Patient-Centered Care Model's Effectiveness in Reducing Patient Waiting Time in the Emergency Department: A Systematic Literature Review

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Abstract
Introduction: The emergency department (ED) is an essential component of any hospital that offers round-the-clock urgent treatment to patients in critical condition. However, lengthy waiting times are expected, which may negatively affect the patient's health and overall experiences. This systematic review aims to assess the effectiveness of patient-centered care (PCC) models in reducing the time patients spend waiting in the emergency room by synthesizing the available evidence. This was conducted by following the following three research objectives: (i) to identify patient-centered care models implementation in hospital settings, (ii) to assess the effectiveness of patient-centered care models in improving patient outcomes in hospital settings, and(iii) to investigate the impact of prolonged waiting time on healthcare utilization in the ED. *Methods:* In this systematic review design to be included, an article had to be: full text, in English, peer-reviewed, address the evaluation of the effectiveness of the PCC model in reducing ED wait times, and the ED. Studies were excluded if they were abstracts, not fully available, published in any language other than English, were not peer-reviewed, did not meet the date of search, and were systematic reviews. The study was conducted by computerized databases which included PubMed, MEDLINE, Embase, Scopus, Web of Science, and CINHAL were searched between April 1, 2023–April 17, 2023. The study used the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement which has been updated to PRISMA 2020, a reporting guideline designed to address the issue of inadequate systematic review reporting. All the articles that satisfied the predefined inclusion criteria were independently assessed for risk of bias by two independent reviewer. *Results:* A systematic review design searched the literature on ED context with PCC as the intervention to reduce the waiting time. Two independent reviewers screened the articles (3,114) using the PRISMA and 27 articles were included. *Conclusion:* Long waiting times resulted in many adverse events for patients, such as delayed treatment and poorer clinical outcomes. PCC can exert a very impressive role contribution to EDs as patients should be integrated with health care providers in their health issues and treated from all perspectives.

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Introduction

Overcrowding in the emergency department (ED) is a major public health and patient safety concern due to the millions of patients worldwide seeking emergency care on an annual basis. The issue stems from a gap between public demand and available physical, human, and institutional resources. Overcrowding in EDs threatens patient safety and public health by jeopardizing patient care and the overall reliability of the emergency care system.

Waiting times put patients at risk for deteriorating prognoses, longer than necessary hospital stays, substandard care, and death [1]. Also, patients who remain in the ED for long times tend to face greater financial costs and report lower satisfaction with their quality of care [2, 3]. Increasing healthcare utilization results in exorbitant direct and indirect expenses for both the patient and the healthcare system. Costs are rising as a result of cyclical use of inpatient and ED services due to delayed diagnosis and a lack of access to therapy. As a result, the quality of care decreases and adverse outcomes may demand further medical interventions and resources, boosting expenses even more [4]. Prolonged LOS in the ED is also linked to higher hospitalization, hospital-acquired pressure ulcers, prescription mistakes, and death. These factors influence costs by potentially increasing expenditures due to increased length of stay (LOS), as well as concerns for patient safety [5].

Traditional ED quality development initiatives typically center their attention on structures, processes, and outcomes, such as the average length of time a patient is kept waiting, the proportion of patients discharged without being seen by a doctor, and the number of patients treated at any given time. Although these factors should be considered to develop a superior ED that improves the health system, it is essential to recognize how patients experience their care. It is of the utmost importance to ensure that patients are discharged from the ED with a sense of contentment regarding the level of care they have received and the quality and individualization of the requested services [6]. Several strategies for overcoming this problem have been demonstrated, including demand management and the implementation of system-wide process objectives such as the "4-h rule," "fast-tracking," "enhanced triage," and "overlapping shifts," as well as new models of care such as the introduction of nurse practitioners and physician assist triage aimed at increasing input [7].

Among the potential solutions that are receiving a lot of attention is the patient-centered care (PCC) model which focuses on patients first and foremost [8]. Although PCC has become increasingly important across a variety of healthcare contexts, emergency medicine must still reevaluate its approach to incorporate this priority into its practice.

According to the Institute of Medicine (IOM), patient-centered care is the delivery of medical treatment that recognizes and addresses each patient's specific preferences and requirements while ensuring that the patient's values are the guiding principle for all therapeutic decisions. Patient-centered care in emergency care maintains and responds to the demands and needs of patients and their families; a willingness to participate in and assist decisions regarding the care they receive; to continue being educated and well-informed about their care; to communicate with their care healthcare professionals; confidentiality; comfort; and expectations [9].

PCC techniques interact with patients holistically by integrating various aspects of care, including medical, psychological, and social dimensions. By focusing on individualized care, shared decision-making, and building a strong therapeutic alliance, PCC ensures that the broader context of the patient's life is considered, leading to more effective and comprehensive care delivery [10]. PCC was introduced and investigated in a wide variety of areas of healthcare, including but not limited to nursing, cancer care, pediatrics, long-term care, mental health, primary care, and other related disciplines. To guarantee that PCC is meaningfully practiced, it requires efforts on all levels, including the patient, the provider, and the healthcare system [6].

Patient-centered care can be evaluated based on how well it meets three main criteria: patient satisfaction, patient engagement, and personalized treatment. Patient satisfaction is the most apparent indicator as it incorporates both domains mentioned earlier, and in certain respects, it encompasses each of the six quality pillars as well (effective, timely, efficient, safe, patient-centered, and equitable) [9].

Engagement is the second aspect of PCC; it focuses on the decision-making processes that consider patients' preferences and beliefs. Third, personalized treatment, where patient's care is tailored to individual patients' requirements.

This research conducted a systematic literature review on PCC models and assessed the effectiveness of these models in reducing emergency room waiting times by synthesizing the available evidence, and this study will shed light on the efficacy of patient-centered care models and their potential to improve ED treatment outcomes.

Table 1. Sample search strategy

#	Database name	Search dates	Number of articles found	Number of articles included
1	PubMed	1 Apr 2023	1,549	21
2	MEDLINE	5 Apr 2023	454	6
3	Embase	10 Apr 2023	398	0
4	Scopus	15 Apr 2023	270	0
5	Web of Science	17 Apr 2023	265	0
6	CINHAL	17 Apr 2023	178	0
Total articles			3,114	0

Research Objectives

The objectives of this research were to identify patient-centered care models implementation in hospital settings, to assess the effectiveness of patient-centered care models in improving patient outcomes in hospital settings, and to investigate the impact of prolonged waiting time on healthcare utilization in the ED.

Methods

This systematic review applied the qualitative framework analysis method to define concepts, map the range of phenomena, create typologies, find associations, explore explanations, and develop new ideas to achieve these goals. In the initial stages of this project, we conducted an unstructured literature review to identify any systematic reviews that investigated the review title. But no reviews were then identified. Then we developed a systematic method of identifying problems, which we identified as being the complexity of concepts, contexts, and potential impacts associated with PCC frameworks. The study used the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement which has been updated to PRISMA 2020, a reporting guideline designed to address the issue of inadequate systematic review reporting [11].

In this study, computerized databases were searched to find related publications, which included PubMed, MEDLINE, Embase, Scopus, Web of Science, and CINHAL between April 1, 2023–April 17, 2023. A manual search of the bibliographies of the indicated publications and necessary material to meet the objectives of this study was conducted.

A combination of Medical Subject Headings (MeSH) terms and keywords related to patient-centered care and ED wait times were used to maximize specificity and sensitivity with these electronic searches were as follows: (MeSH): "Patient-Centered Care," "PCC in Emergency department," "Emergency room," "ED," "ER," "waiting time." This review includes studies published in English between 2013 and 2023 (Table 1).

In order to be included, an article had to be: full text, published in English, peer-reviewed, address the evaluation of the effectiveness of the PCC model in reducing ED wait times, and evaluate the effectiveness of the PCC model in ED. Studies were excluded if they were abstracts, not fully available, published in any language other than English, were not peer-reviewed, did not meet the date of search, and were systematic reviews.

Screening and Data Extraction

Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram is shown in Figure 1 [12]. The search strategy process used the PRISMA flowchart, where a total of three thousand and one hundred fourteen articles were initially found, then duplicated articles were removed and that was followed with an inspection of the titles, abstracts, and executive summaries separately. After that, the remaining abstracts were evaluated by two team members who separately used the inclusion/exclusion criteria, and full texts were acquired when abstracts were insufficient. All the articles that satisfied the predefined inclusion criteria were independently assessed for risk of bias by two independent reviewers. When there were disagreements amongst reviewers, the reasons were determined, and a final conclusion was reached based on a third senior reviewer agreement. Finally, full-text retained references were obtained and appraised against inclusion and exclusion criteria.

Then, the entire text was reviewed, and information was gathered on the context, characteristics of the sample, goals, design, and outcomes. Excel was used to create a form that iteratively extracted all necessary identifiers (online suppl. Table; for all online suppl. material, see https://doi.org/10.1159/000540398). Information on the study's methodology, population, location, country, approach, results, and recommendations, as well as citation details (author names, publication year, title, type of publication). Each study was analyzed for additional data on patient satisfaction, experience measures, waiting times, crowding, LOS, and other outcome measures.

Although each article offers a unique perspective, several key themes emerged from the synthesis of the findings, and each approach was assigned to a primary PCC approach theme, such as patient literacy, quality improvement tools, technology, Emergency Severity Index (ESI) based flow, advanced professionals, and others. After undergoing a data reduction process, interventions that shared a theme were grouped and subdivided into conceptual groups.

Results

Screening and Data Extraction

During the screening process across different databases, a total of one thousand five hundred and forty-nine articles were extracted from PubMed and twenty-one of
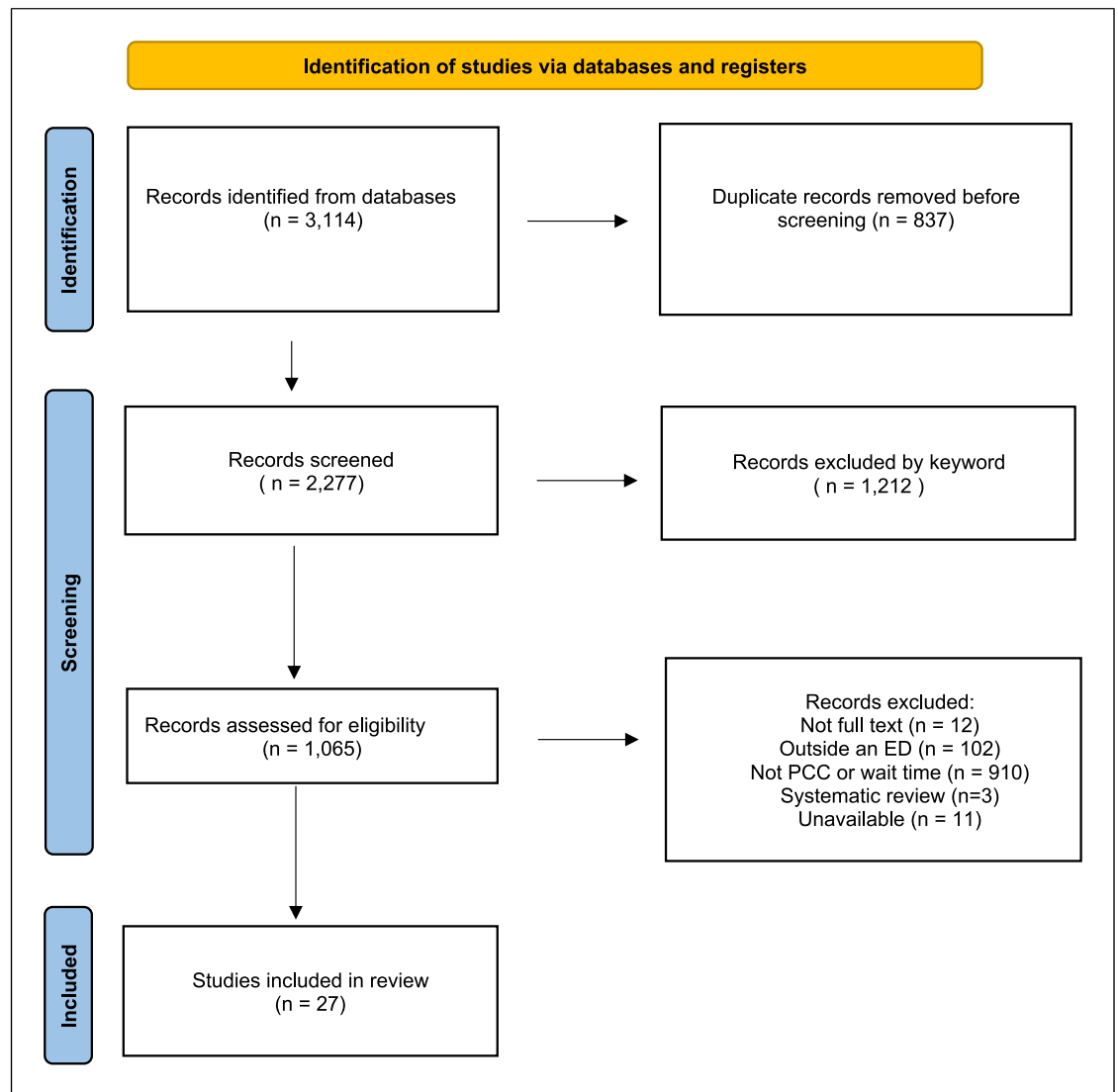
Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram.

them were included in the current review. From MED-LINE four hundred and fifty-four articles were found but only six were included in the study. Articles found in Embase three hundred and ninety-eight, Scopus two hundred and seventy, Web of Science two hundred and sixty-five, and CINHAL one hundred and seventy-eight, none of them were included in the present quest.

