algorithms function as "black boxes" making it difficult for healthcare providers to understand how decisions are made. This opacity can hinder trust and acceptance among clinicians.[64] The deployment of AI in healthcare also raises ethical issues, such as accountability for AI-driven decisions and the potential for AI to supplant human judgement. Legal frameworks are still evolving to address these challenges.[65]

In conclusion, technology can also facilitate the dissemination and adoption of CPGs, by providing healthcare providers with easy access to the guidelines and the latest evidence. Mobile applications, web-based platforms, and other digital tools can be used to deliver the guidelines and associated educational materials to healthcare providers, and to facilitate their use in clinical practice.[66]

Future prospects for healthcare in KSA

The ongoing development and implementation of CPGs in KSA are just one aspect of the nation's ambitious healthcare transformation agenda, which is aimed at achieving universal health coverage and improving the quality and efficiency of care. Looking forward, several key trends are likely to shape the future of healthcare in the KSA.[2,14]

One of the most significant trends is the increasing use of technology in healthcare, as discussed earlier. This trend is likely to continue, as advances in technology enable the development of new tools and approaches that can improve patient outcomes and reduce healthcare costs. Additionally, the adoption of digital health technologies is likely to be accelerated based on the recent coronavirus disease 2019 (COVID-19) pandemic, which has highlighted the importance of remote care and telemedicine.[67]

Another trend that is likely to shape the future of healthcare in KSA is the growing emphasis on patient-centric care. As healthcare providers and policymakers recognize the importance of addressing patients' individual needs and preferences, there is likely to be a shift toward a more personalized and holistic approach to care. This approach will involve the integration of physical, mental, and social aspects of health, and the engagement of patients in their own care. These approaches are witnessed in the Vision 2030 initiative that outlines a comprehensive transformation of the healthcare sector in KSA, focusing on proactive care and wellness. This includes the integration of various health aspects to provide patient-centered care, as highlighted in the Vision Realization Office's reports. REFs. Furthermore, the MOH has been implementing a new Model of Care that emphasizes holistic healthcare delivery. This model aims to address not only physical health but also mental and social well-being, aligning with the goals of Vision 2030 to enhance patient engagement and care quality.[35] Lastly, KSA's focus on public health and preventive services under Vision 2030 underscores the shift towards a holistic approach. This includes comprehensive screening programs and initiatives to promote healthy lifestyles, which are essential components of personalized healthcare.[43]

Finally, the ongoing development and implementation of CPGs in KSA are likely to continue to play a critical role in shaping the future of healthcare in the KSA. As the guidelines become more widely adopted and integrated into clinical practice, they will help to standardize care, improve patient outcomes, and reduce variations in practice across different settings and patient populations.[68] However, it is important to state that while adherence to CPGs can aid in the aforementioned, comprehensive monitoring within a sufficient period of observation will be essential to accurately assess the impact of CPGs on these outcomes.

Conclusion

The development and implementation of clinical practice guidelines are critical steps in revolutionizing healthcare in

KSA, as they enable healthcare providers to deliver consistent, evidence-based care across diverse settings and patient populations. While implementing CPGs can be challenging, there are several strategies and technologies that can be employed to overcome these barriers and ensure the successful adoption and use of the guidelines. By embracing innovation, fostering collaboration, and prioritizing patient-centric care, KSA is paving the way for a new era of excellence in healthcare, both within its borders and as a global leader in healthcare innovation.

Conflict of interest

The authors have no conflict of interest to declare.

Source of funding

This article did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical approval

Ethical approval is not required for perspective articles and there are no ethical issue(s).

Authors contributions

VGC conceived and designed the study, conducted the research, provided the research materials, and collected and organized the data. AKM drafted the manuscript and revised it critically for important intellectual content. ZAM and MYS conducted the copyediting and final approval of the version to be published. VGC wrote the initial and final drafts of the manuscript, and provided logistic support. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Acknowledgements

We gratefully acknowledge Elsevier team, particularly Dr. Klara Brunnhuber and Dr. Ximena Alvira, for their invaluable contributions to the sections on the guideline lifecycle, current KSA guidelines gaps and limitations as well as the guideline development process and tools in this publication. Their expertise, research tools, and innovative platforms have significantly enhanced our work.

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How to cite this article: Crisera VG, AlMubarak AK, Saeedi MY, Memish ZA. Revolutionizing healthcare in KSA: A deep dive into clinical practice guideline development and implementation. J Taibah Univ Med Sc 2024;19(6):1202–1211.