Three thousand and one hundred fourteen studies were imported for screening. Eight hundred thirty-seven duplicate records were removed before the screening process. One thousand two hundred and twelve records were excluded through keywords, one thousand sixty-five were assessed for eligibility in the full-text phase, and twenty-seven studies were included in the data extraction

phase for reviewing. The exclusion criteria were based on many causes, which were no patient-centered care and/or the waiting time ($n = 910$), the setting was not ED ($n = 102$), a full-text article was unavailable ($n = 12$), systematic review ($n = 3$), and unavailable records ($n = 11$) (shown in Fig. 1).

The current review used twenty-seven studies of different natures and countries. Coverage of different article types was achieved as possible. Six experimental studies were reviewed, six longitudinal studies, four literature reviews, two observational studies, two mixed methods approach, one of each survey, cross-sectional study, quasi-experimental study, mixed method survey, retrospective analysis, exploratory qualitative, quantitative
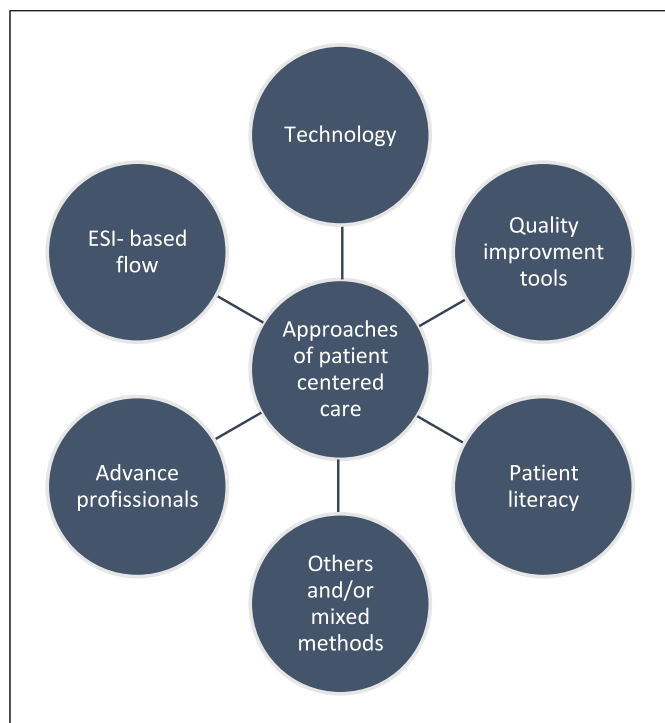
Fig. 2. Different approaches to patient-centered care.

study, and mixed methods experimental sequential design with integration of findings (online suppl. Table).

A large number of countries were included in the current review, which was the USA (*n* = 8), Canada (*n* = 4), KSA (*n* = 3), and a single study from each of the following: Singapore, India, Israel, Portugal, Tunisia, UAE, China, Australia, Finland, Switzerland, Egypt, and the Netherlands (online suppl. Table). All studies included patient and/or healthcare professional populations with ED experience. Twenty-three studies included populations related to adult ED care, two studies included populations related to pediatric ED care, and two studies related to older patients at ED (online suppl. Table).

Interventions Were Taken to Achieve Patient-Centered Care as Currently Reviewed in the Literature
In all articles that have been reviewed in the current review (shown in Fig. 2), interventions taken to achieve patient-centered care can be categorized into six different approaches defined below.

Patient Literacy
According to a recent study, a notable portion of patients are unfamiliar with the triage system and unaware of the reasons why some patients are prioritized over others

in the emergency room, even if they have been waiting for a shorter time. Additionally, most patients prefer to receive regular updates on delays, often requesting updates every half-hour. Furthermore, a significant number of patients lack a designated primary care physician, underscoring the critical role of primary health care (PHC) in enhancing overall community health and mitigating mortality and health disparities [13, 14].

Quality Improvement Tools
Lean Six Sigma is a management philosophy that combines Lean Manufacturing and Six Sigma strategies to enhance patient care by decreasing medical errors, reducing waste and waiting time, and improving satisfaction levels in the health sector. According to Al-Zuheri et al. [15], its application has shown a positive impact on patient satisfaction levels.

To improve patient experience scores in pediatric emergency care, a multidisciplinary team consisting of pediatric emergency medicine nurses, physicians, and hospital quality improvement personnel was assembled. The interventions included rounding in the waiting and examination rooms, staff training, team huddles, and the formation of a cross-department committee.

The sub-scores of interest included physician performance, activities for patients to perform in the waiting room, waiting time for radiology, staff sensitivity, and communication about delays. Over 6 months, the overall patient experience score significantly improved from 86.1 to 89.8, as reported by Emerson et al. [16].

Additionally, Hammoudeh et al. [17] conducted a pre-and post-lean design study to evaluate the effectiveness of a Lean technique alone or combined with the Priority Admission Triage (PAT) program to reduce the admission waiting time of the emergency medical ward. The interventions included a structured re-design process, enhanced communication with the medical department, a new high-sensitivity troponin-T (hsTnT) blood test, and the implementation of the PAT program. The results showed significant reductions in triage waiting time, end waiting time for consultation, and admission waiting time of Emergency Medical Ward. The study concluded that lean management and the PAT program improved patient flow in the ED, enhancing high-quality emergency care and patient satisfaction.

Furthermore, Saleh et al. [18] employed Quality Function Deployment, a Six Sigma design, to reduce the average waiting time for all types of ED patients. The study found that guidelines and standards were dominant factors that should be considered to reduce the waiting time. One way to employ ED guidelines is to classify patients based on their clinical status.

To reduce the wait time to triage, Yuzeng and Hui [14] conducted a study to determine the effectiveness of implementing a series of Plan, Do, Study, Act (PDSA) cycles within 1 year. The interventions included refining triage criteria, forming a triage nurse clinician role, conducting a needs analysis of required nursing manpower, and eyeball triage by senior nurses to facilitate direct bedding of patients [14]. The study showed a 28% reduction in the wait time to triage from a baseline duration of 18 min to a post-implementation period of 13 min.

Technology

The implementation of a stochastic mixed-integer linear programming (MILP) model is effective in improving patient flow and increasing patient satisfaction by significantly reducing the average total patient waiting time from patient arrival in the ED until hospitalization. The model considers time constraints and efficient planning of the limited available resources to ensure that the system's demands are met. Specifically, the model focuses on optimizing 6 main patient queues or activities in the ED, namely triage, general assessment, surgical assessment, auxiliary examinations, life-threatening emergencies (SAUV), and bed assignment. The proposed approach has been demonstrated to successfully reduce the average patient waiting time [19].

Artificial intelligence (AI) has also been employed to enhance hospital operational efficiency, particularly in EDs, resulting in a reduction of the average LOS by 15% when employing the genetic algorithm (GA). Predictive AI models have been utilized in predicting patient inflow into EDs, readmissions into EDs, disease or other outcomes, and in-patient mortality, which can optimize hospital resources and increase patient satisfaction through patient monitoring. Specifically, the prediction of waiting times and appointment delays is particularly useful in achieving these goals [20].

Furthermore, the implementation of AI and Natural Language Processing in the Firstpass technique has facilitated innovative patient flow and feedback modules. Firstpass is a software technology platform that enables hospitals to measure patient experience covering both in-patient and out-patient, enabling providers to take corrective and preventive remedies. This platform unlocks real-time patient data insights, including wait times, care time, and transit time, and provides providers with a view of the facility's situation, including the department's patient crowd, understaffed areas, and utilization of overstaffed areas [21].

Furthermore, a systematic review was conducted by performing a comprehensive search of bibliographic databases, which included 19 articles. The review identified five categories of proposed strategies for improving patient flow and overcrowding in EDs: work organization, investment in primary care, creation of new dedicated professional figures, work, structural modifications, and implementation of predictive simulation models using mathematical algorithms. The most effective measures to improve the flow of patients were found to be improving the efficiency of human resources and developing predictive mathematical models [22]. However, to enhance the patient experience in pediatric EDs, a mobile health (mHealth) app called Info Kids was developed based on patient-centered care principles. An evaluation of the app's usability was conducted by potential end-users, and the results showed good effectiveness and overall good to excellent perceived usability. However, an ergonomic evaluation identified 14 usability problems that need improvement [23].

Developing a system called myED provided patients with real-time, dynamic, and updated information about their ED medical journey, including specific procedures and expected waiting times. Patients could access this information on their mobile phones through a responsive website, and their understanding of the ED journey improved significantly after using the system. This helped address patients' psychological needs for information and understanding, which is often overlooked [24].

Point of care testing (POCT) was studied as a tool to reduce the LOS in ED non-ambulatory patients. The results showed that POCT shortened the laboratory process, reduced waiting time for blood sampling, and allowed patients to be discharged home quicker than central laboratory testing. With proper training and education of the ED care team, POCT can be an effective tool for improving patient flow [25].

Emergency Severity Index-Based Flow

Split Flow and PCC. Split flow by an intake attending physician with numerous internal waiting spaces can provide significant benefits. LOS dropped by 54 min, and D2P decreased by 16.6 min compared to a conventional ED with ESI-based flow and a single waiting room, as shown by a DES simulation of a single ED.

A 2-factor analysis study design examined the interaction of 3 flow models (split by Emergency Severity Index score, split by a physician, and no split) with three sub-waiting area types (no sub-waiting, one sub-waiting, and two sub-waiting). This decreased LOS by 54 min, and D2P was reduced by 16.6 min compared to

a conventional ED with ESI-based flow and a single waiting room. ED flow and physical design modifications have significant potential to improve operational and patient-centered metrics. Adding sub-waiting areas and using a physician to split flow, as opposed to ESI score sorting, significantly improved operational and patient-centered metrics [26].

Advance Professionals

Hourly rounding has been found to positively impact patient satisfaction in the ED setting. In a trial to increase patient satisfaction scores, nursing staff actively provided frequent updates to patients. This intervention resulted in an increase in overall patient satisfaction from 52 to 73%, an increase in perception of staff attitude from 70 to 84%, and an increase in the percentage of patients who felt their questions and concerns were addressed by the healthcare team from 63 to 81% [27]. To further improve patient flow and satisfaction, some EDs have introduced a specific nursing role for patients in the waiting room. This has resulted in better communication and improved patient safety, ultimately leading to more patient-centered care [28].

Others and/or Mixed Methods

Individualized Care Plans and Care Transition Interventions to Deal with Patients Suffering Chronic Pain so Targeting ED and How This Raises the Crowdedness of ED. An exploratory qualitative study design was used to explore the reasons for those frequenting the ED to treat chronic pain, as their rate is about 42% of all ED visits. Four themes emerged from the qualitative data analysis: time of day, pain intensity, barriers to and reasons for using the ED for care, and lack of an individualized care plan [29].

The Qualitative Patient Journey Method for Older Patients and How It Affects Their ED Experience. The perspective and experience of older patients are critical to consider in ED, and this can be achieved via the qualitative patient journey method. This method included the patient's voice in many issues like waiting time and hospital discharge instructions. Health status, social system, contact with the general practitioner, aftercare, discharge, and expectations were the five main themes in the study. The two significant findings were that lack of clarity regarding waiting times and suboptimal discharge communication contributed to negative experiences. Recommendations regarding waiting time (i.e., a 2-h time out at the ED) and discharge communication (i.e., checklist for discharge) could contribute to a positive ED experience and thereby potentially improve patient-centered care [30].

SurgeCon (Pragmatic, ED Management Platform). SurgeCon is a pragmatic ED management platform that includes a series of interventions that improve ED efficiency and patient satisfaction. The Canadian ED provides timely emergency care and improves ED patient flow in the rural context. This was achieved in a rural community hospital ED over 45 months. The intervention involved Lean training, fast-track implementation, a patient-centeredness approach, a door-to-doctor approach, performance reporting, and an action-based surge capacity protocol. There was a significant decrease in physician initial assessment time, LOS for departed patients, and left without being seen [31].

Discussion

The hospital is a complex community facing challenges related to medical and economic barriers due to increased service demand, high costs, limited budget, and healthcare resources [19]. The ED crowd affects patients greatly and makes them wait for a long time to be examined by health care members, which passively affects overall patient satisfaction levels and gives them a bad impression of health care service [19].

Long waiting times in ED can be life-threatening as sometimes one minute means a lot in an urgent case in ED [15]. One major factor behind the long waiting times in ED is the steadily increasing visits worldwide, which may be related to many causes like the aging of the population, limited access to medical care from other resources, and high rate of use of ED for nonemergency care [19].

Identification of a PCC Model Implementation in a Hospital Setting

The health care decisions and actions are all targeted toward patient benefits, needs as well as satisfaction, which is termed patient-centered care (PCC) [32]. Patient-centered care can exert a very impressive role contribution to EDs [6]. Patients should receive integrated care that addresses their clinical, emotional, financial, and psychological needs.

Factors such as the healthcare system's mission, leadership, and quality improvement impact patient-centered care [32]. In addition, enhanced communication between healthcare providers and patients, education of the staff, and involvement of the patient/family in information sharing and decision-making makes them feel comfortable, respected, and trusted [6]. Moreover, patient and family preferences, cultures, and socioeconomic conditions should be taken into consideration [32].

To improve patients' experience in the ED, interventions targeting long waiting times were reviewed. Reducing wait times can help alleviate overcrowding. Healthcare institutions use different methods and tools to improve performance and quality [15].

Among the key elements affecting patient satisfaction levels in the ED waiting room was increased knowledge of triage systems [13, 14], which comes in agreement with a study documented by Shah et al. [33]. In addition to the provision of information about health education topics during the waiting time, which is consistent with Penry Williams et al [34]. Moreover, information on how the ED operates is delivered through a video in the waiting room, and educational videos during ED visits were also associated with increased patient satisfaction [34].

In addition, it was reported that the availability of primary health care (PHC) helped a lot in decreasing the flow of patients towards ED which decreased crowdedness in ED and hence decreased the waiting time as well [13, 14]. In line with these results, there was a recent study that reported that placing primary care staff in the ED to triage patients significantly reduced waiting time in the ED or time to return home.

In Saudi Arabia, primary healthcare (PHC) was neglected, leading to overcrowding in EDs. To address this, the KSA government introduced the 2030 vision, which aims to promote the use of PHC as a first point of contact by expanding family medicine residency programs across the country [13].

Effectiveness of the PCC Model in Improving Patient Outcomes in the Hospital Setting

It was found that median LOS, door-to-doctor time, number of left without being seen patients, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) top box %, and Yelp overall rating were improved after the intervention of the lean technique. In turn, this greatly facilitated ED throughput for admissions and increased bed availability [35]. This is in line with a review article that reported that the Lean Six Sigma approach significantly decreased patients' waiting time, hence raising their satisfaction level [15].

To establish a suitable and perennial environment for Lean application, continuous improvement should be done [36, 37] and training on lean techniques should be applied to all team members while encouraging them to propose and implement ideas for problem-solving [38]. Moreover, continuous and efficient communication also helps in spreading this culture [39]. Although Lean succeeded in overcoming some challenges in ED such as waiting time and LOS in hospitals [40], some solutions to improve patient flow management were disrupted by the lack of managers' engagement and teams in project implementation [41].

The American Academy of Pediatrics, American College of Emergency Physicians, and the Institute of Medicine endorsed that understanding and enhancing patients' experiences in the pediatric ED is an essential dimension of providing high-level patient and family-centered care. Rochat et al. [23] reported that using the mobile app was documented to aid in supporting patients in pediatric settings who are suffering from long waiting times in ED, which increased their satisfaction level.

Similar to other health information technologies, the benefits of apps can only be achieved if end users intend to adopt them [42]. Although usability has been identified as a key component of good practice in the development of digital apps [43], only a small fraction of medical apps published their usability evaluation results, despite their growing number [44].

One other important arm of ED crowding is the increasing number of older people with complex medical and social situations who visit the ED [45]. As declared by Schouten et al. [30], older patients globally account for up to 30% of all ED visits, and this proportion will continue to increase. In addition, up to 22% of older patients who visit the ED were reported to have a return visit within 30 days. Older patient perspectives and strive were involved to achieve PCC at the ED. Furthermore, it was documented that the two most apparent issues with older patients' experience were the waiting time and discharge communication, which was in line with many other studies on patient experiences at the ED as described in literature reviews [46]. In agreement also with our study, a recent study illustrated that older patients denoted many themes in the ED which include prompt triage, seamless, fast, and efficient services, and preferences for a segregated ED with separate services for older patients [47].

Studies have shown that perceived waiting times and not being informed about the waiting times have a larger impact on patient experience and satisfaction than objective waiting times which indicates that clear communication to make sure that patients do not feel like they are forgotten and excluded, is very critical to their satisfaction. Patients judged that the return visit reason mostly was related to the initial visit reason as well. Some patients reported negative experiences in the form of insufficient discharge instructions and/or aftercare. Based on this, it critically suggested that some patients might have not received optimal ED care during the initial visit [30]. Worth mentioning that about 30%–40% of ED return visits could be prevented with appropriate and adequate discharge instructions and aftercare [48].

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The Impact of Prolonged Waiting Time on Healthcare Utilization in the ED

Long waiting times resulted in many adverse events for patients such as delayed access to treatments [49] which resulted in their dissatisfaction [50], poorer clinical outcomes [51, 52], with increased costs [53]. In addition, a feeling of inequality occurs among patients [51, 54] which consequently raise the patient's anxiety [55].

For patients with chronic health conditions, there may be a cumulative burden from waiting time so they may spend more time out of the workforce, hence worsening their socioeconomic levels. Based on this, there will be a higher disease burden that increases healthcare resource utilization [56].

Conclusively, the findings of this review are constrained by the quality of data reported in the retrieved studies, as well as the limited evidence available. In some quantitative articles, there was a lack of effect sizes or significance levels, which prevented us from providing this information. The absence of quantitative evidence also precluded us from conducting a meta-analysis to strengthen our results. It is possible that opposing evidence was not available due to publication bias, as articles aligned with current evidence are more likely to be published. Additionally, our search was limited to peer-reviewed articles in English, potentially resulting in the exclusion of articles in other languages or non-peer-reviewed sources. Furthermore, the inclusion of studies with small sample sizes may limit the generalizability of the findings to other populations. In the future, more quantitative evidence is needed to gain a better understanding of the impact of PCC on patient outcomes. As new information becomes available regarding PCC and waiting time in the ED, the strength of the evidence produced by this review should be reevaluated.

Conclusion

Patient-centered care is a holistic approach to forming a trusting relationship between patients and care providers; this is achieved via providing care that includes patient involvement, communication, well-trained staff, and meeting all patients' psychosocial, physical, emotional, medical, social, cognitive, and cultural needs. To reach a well-organized and successful PCC many axes should be targeted at the same time, like improvements to healthcare providers and increasing their qualifications along with dealing with patient needs to shorten the process rather than application of one thing alone.

Developing new techniques and coping with advances in technology have a very impressive effect on patient satisfaction like developing a mobile app that targets their appointments in the hospital ED and contains all their data. The role of artificial intelligence cannot be ignored in the setting of PCC as when it is applied it reduces the average length of stay and helps in predicting the waiting time and appointment delays which optimize hospital resources and increase patient satisfaction via patient monitoring. As a result of the application of patient-centered care in the ED, waiting times are reduced greatly.

Limitations

The reported results did not include quantitative findings due to the nature of the objectives of this review that dictated using the qualitative framework analysis method with the included papers. In addition, our search was limited to peer-reviewed articles in English, potentially resulting in the exclusion of articles in other languages or non-peer-reviewed sources.

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Assessments of the Quality, Understandability, and Actionability of Arabic Web-Based Content on Oral Cancer and Precancerous Disorders

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Abstract

Introduction: Empowering high-risk individuals to oral cancer and potentially cancerous disorders with written health information is needed for early detection of mucosal changes and self-care. This infodemiological study aimed to assess the web-based and Arabic content related to these disorders when quickly searching the internet. ***Methods:*** The top 20 websites yielded from each of the 7 searches were initially screened for eligibility (oral cancer, leukoplakia, erythroplakia, oral submucous fibrosis, oral lichen planus, oral lichenoid lesions, and oral graft-versus-host disease). These related to search terms written for healthcare consumers were assessed for website characteristics, quality criteria (4 JAMA benchmarks [authorship, attribution, disclosure, and currency] and Health on the Net seal), and understandability and actionability (Patient Education Materials Assessment Tool). The latter was scored from 0 to 100% based on meeting the criteria. Data representation and analysis were performed using Microsoft Excel and IBM SPSS. ***Results:*** Of the screened 140 websites, 70 (50%) were included in the analysis for all search terms, with oral cancer and lichen planus yielding the most relevant websites (19 and 17, respectively). Commercial and not-for-profit organisations created 50% of the analysed websites. The analysed content was mainly presented as medical facts (71%), often without presenting audiovisual aids (61%). The average JAMA benchmarks achieved per website were 2.5 out of 4, of which "disclosure" and "attribution" were often missing in more than 70% of these websites. Content related to oral cancer and leukoplakia considerably obtained higher average quality benchmarks than other disorders. Acceptable levels for understandability and actionability (≥70%) were found in 52% and 15% of all materials. ***Conclusion:*** Patients with these oral disorders seeking web-based information before or after healthcare visits are unlikely to find sufficient and reliable content they can understand and act upon accordingly. Thus, healthcare stakeholders may consider creating and integrating reliable information resources within the health services to support the patients' informed decision-making on their care plans and to maintain value-based healthcare services in line with Saudi Arabia's healthcare transformation vision for 2030.

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Plain Language Summary

Patients with mouth skin changes, that raise the risk of mouth cancer, may search the net to find information to help them care for themselves and to ask for help – if they

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think a doctor visit will benefit them. There are good reading sources for Arabic health information about mouth health, but they are usually short and not enough. Also, the language can be difficult to understand and remember. To solve this, health professionals must create information about mouth diseases and make it available online to supplement what they have received during the clinical visits.

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Introduction

Oral cancer (OC), mainly in the form of oral squamous cell carcinoma, remains a disease of concern to the affected individuals and healthcare services around the globe due to its high mortality and morbidity [1, 2]. In the Arab world, it is estimated that OC affects up to 1.8–2.3% of 100,000 of the population [3, 4]. These rates were comparable in Saudi Arabia, with an estimated incidence rate between 1994 and 2015 at 2.9/100,0000, distributed similarly between females (1.4 and 1.5 per 100,000, respectively) [5]. However, these rates might be higher considering other cancers affecting the oropharyngeal area, such as salivary gland neoplasms, leukaemias, and lymphomas [3]. Moreover, the population studies also indicated an increased age-specific incidence rate among females in their third to sixth decade and males aged 75 years old and above [5]. Regional differences within Saudi Arabia were also notable, with Jazan and Hail regions recording the highest and lowest OC incidences, respectively [5]. Such differences are likely due to dietary risk factors adopted in some regions, such as using smokeless tobacco (e.g., Shammah) and Khat plant (Catha edulis) [5, 6].

Many cases of oral squamous cell carcinoma are likely preceded by precursor oromucosal lesions collectively referred to as oral potentially malignant disorders (OPMDs) [7]. These include leukoplakia (LP), erythroplakia (EP), oral submucosal fibrosis (OSF), and oral lichen planus (OLP) [8]. Recently, oral graft-versus-host disease (OGvHD) and oral lichenoid lesions (OLLs) have been considered among the antecedent disorders that increase the risk of malignant transformation [8]. A systematic review indicated that this malignancy risk ranges between 4 and 11% for all OPMD subgroups and increased annual risk based on the presence and degree of oral dysplastic changes [9]. Recognised risk factors are similar to those associated with an increased risk of OC, such as using tobacco and drinking alcohol, chewing areca nut and betel quid,

autoimmune disease (e.g., oral lichenoid changes), genetic disease (e.g., dyskeratosis congenital), and possibly human papillomavirus [10].

Regarding their prevalence, OPMDs are estimated to affect 3.7% of a Middle Eastern population, which is lower than their counterparts in Asia (10.5%) but slightly similar to those in South America/the Caribbean (3.9%) and Europe (3%) [11]. In Saudi Arabia, little is known about the population-based epidemiological and socio-demographic characteristics required to inform the national intervention strategies for individuals with these disorders [12]. Among tobacco users, up to 10% of adults attending dental clinics were found to have at least one of these disorders in Saudi Arabia [13]. Despite the methodological heterogeneity of assessed studies, a recent review indicated that prevalence rates of LP, OLP, and EP were between 0.2% and 11% among the studied populations in Saudi [12].

Preventive measures to reduce the malignant transformation and early detection of oromucosal changes include periodic monitoring and providing high-risk individuals with tailored information about worrying symptoms that require urgent care [12, 14]. However, patients and clinicians might not always agree on what information they need about these disorders or what is important [15]. With the widespread use of the internet and its reachability, individuals with these disorders are likely to seek online information before or after healthcare visits to understand their oral health better [16, 17]. Concerning OC and OPMDs, patients may look for information about their unsettling or distressing symptoms (e.g., ulcerative or erosive lesions in the mouth), lowering risk factors (e.g., a reasonable amount of alcohol consumption), screening and diagnosis (e.g., where to go for screening and evaluation), management options, and making informed decisions about their care plans [16, 18, 19]. The websites of academic institutions, government-funded or private hospitals, professional associations, hospitals, and not-for-profit organisations often provide various information concerning these disorders [18, 20]. However, concerns remain about content quality, comprehensibility, understandability, and actionability regarding OC and OPMDs in different languages [17, 20, 21].

Numerous tools are available to assess health information, with some specific to web-based health information [20]. Adopting these tools is often based on their usability, generalisability (e.g., generic or disease-specific instruments), whether an instrument can measure whether it is intended with no errors, interpretability of

the yielded scores, and user-friendliness [20, 22]. For instance, some mainly aimed to assess the quality of online information content and design (e.g., DISCERN, HIWET, LIDA, QUEST, Self-Assessment Method, and TEMPtED), health information in general (e.g., EQIP), health literacy demands (e.g., Health Literacy INDEX), and health reports to laypeople (e.g., ISQ and QIMR) [23–33]. Others have tailored their assessments for information about specific health topics, including Alzheimer's disease, diabetes, and medications [34–36].

Moreover, the Journal of American Medical Association (JAMA) quality benchmarks are considered suitable for assessing the quality of health information, including those related to oral diseases [37, 38]. Unlike many instruments that lack assessments of whether a reader can understand and act upon what they read, the Patient Education Materials Assessment Tool (PEMAT) showed good psychometric properties to assess the understandability and actionability of health-related materials [39, 40]. Currently, no up-to-date studies comprehensively analyse Arabic web content about oral and dental illnesses, particularly OC and OPMDs. Previous work on these conditions was conducted in another language or did not assess the understandability and actionability of OC and OPMD materials [16, 41, 42]. Therefore, this infodemiological study aimed to assess the characteristics, quality, actionability, and understandability of information about OC and OPMDS when a patient or layperson quickly searches the internet.

Materials and Methods

This was an online-based assessment of the content, quality, understandability, and actionability of Arabic information concerning OC and recognised OPMDs using the most commonly used search engine for health information and often yields the highest related health content (https://www.google.com) [8, 41, 43].

Search Terms
OC and 6 OPMDs (oral leukoplakia, oral erythroplakia, oral lichen planus, oral lichenoid lesions, oral submucous fibrosis, and oral graft-versus-host disease) were searched following the Arabic terms used in daily clinical consultations, the Unified Medical Dictionary [44], and online translation encyclopaedia (https://www.tbeeb.net). Given that visitors spend 5–6 min on average and often visit the first 10 websites related to health information in search engines [41, 45, 46], the first 20 websites of each term were accessed in 1 day (November 9, 2024) and archived for the assessments to avoid periodic content changes (online suppl. Files 1 and 2; for all online suppl. material, see https://doi.org/10.1159/000539051).

Inclusion and Exclusion Criteria
All websites included information about OC and OPMDs written for patients and the public. Those aimed at healthcare professionals, commercial content related to clinical services or products, broken links or those presented in languages other than Arabic, or included only information about extra-oral involvement of these disorders were excluded [16, 20, 41, 42, 47]. The excluded websites were identified using complex language and terms, reviews of medical literature, and a focus on a specific commercial product or service with limited information rather than addressing the patient or laypersons [20, 21].

Assessment Methods
1. Content assessment: websites were evaluated based on similar previous work on head and neck cancer [48] to (i) website affiliation (commercial, not-for-profit, university or medical centre, governmental or health authority, and news or social media), (ii) specialisation (website is entirely or partially aimed for OC/OPMDs), (iii) content presentation (medical facts, questions and answers, human interest stories, or clinical trials), and (iv) the use of audiovisual materials (image, video, audio, or none).
2. Quality assessment: JAMA benchmarks were used to assess the quality. These include (i) authorship (authors, their credentials, website ownership), (ii) attribution (source/s of information), (iii) disclosure (declaring any conflict of interest, funding sources), and (iv) currency (dates are noted and recent) [37]. Health on the Net (HON) seal, introduced in 1996, is granted to websites that consider 8 criteria: authoritative, complementarity, privacy policy, attribution/reference criteria, dates, justifiability, transparency, and financial disclosure and advertising policy [49].
3. Understandability and actionability assessments: PEMAT for printed (PEMAT-P) and audiovisual (PEMAT-AV) materials were used [39]. Items included in PEMAT-P ($n = 24$) and PEMAT-AV ($n = 17$) aimed to assess the understandability of information (the content, word choice and style, using numbers, organisation, layout and design, and use of visual illustrations) and its actionability. Items were binary rated (agree = 1, disagree = 0), leading to a score for each domain, with some items being rated as not applicable. Total scores given to each domain were separated (all scored points/all x 100) and presented as percentages (highest = 100%, lowest = 0%). Acceptable scores for both dimensions are at or above 70% [39].

Data Analysis and Quality Assurance
Descriptive analysis (mean [±SD], median, and percentages) was performed for the study variables on each assessed website. Data were initially represented and coded using Microsoft Excel (v. 16) and analysed using IBM SPSS Statistics (v. 29).

Results

A total of 140 websites were initially identified for the Arabic terms for "oral cancer," "leukoplakia," "erythroplakia," "oral lichen planus," "oral lichenoid lesions," "oral submucous fibrosis," and "oral graft-versus-host

Alsoghier
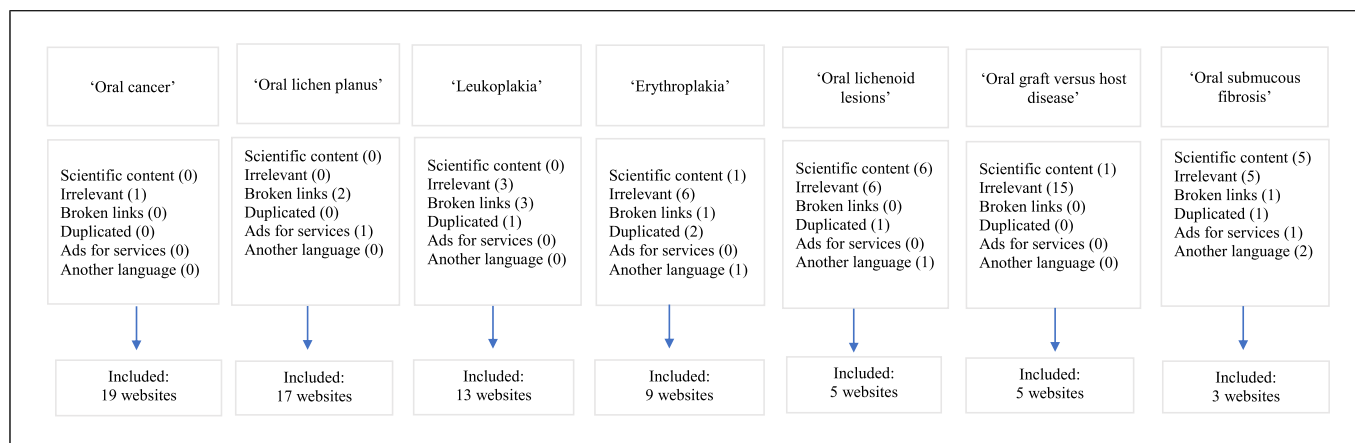
Fig. 1. Analysed and included website concerning OC and potentially malignant disorders.

disease" (online suppl. File 2). A total number of 70 websites were included in the analysis after excluding those with scientific content aimed at health professionals ($n = 13$), irrelevant content ($n = 36$), links that were broken ($n = 8$), duplicated ($n = 7$), advertisements for services or products ($n = 5$), and content presented in languages other than Arabic ($n = 5$) as shown in Figures 1 and 2. Of note, OC yielded the highest number of relevant websites ($n = 19$), followed by OLP ($n = 17$), compared to OSF, which yielded the lowest number of relevant websites ($n = 3$). Regarding the reasons for exclusion, irrelevant content was increasingly encountered in OGvHD searches ($n = 15$), whereas OSF generated the highest scientific content ($n = 5$) and languages other than Arabic ($n = 2$).

Regarding the website characteristics, 50% ($n = 35$) of the 70 included websites were affiliated with commercial ($n = 20$) and not-for-profit organisations ($n = 14$), 100% were partially related to OC and precancer ($n = 70$), 71% presented their content as medical facts ($n = 50$), and 61% presented their content as written information only without audiovisual materials ($n = 43$). Furthermore, the analysis for JAMA benchmarks indicated that 35 of these websites (50%) met the "currency" criteria compared to "disclosure," which was only met by 15 websites (21%). Also, the mean and median number of benchmarks obtained by the analysed websites was 2.5 and 2 out of 4, respectively. The HON seal was only found in only 1 of these 70 websites (Table 1).

The sub-analysis for each searched term showed that OC and LP websites obtained the highest average JAMA benchmarks (3.5 out of 4 for each), and the lowest was noted with OSF and OLL (1.33 and 1.2, respectively). Despite the variation of included websites for each term,

OLP yielded the highest percentage of websites that met "authorship" criteria (58%), OGvHD for "attribution" (75%), OC for "disclosure" (36%), and LP for "currency" (69%) (Table 2).

Figure 3 indicates that only six websites (8%) achieved four JAMA benchmarks, 16 (22%) with three benchmarks, 23 (32%) with two benchmarks, 15 (21%) with only one benchmark, and 7 (10%) with none. Additionally, 57% of OC websites achieved three or more JAMA benchmarks compared to OGvHD (25%), LP (23%), and EP and OLP (22% each). OLL and OSF websites had the lowest scores in meeting three or more of these benchmarks.

Furthermore, the analysis of the 65 screened websites with printed materials using PEMAT-P indicated an overall low understandability and actionability at 63% and 45%, respectively. The six websites with audiovisual materials had relatively higher understandability (83%) and actionability (62%), as indicated by PEMAT-AV (Table 3). The highly rated understandability items for printed and audiovisual materials included making the material's purpose evident (93% and 100%), having informative headers (91% and 75%), breaking the information into short sections (89% and 100%), using visual cues to bring attention for key points (87% and 100%), providing a summary (85% and 100%), presenting information in a logical sequence (83% and 100%), and using everyday language (75% and 100).

PEMAT-P items with the lowest scores included lacking clear titles or captions for visual aids (51%), presenting information or content that distracts from its purpose (58%), and lacking the use of active voice (59%). Also, none of the websites with printed materials have used simple tables to illustrate the management or advice.
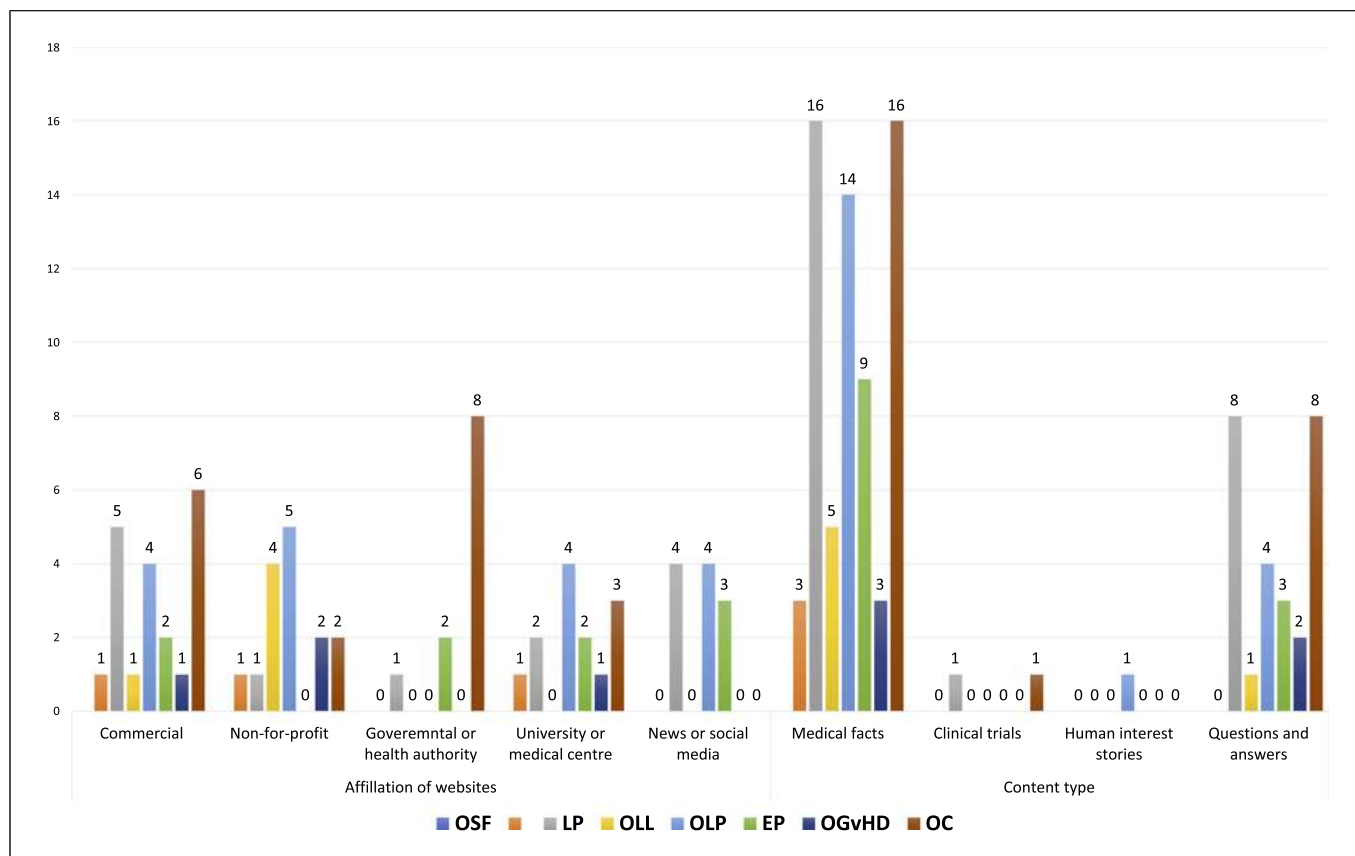
Fig. 2. Visual representation of website characteristics for each searched term.

PEMAT-AV indicated that all understandability items for audiovisual materials had scored 75% or higher (Table 3 and online suppl. File 3).

Concerning the actionability for both materials, most websites identified at least one action the user can take (100% and 87%) and broke down any action into manageable and explicit steps (75% and 87%) but inadequately addressed the user directly when describing actions (67% and 62%). Moreover, none of the websites with printed materials ($n = 65$) has shown simple instructions on how to perform calculations, and none of the websites ($n = 70$) explains how to use charts, graphs, or others to act (Table 3 and online suppl. File 4).

Regarding the acceptable level of PEMAT ($\geq 70\%$) for understandability and actionability, a total of 37 and 11 of the 71 sources have scored this level or higher (52% and 15%, respectively). These were 64 websites with printed information, 6 with AV, and 1 with printed and AV materials. The sub-analysis of PEMAT-P demonstrated that this level was obtained by only 31 (47%) for understandability and 9 (13%) for actionability of the

65 websites. In contrast, 6 (100%) and 2 (33%) of the six websites with PEMAT-AV exceeded this cut-off level for both dimensions, respectively. Despite the low number of websites analysed with AV materials, content related to OLL, OC, OLP, and EP obtained high PEMAT-AV understandability scores (>80%). Furthermore, none of the LP, OSF, and OGvHD searches yielded any AV material (Table 4). Figure 4 also shows the general observations related to (1) web searches, (2) content quality and presentation, (3) language and translation, and (4) declarations among the analysed websites.

Discussion

It was not unexpected that Arabic readers looking for printed and audiovisual sources concerning oral diseases with increased risk for MT and OC will encounter difficulties finding adequate, reliable, understandable, and actionable online content allied to these diseases. It was

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Table 1. The characteristics of the analysed websites (*n* = 70)

Characteristics	Criteria	*N* (%)
Affiliation of websites	Commercial	20 (28.5)
	Not for profit	15 (21.4)
	University or medical centre	13 (18.5)
	Governmental or health authority	11 (15.7)
	News or social media	11 (15.7)
Specialisation of websites	Partially related to OC and precancer	70 (100)
	Entirely related to OC and precancer	0 (0)
Content type[1]	Medical facts	50 (71.4)
	Questions and answers	18 (25.7)
	Clinical trials	1 (1.4)
	Human interest stories	1 (1.4)
Content presentation[2]	No audiovisual materials used	43 (61.4)
	Images	6 (8.5)
	Video	6 (8.5)
	Audio	0 (0)
JAMA benchmarks	Currency	35 (50)
	Authorship	26 (37.1)
	Attribution	21 (30)
	Disclosure	15 (21.4)
	Mean (SD)/median number of achieved benchmarks	2.5/2
HON seal	Yes	1 (1.4)
	No	69

[1]Some websites had one or more content types. [2]Some websites had one or more content presentations.

Table 2. The JAMA benchmark distribution for the included websites for each term

Term	Websites, *n* (%)				Mean total JAMA score
	authorship	attribution	disclosure	currency	
OC	7 (36.8)	7 (36.8)	7 (36.8)	10 (52.6)	3.5
LP	5 (38.4)	7 (53.8)	2 (15.3)	9 (69.2)	3.5
OGvHD	2 (50)	3 (75)	0 (0)	3 (75)	2
EP	4 (44.4)	4 (44.4)	2 (22.2)	7 (77.7)	1.89
OLP	10 (58.8)	5 (29.4)	3 (17.6)	10 (58.8)	1.65
OSF	0 (0)	2 (66.6)	0 (0)	2 (66.6)	1.33
OLL	3 (60)	0 (0)	1 (20)	3 (60)	1.2

EP, erythroplakia; LP, leukoplakia; OGvHD, oral graft-versus-host disease; OLL, oral lichenoid lesion; OSF, oral submucous fibrosis; OC, oral cancer.

noted that English content written for patients with these oral diseases was primarily designed for professionals [16, 17] – the Arabic content was no exception. In line with other similar previous studies in other languages, the found content was sometimes highly irrelevant to the searched disorders, often overlooking or overemphasising the risk of oral MT, and lacked declarations of funding and conflict of interests, and disease-specific information was difficult to understand and acted upon [16, 21, 50, 51]. Moreover, non-specialists and non-humans generally created/translated most of the analysed content (e.g., machine-translated to Arabic). As a result, this may affect
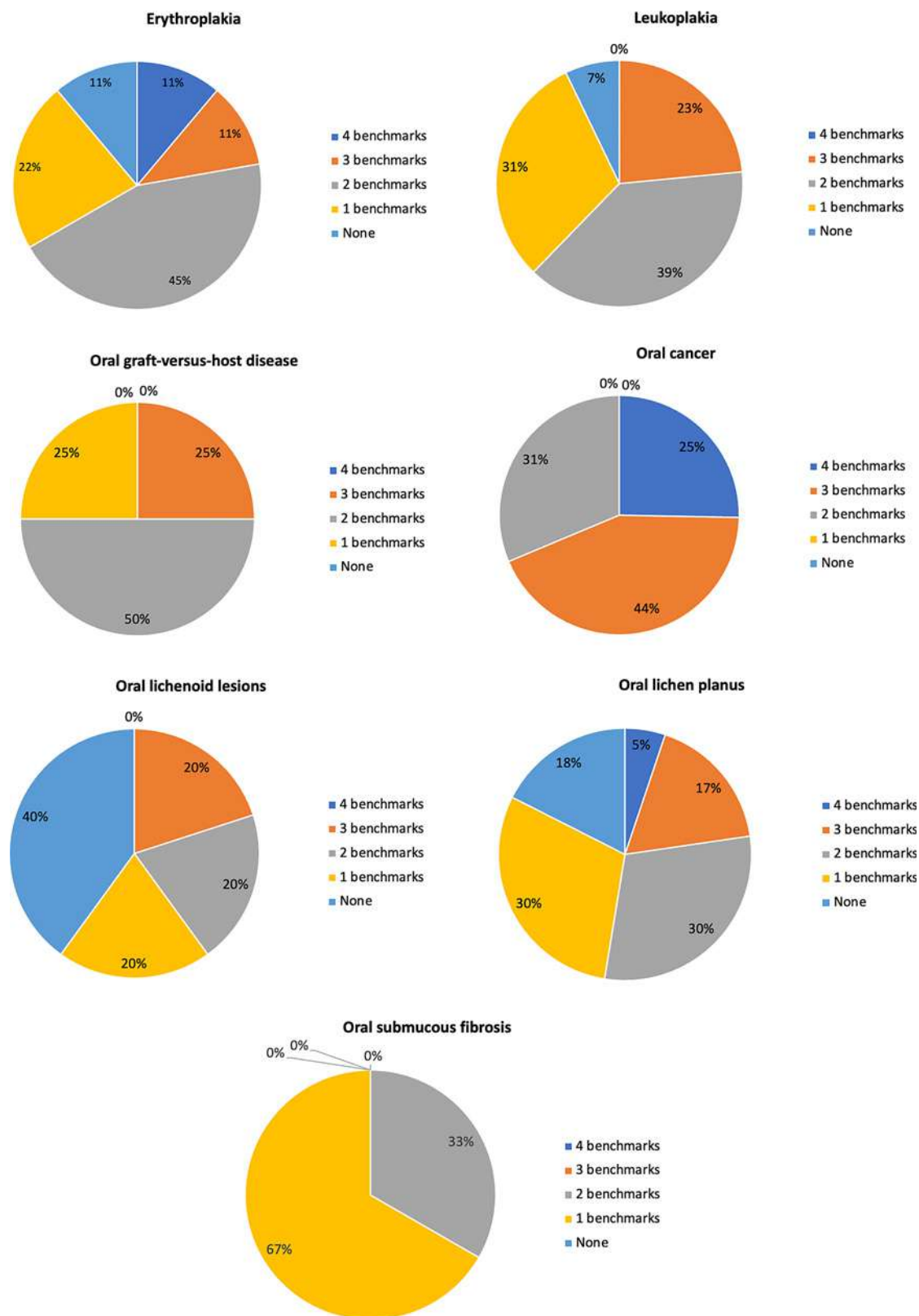
Fig. 3. The percentages of websites are based on the number of obtained JAMA benchmarks for each searched term.

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Table 3. The mean PEMAT scores for all analysed websites ($n = 70$)

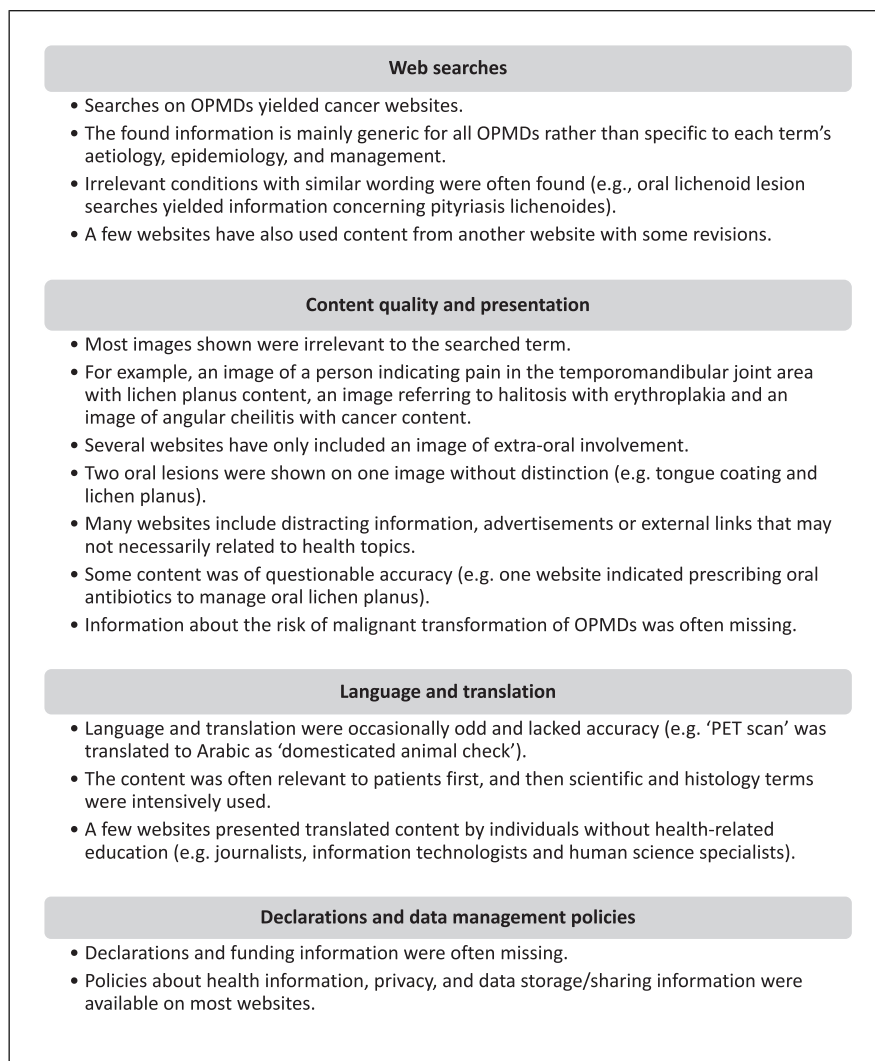| PEMAT items	PEMAT-P score, %	PEMAT-AV score, %
Overall understandability score	63	83
It makes its purpose completely evident	93	100
Sections have informative headers	91	75
Breaks or "chunks" information into short sections	89	100
Uses visual cues to draw attention to key points	87	100
Provides a summary	85	100
Presents information in a logical sequence	83	87.50
Uses common, everyday language	75	100
Does not expect the user to perform calculations[1]	67	–
Uses illustrations and photographs that are clear and uncluttered	66	100
Visual aids reinforce rather than distract from the content[1]	66	–
Medical terms are used only to familiarise the audience with the terms	65	100
Uses visual aids whenever they could make content more easily understood[1]	63	–
Numbers appearing in the material are clear and easy to understand	60	
It uses the active voice	59	75
Does not include information or content that distracts from its purpose[1]	58	–
Visual aids have clear titles or captions[1]	51	–
Uses visual cues to draw attention to key points[2]	–	100
Text on the screen is easy to read[2]	–	100
Allows the user to hear the words clearly[2]	–	100
Uses simple tables with short and clear row and column headings	N/A[3]	100
Overall actionability score	45	62.75
Clearly identifies at least one action the user can take	100	87.50
Uses visual aids whenever they could make it easier to act on the instructions[1]	85	–
Breaks down any action into manageable, explicit steps	75	87.50
Addresses the user directly when describing actions	67	62.50
Provides a tangible tool whenever it could help the user take action[1]	47	–
Provides simple instructions or examples of how to perform calculations[1]	N/A[3]	–
Explains how to use the charts, graphs, tables, or diagrams to take actions	N/A[3]	N/A[3]

[1]The item is specific to PEMAT-P (printable materials). [2]The item is specific to PEMAT-AV (audiovisual materials). [3]All items were scored as not applicable according to PEMAT.

Table 4. The mean PEMAT scores for all analysed websites ($n = 70$)

Search term (analysed printed and audiovisual websites, n)[1]	PEMAT-P scores, %		PEMAT-AV scores, %	
	understandability	actionability	understandability	actionability
LP ($p = 13$, av $= 0$)	79	45	N/A[2]	N/A[2]
OLP ($p = 15$, av $= 2$)	75	50	85	16
OC ($p = 18$, av $= 2$)	74	56	90	67
EP ($p = 8$, av $= 1$)	61	54	83	66
OSF ($p = 3$, av $= 0$)	54	53	N/A[2]	N/A[2]
OGvHD ($p = 4$, av $= 0$)	53	35	N/A[2]	N/A[2]
OLL ($p = 4$, av $= 1$)	45	30	91	100

EP, erythroplakia; LP, leukoplakia; OGvHD, oral graft-versus-host disease; OLL, oral lichenoid lesion; OSF, oral submucous fibrosis; OC, oral cancer. [1]Some websites included both printed and AV materials. [2]N/A: not applicable as no AV found.

Downloaded from http://karger.com/sjhr/article-pdf/4/3/114/4273829/000539051.pdf by guest on 04 September 2024

Web searches

- Searches on OPMDs yielded cancer websites.
- The found information is mainly generic for all OPMDs rather than specific to each term's aetiology, epidemiology, and management.
- Irrelevant conditions with similar wording were often found (e.g., oral lichenoid lesion searches yielded information concerning pityriasis lichenoides).
- A few websites have also used content from another website with some revisions.

Content quality and presentation

- Most images shown were irrelevant to the searched term.
- For example, an image of a person indicating pain in the temporomandibular joint area with lichen planus content, an image referring to halitosis with erythroplakia and an image of angular cheilitis with cancer content.
- Several websites have only included an image of extra-oral involvement.
- Two oral lesions were shown on one image without distinction (e.g. tongue coating and lichen planus).
- Many websites include distracting information, advertisements or external links that may not necessarily related to health topics.
- Some content was of questionable accuracy (e.g. one website indicated prescribing oral antibiotics to manage oral lichen planus).
- Information about the risk of malignant transformation of OPMDs was often missing.

Language and translation

- Language and translation were occasionally odd and lacked accuracy (e.g. 'PET scan' was translated to Arabic as 'domesticated animal check').
- The content was often relevant to patients first, and then scientific and histology terms were intensively used.
- A few websites presented translated content by individuals without health-related education (e.g. journalists, information technologists and human science specialists).

Declarations and data management policies

- Declarations and funding information were often missing.
- Policies about health information, privacy, and data storage/sharing information were available on most websites.

Fig. 4. General observations related to the web searches.

the patient's oral health literacy to obtain and comprehend health information needed to make informed decisions about the management of OPMDs and in adopting positive health-related behavioural changes (e.g., quitting tobacco use) that lower the risk of oral MT [41, 52, 53].

Individuals (or patients) with disabilities are likely to struggle to access and recall what they read as many websites lack AV materials, use irrelevant or unclear images, offer no text-to-audio function, and require calculation of risk or prevalence. Notably, most websites lack essential qualities for visual aids that could help understand the content, such as presenting clear titles for visual aids or using visual aids that distract the readers [54]. Also, several lacked active voice needed to make content readable, engaging, and interesting, especially

among patients with low health literacy [55, 56]. As a result, these individuals could be less capable of identifying worrying oral mucosal changes (e.g., a white patch that lasts longer than 2 weeks) and seek professional assistance when symptoms arise or progress [52, 57, 58].

Each term's included websites were proportional to their prevalence in a population and previous studies [13, 16] except for OSF. This might reflect the generally lower prevalence of OSF in the Middle East than in other parts of the world despite the widespread use of various chewing habits (e.g., Khat and Shammah) in specific areas of this region [11, 59].

Previous studies indicated generally low-quality online content regarding OPMDs: many lacked evidence to support the information, and the content might have raised disproportionate alarm, inadequate symptom

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description, and questionable suitability of the suggested advice [16, 17, 21]. Differences were sometimes between languages as the English content on OC might present a higher quality and comprehensiveness than that of Spanish and Portuguese languages [20, 42]. Nevertheless, the present low achievement of JAMA benchmarks indicated by their achieved numbers per site presently (2.5 out of 4) was higher than those found in English dental topics such as medication-induced osteonecrosis of the jaw [1.6] [60] and molar hypomineralisation [1.3] [61].

Some websites (e.g., Wikipedia) met the "disclosure" criterion but lacked this on content creators due to their collaborative content generation and editing functions [62]. Furthermore, the present analysis of Arabic OC websites (n = 19) indicated lower rates of presenting authors/their affiliations and attributions of content (36% each) compared to 56% and 67% of 27 Portuguese OC websites, respectively [42]. Furthermore, previous assessments of Arabic OC websites demonstrated low attainment of authorship (17%) and attribution (12%) compared to disclosure (59%) in 86 websites [41]. There was no notable difference between these benchmarks (36% each), perhaps due to the 4-year difference and the number of analysed websites between both studies.

HON seal was rarely found in parallel with studies assessing online oral health topics [17, 60, 61]. This is likely because professionals are unaware of its existence, health information seekers do not usually know its purposes, or these websites do not meet the necessary HON certification criteria [49, 60]. Concerning understandability and actionability, it was notable that content in most analysed websites was presently scored below the recommended cut-off (>70%) for material to be read and acted upon [39]. Like other studies on health topics, most of the found materials received lower actionability scores than understandability [61, 63, 64]. Hence, this may hint at a limited reader's ability to take action despite being able to understand what they have read [39].

Many websites were not-for-profit initiatives towards supporting high-quality Arabic health information online with an editorial board of health practitioners (e.g., https://www.sehatok.com/, https://www.ibelieveinsci.com). Other websites presented the estimated time needed to read their material (e.g., https://www.ilajak.com/ar/blog/oral-cancer) and a downloadable audio version of the written information and text display options (e.g., interactive and slide showing content, text magnification, and highlighting) (https://

www.moh.gov.sa/awarenessplateform/ChronicDisease/Pages/HeadAndNeckCancer.aspx). Therefore, clinicians and health education specialists may consider these functions and initiatives when developing online health information and hinting at trusted information sources during clinical consultations and patient education materials [17, 50].

The study's strengths included assessing Arabic web-based content concerning seven oral diseases, which were not previously assessed except for OC [41]. It also provides informative findings about who created the content and its characteristics, reliability, trustworthiness, and the ability of a person to understand and act upon the Arabic printed/AV materials on OPMDs and OC by using validated instruments, which are considered suitable to assess information in different languages and health topics [37, 39]. Previous studies did not necessarily assess the understandability and actionability of the searched materials on these disorders and other Arabic oral health-related topics [18, 21, 47, 65].

The study was limited by restricting the searches to the top 20 websites for each term and limiting the search to one search engine [42]. This was in line with the present objectives to see what comes up when a patient "quickly" searches the internet for oral cancer and precancers, as most health information seekers do online [22]. It did not intend to comprehensively assess the content for each disorder, which is usually assessed independently considering their different aetiology, epidemiology, clinical presentations, and sometimes management approaches [20, 21, 42, 51]. Furthermore, the low number of eligible websites (70 out of 140) is likely due to the several Arabic synonyms for OPMDs, like those concerning Arabic dental caries materials [47].

Previous work used more than one search engine to assess online information for OPMDs, but these were commonly used in countries (e.g., the UK and USA) where the study was conducted [16, 20]. Also, whether the found Arabic content is accurate, up-to-date, and evidence-based is yet unknown [20, 66]. There was no patient input or assessments on their internet and health information use. Most websites do not count the number of hits or visitors that can help estimate their use. Finally, some disorders or lesions that could increase the risk of OC (e.g., actinic cheilitis, dyskeratosis congenita, palatal lesions in reverse smokers, Bloom's syndrome, and xeroderma pigmentosum) were not included due to their relatively rare incidence worldwide and among non-white populations compared to the searched terms [8, 11, 67].

Further assessments may, therefore, consider conducting focused analysis on each using different search engines (e.g., Google, Bing, Yahoo, YouTube), social media platforms (e.g., Twitter, Facebook, TikTok) using their Arabic synonyms of these disorders [17, 20, 21, 38]. Also, healthcare providers and patient education experts may consider liaison with experts in Arabic linguistics and translation to update the WHO-adopted Unified Medical Dictionary (https://umd.emro.who.int/whodictionary) that currently lacks the translation of combined terms such as OLL and OGvHD – should a clinician search for it.

Saudi Arabia's Health Sector Transformation Program for Vision 2030 ensures sufficient health information for healthcare consumers. It also promotes understanding their disease, prevention, and self-care as part of their value-based management plans [46]. There is a high need for organisational efforts and initiatives that address the present study limitations for qualitative assessments of the accuracy, comprehensiveness, and evidence-based basis of Arabic health on the web, specifically towards OC and OPMDs. The nationally recognised King Abdullah Bin Abdulaziz Arabic Health Encyclopaedia initiated in 2012 is worth highlighting. It aimed to provide the community with reliable, up-to-date Arabic health information on various medical topics, human body anatomy, tips for a healthy lifestyle, and valuable links for self-care and advice [68]. Such national initiatives may include population and patient-based appraisals on the utilisation to obtain health information on OC and OPMDs. Also, seeking online health information about these disorders can be assessed with relevance to the patient's preferred source/s of health information (e.g., governmental or healthcare services, health professionals, and not-for-profit or social networks). Whether this information led to adopting favourable health behaviour changes and outcomes could also be addressed.

Healthcare performance assessment and improvement can be conducted by asking patients and the public about their perspectives and satisfaction towards the appropriateness of obtained information and whether this affected the healthcare utilisation (e.g., number and pattern of visits to oral or general healthcare services) [69, 70]. These assessments could also consider the self-rated general and oral health, demographics, and socioeconomic characteristics to deliver a high-quality and value-based healthcare service that reduces the unmet needs of specific patient populations and the public [46].

Conclusion

The present findings indicated that patients or the public seeking online information about OC and OPMDS are likely to encounter difficulty in finding sufficient and reliable content that will meet their information needs and help them understand and act based on what they read. Only 50% of the 140 screened websites were found relevant, with OC and OLP websites representing half of the relevant ones. These websites achieved only 2.5 of the 4 JAMA quality benchmarks, and many failed to declare any conflict of interest, funding, and sources of information. It seemed that materials in more than half of these websites are easily understood, but only 15% achieved the recommended level for actionability. The study findings could help inform a national incentive for an Arabic information encyclopaedia that meets the needs and expectations and promotes awareness of the patients and the public towards these possibly life-threatening and morbidity-causing oral disorders.

Statement of Ethics

An ethics statement was not required for this study type; no human or animal subjects or materials were used.

Conflict of Interest Statement

The author has no conflicts of interest to declare.

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Author Contributions

Abdullah Alsoghier designed the study, analysed the data, prepared the initial manuscript, and approved the final manuscript.

Data Availability Statement

The data that support the findings of this study are not publicly available due to detailed analysis of the numerous search terms and assessment tools, but are available from the corresponding author (A.A., aalsoghier@ksu.edu.sa).

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Research Article

Performance Power: Boosting Saudi Arabia's Health System Disaster Readiness (2017–2023)

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Abstract

Introduction: The 2016 self-assessment based on joint external evaluation (JEE) identified certain gaps, which prompted the need for additional improvement. This study attempted to address an approach to enhance preparedness using the performance management system's components focusing on related areas in the JEE tool by the International Health Regulations (IHR). ***Methods:*** This was an observational cross-sectional study including all hospitals and regional health directorates within the Ministry of Health, Saudi Arabia. Entities preparedness was calculated using the JEE tool. Moreover, the implementation of the performance management system was also assessed for Saudi Arabia from the year 2017 to 2022. Additionally, the feedback was collected using the survey from the 11 National Preparedness Index (NPI) coordinators. ***Results:*** Total readiness was found to be 52% only, which was far less than the planned value of 75%. While regarding the implementation of the performance management system, it was noted that there was a progressive increase in the implementation from 10% in the year 2017 to 81.25% in the year 2022. Considering the feedback responses of NPI coordinators, it was found that 100% of coordinators agreed that the NPI has supported enhancing Health emergency preparedness and that the follow-up and support from the NPI team played an important role in NPI score improvement. ***Conclusion:*** The analysis indicated that while there are areas of progress, Saudi Arabia is still working on strengthening fundamental public health functions and emergency preparedness. This is evident when comparing a range of indicators with those of many countries under the purview of the World Health Organization (WHO).

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Introduction

Performance management systems have become of high importance at the level of various sciences, which include the sciences of emergency and disaster management. In a parallel context, the interest in preparing for emergencies has increased over recent years, starting with the unification of definitions and objectives on national and local levels [1]. For monitoring and improving systems' capacities and capabilities, measuring preparedness complex is an essential concept to consider despite the limitations related to it [2].

For instance, the disaster risk reduction strategy for the Arab States has complemented the continuous efforts by technical national and international institutions that

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helped in reducing the risk of disasters in the Arab States [3]. Additionally, a multi-sectoral approach was implemented by the partners of the League of Arab States to reduce the risk of disasters in Arab regions by 2030, in line with the priorities set by the Sendai Framework for Disaster Risk Reduction 2015–2030, and the SDGs [4, 5].

The literature suggested that a one-size-fits-all assessment system has limited the comparative value and was not proven to answer the unique countries' risks. By looking at the risk posture in each state and the unique capability needs, a model emerges that includes existing quantitative information and combines it with qualitative efforts sustained in emergency management [2, 6, 7].

In that context, using different tools for measuring and enhancing preparedness can be justified as stated by Chiossi's study scoping review on recent tools and methods for assessing public health emergency preparedness [2], despite the limitations in these methodologies such as the lack of system-level performance measures [8].

The 2016 self-assessment based on a joint external evaluation (JEE) for technical area preparedness showed that the Saudi Arabia scores were sufficient. However, certain areas requiring further enhancement were recognized, in addition to the subjective nature of the evaluation, which underscored the necessity for ongoing improvement.

The question that the study attempts to answer is, what is the impact of the implementation of a performance management system on enhancing the kingdom's disaster preparedness? This study attempted to address an approach to enhance preparedness using the performance management system's components focusing on related areas in the JEE tool by the International Health Regulations (IHR) [9]. This study aimed to highlight the role of performance management in enhancing Disaster Preparedness based on JEE standards. To explore the relationship between performance management systems and disaster preparedness based on JEE standards.

Methods

The study was conducted in Saudi Arabia, the Ministry of Health, in the general directorate of emergencies, disasters, and medical transportation. The governance of disaster and crisis management is characterized by the following: the first responder to all risks except health risks is the civil defense, and the first responder for health emergencies is the Ministry of Health and the Saudi Red Crescent. In the governance framework of disaster and crisis management within Saudi Arabia, the General Directorate of Emergencies, disasters and medical transportation under the Ministry of Health outlines the roles of responders: civil defense is tasked with responding to all risks except health-related ones, whereas the Ministry of Health alongside the Saudi Red Crescent are designated as the primary responders for

health emergencies (Ministry of Health, General Directorate of Emergencies, Disasters and Medical Transportation, Saudi Arabia) [10].

The population of the study included all regional health directorates for the first component, National Preparedness Index (NPI) regional health directorate coordinators ($n = 40$) and regional directors for the regional directorates of emergencies, disasters, and medical transportation ($n = 20$). All the people working as National Health Emergency Operations Center (NHEOC) NPI's Coordinators were taken as a sample size for both study components. The study encompasses all individuals in pivotal roles associated with the NHEOC and the regional health directorates, specifically targeting 40 NPI regional health directorate coordinators and 20 regional directors for the Regional Directorates of Emergencies, Disasters, and Medical Transportation. By including every person holding these roles, the study captured an exhaustive perspective on the governance, coordination, and operational dynamics across all regions. Given the crucial and limited number of individuals in these roles, including all such individuals was feasible and efficient. This strategy maximized the efficiency of the data collection process, ensuring comprehensive coverage of essential viewpoints without logistical complexities [11].

The materials and methods of this study were thoughtfully designed to include both an experimental section and a survey section, ensuring a comprehensive analysis of the performance management systems used within the NPI. Below is a brief description and justification of these methods.

The experimental section of the study involved using the NPI performance management system to evaluate preparedness across various operational units, namely, the Ministry of Health and Regional Health Directorates. The methodology was centered on assessing 16 performance indicators, which are critical for gauging the readiness of these directorates to handle health emergencies. Each indicator was scored across three categories: "not available," "partially available," and "available." This categorization allowed a nuanced analysis of the preparedness levels, highlighting areas of strength and those needing improvement. The second part is the survey section conducted to gather feedback and insights from stakeholders within the evaluated entities. This component is crucial for understanding the contextual factors that influence the performance scores and for gathering firsthand accounts of the system's efficacy and areas for enhancement.

Combining experimental and survey methods allowed a robust evaluation that incorporated both quantitative performance data and qualitative insights. This holistic approach ensured a more comprehensive understanding of the preparedness levels. The use of defined performance indicators and categorical scoring in the experimental section provided clarity and specificity in the assessment, making it easier to identify specific areas of improvement and success within the health directorates. The survey method engaged stakeholders directly, providing a platform for expressing concerns and suggestions. This engagement was essential for validating the experimental data and for ensuring that the performance management system was responsive to the actual needs and conditions on the ground. The findings from both sections of the study are invaluable for refining the NPI and its associated performance management system. The dual-method approach facilitates ongoing adjustments and enhancements based on detailed, multi-faceted feedback [11]. The latter included a questionnaire targeting relevant staff opinion on the use of the NPI and the follow-up of its team on enhancing disaster preparedness.

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The questionnaire was administered to the same respondents at two different points in time under similar conditions. The National Experts in Disaster Management ensured that the questionnaire items comprehensively covered all relevant aspects of disaster preparedness influenced by the NPI. The correlation between the questionnaire results and other established measures of disaster preparedness was examined to confirm that the questionnaire effectively measured the intended construct. The questionnaire results were compared with external criteria that are definitive markers of disaster preparedness, to confirm the accuracy of the questionnaire in measuring preparedness levels. Further, the questionnaire was pilot-tested to identify and correct issues related to question clarity, structure, or response scaling, which helped refine the tool for better reliability and validity.

The regional preparedness key performance indicators (KPI) of different regional health directorates were assessed using the questionnaire from the years 2019 to 2022. Annual preparedness scores were calculated for each region included in the study. Further, the implementation of a performance management system was inquired about by the participants for the years 2020 and 2021. On this basis, the preparedness score of the regional health directorates were assessed.

No weighting scheme present is standardized for the generation of indices in JEE as per the 19 technical areas [12]. Furthermore, there is a scientific debate on the benefit of presenting a single JEE index composite. Thus, color coding for the NPI was based on internally agreed thresholds and targets. Where standards 1–10 were scored as 3, 1, and 0 representing full availability, partial availability, and non-availability of the specific standards, respectively. Whereas standards 11–16 were scored as 12, 1, and 0 representing full availability, partial availability, and non-availability of the standards, respectively, in each of the study settings. Moreover, full availability, partial availability and non-availability of the standards were color coded as green, yellow, and red, respectively. After that total score for each regional health directorate was calculated to determine the readiness and then cumulative readiness was calculated for Saudi Arabia.

The results of the present study were analyzed using an Excel sheet. Data were expressed as mean ± standard deviation for continuous variables while frequency and percentages were presented for categorical variables. The significance of the implementation of the performance management system was assessed through cross-tabulation and the χ^2 test. A p value of less than 0.05 was considered statistically significant. All statistical analyses were conducted using SPSS version 22. Additionally, the feedback-generated responses were analyzed using the χ^2 test and paired sample t test. While this analysis looks basic, it presented a non-biased baseline status of Saudi Arabia regarding the IHR capacities.

Results

In 2020, it was observed that overall preparedness reached a mere 52%, which notably fell short of the targeted benchmark of 75%. This underscores a critical need for strategic initiatives to bridge the preparedness discrepancy and align with the planned targets (Table 1).

Moreover, the implementation of the performance management system was also assessed in different cities of Saudi Arabia for the years 2017–2022. The analysis of the performance management system's implementation in Saudi Arabia from 2017 to 2022 was conducted to evaluate its impact on disaster preparedness levels across different provinces and nationwide. This type of analysis is critical for the provision of progress evidence. The data showing a progressive increase in preparedness scores from 10% in 2017 to 82% in 2022 provides concrete evidence of the effectiveness of the performance management system introduced in 2020. This upward trend is crucial for demonstrating the tangible benefits of structured performance management in enhancing disaster readiness. The use of statistical tests, such as the χ^2 test, to find a significant correlation (p value = 0.015) between the implementation of performance management systems and disaster preparedness confirms the hypothesis that effective performance management is key to improving preparedness. This statistical validation underscores the reliability of the performance management system as a tool for enhancing disaster readiness (Table 2).

Implementation of the performance management system was also assessed collectively for Saudi Arabia. It was noted that there was a progressive increase in the preparedness score from 10% in the year 2017 to 82% in the year 2022 as the performance management system was implemented in the year 2020. Thus, the hypothesis of the current study that there is a correlation between performance measurement systems and disaster preparedness was confirmed as a statistically significant association was found between the implementation of performance management systems and disaster preparedness (p value = 0.015) (shown in Fig. 1).

Additionally, the feedback was collected using the survey from the 11 NPI coordinators through feedback forms and the generated responses were analyzed. For this purpose, feedback responses from NPI coordinators were collected and it was found that 100% of coordinators agreed that the NPI has supported enhancing health emergency preparedness and that the follow-up and support from the NPI team played an important role in NPI score improvement (p value = 0.045). Furthermore, the most effective performance management system's elements in the National Emergency Preparedness Index project were tagged to be NPI targets setting (n = 8/11), followed by regular follow-up meetings with NPI regional health directorates coordinators (n = 4/11) (p value = 0.000). The feedback collected through surveys from NPI coordinators showed that 100% agreed that the NPI has significantly enhanced health emergency preparedness, which is vital. It not only confirms the effectiveness of the NPI but also highlights the critical role of continuous support and follow-up by the NPI team. The analysis of this feedback provides insights into which

Table 1. Evaluation of emergency preparedness for the year 2020 using 16 Standard Preparedness Assessment tool

Regions	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	T
MoH	NA	3	3	3	3	3	1	3	3	NA	NA	NA	12	12	12	NA	58
Asir	3	3	1	1	3	3	1	3	3	3	1	1	1	1	12	3	43
Bisha	3	3	1	1	3	3	1	3	3	3	1	1	1	1	1	3	32
Baha	3	3	1	1	3	3	1	3	3	3	1	1	1	1	12	3	43
Dammam	3	3	1	1	3	3	1	3	3	3	1	1	1	1	12	3	43
Hafr Albatin	3	3	1	1	3	3	1	3	3	3	1	1	1	1	1	3	32
Hail	3	3	1	1	3	3	1	3	3	3	1	0	1	1	12	3	42
Hassa	3	3	1	1	3	3	1	3	3	3	1	1	1	1	12	3	43
Jazan	3	3	1	1	3	3	1	3	3	3	1	1	1	1	1	3	32
Jeddah	3	3	1	1	3	3	1	3	3	3	1	1	1	1	1	3	32
Jouf	3	3	1	1	3	3	1	3	3	3	1	1	1	1	1	3	32
Madinah	3	3	1	1	3	3	1	3	3	3	1	1	1	1	12	3	43
Makkah	3	3	1	1	3	3	1	3	3	3	1	1	12	1	12	3	54
Najran	3	3	1	1	3	3	1	3	3	3	1	1	1	1	12	3	43
Northern borders	3	3	1	1	3	3	1	3	3	3	1	1	1	1	12	3	43
Qassim	3	3	1	1	3	3	1	3	3	3	1	1	12	1	12	3	54
Qonfotha	3	3	1	1	3	3	1	3	3	3	1	1	1	1	1	3	32
Quryat	3	3	1	1	3	3	1	3	3	3	1	1	1	1	12	3	43
Riyadh	3	3	1	1	3	3	1	3	3	3	1	1	12	1	1	3	43
Tabouk	3	3	1	1	3	3	1	3	3	3	1	1	1	1	1	3	32
Taief	3	3	1	1	3	3	1	3	3	3	1	1	1	1	1	3	32
Total Score																	851
Total Readiness %																	52

NA, not applicable; S, standard; T, total.

elements of the system are most beneficial, such as target setting and regular follow-up meetings. The analysis helped identify the most impactful elements of the performance management system, allowing for targeted improvements in future iterations. This was particularly important for optimizing the system to meet the unique needs of different regions within Saudi Arabia. The findings from this analysis provided a compelling impetus for policy and operational refinement. By demonstrating a clear link between systematic performance management and improved preparedness, the study supported the need for continued investment in these systems to achieve higher levels of readiness.

The analysis would aid decision-makers in understanding the effectiveness of current strategies and in planning future actions to further enhance disaster preparedness. Understanding which aspects of the performance management system are most effective allows for better allocation of resources to areas where they are most needed. The results provided a benchmark for evaluating the effectiveness of disaster preparedness initiatives and for identifying areas where additional efforts are necessary. Ultimately, the analysis contributed to building a more resilient health system capable of responding effectively to disasters, thereby safeguarding public health (Table 3).

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Table 2. The implementation of the performance management system in different cities of Saudi Arabia for the years 2017–2022

| RHD	2017	2018	2019	2019	2020	2021				2022			
	Annual		RP-KPI	NR-KPI	RP-KPI	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Asir	7		-	16	43	22	24	31	34	35	35	35	34
Baha	7		-	16	43	22	24	24	29	28	28	29	31
Bisha	7		-	16	32	22	24	30	34	32	32	32	37
Dammam	8		-	16	43	22	24	27	31	30	30	31	31
Hail	7		-	14	42	22	24	30	32	35	35	35	35
Hassa	8		-	16	43	22	25	26	29	28	28	29	29
Hafr Albatin	8		-	16	32	22	24	27	31	34	34	36	36
Jazan	9		-	16	32	22	24	25	31	28	28	28	28
Jeddah	9		-	16	32	22	24	26	31	29	29	29	29
Jouf	7		-	14	32	22	25	27	30	29	29	29	29
Madinah	10		-	14	43	22	24	28	34	30	30	30	30
Makkah	10		-	16	54	22	24	28	30	35	36	36	36
Najran	7		-	16	43	22	24	25	29	31	32	32	32
Northern Borders	7		-	14	43	22	25	26	30	31	31	31	31
Qassim	7		-	14	54	22	24	26	31	29	29	29	29
Qonfotha	7		-	16	32	22	24	28	31	29	29	29	29
Qaryat	7		-	14	43	22	25	27	31	33	33	33	33
Riyadh	7		-	16	43	22	24	26	29	29	29	29	29
Tabouk	8		-	14	32	22	24	25	29	34	35	35	35
Taif	7		-	16	32	22	24	32	34	33	35	35	35
Total	154	0	0	306	793	440	484	544	620	622	627	632	638

RHD, Regional Health Directorate; RP-KPI, Regional Preparedness KPI; NR-KPI, National Readiness KPI.

Discussion

The overarching evaluation revealed opportunities for enhancement within the regional health directorates to fully integrate the essential IHR capacities. Furthermore, there was considerable potential for development within the regions, as they were approaching the achievement of capacity level 5 for approximately 7 out of the 16 indicators assessed. These included the availability of surge capacity to respond to public health emergencies of both national and international concerns, availability of stockpile plans and logistics management protocols, availability of hospital emergency operations centers (EOCs) staffed and equipped to manage emergencies at local levels, availability of regional health emergency operations center (RHEOC) based on GDEDA-MoH standards, functioning staffed and equipped, availability of capacity building plan for NHEOCS-RHEOC_HEPPUs, and availability of fund and
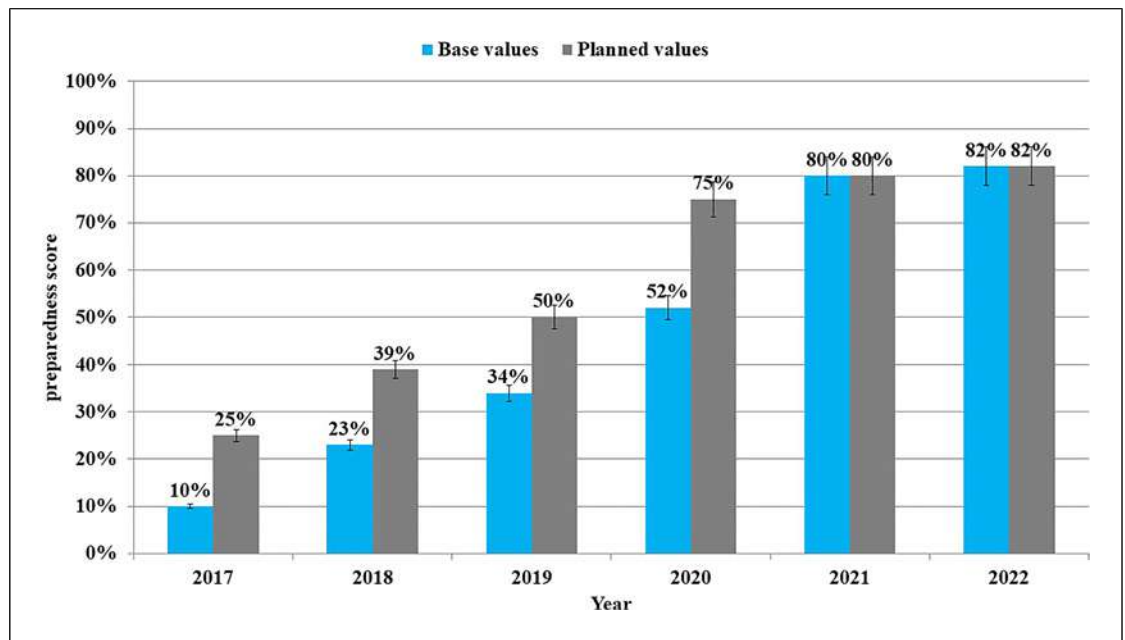
Fig. 1. Comparison of base values to the planned values of the preparedness score from the years 2017–2022.

funding process for emergency response and preparedness activities [13].

Whereas, capacity level 5 was obtained for almost half of the indicators (8 out of 16) including the availability of all hazards emergency preparedness and response plan at the regional level covering MoH Emergency planning framework\SHB Framework\IHR (requirements), Point of Entries (PoEs) [14, 15]. The availability of procedures plans to relocate or mobilize resources in the 5 emergency response levels to support response, priority public health risks, and resources were mapped and utilized to address IHR-relevant hazards and priority risks. Risks were assessed regularly and considered in emergency planning, and regular drills and exercises were carried out regularly for gap assessment. The closure feedback and lessons learned were used for improvement aspects, availability of hospital emergency preparedness tools and auditing procedures and teams to carry out these activities, and implementation of the ambulance centers project [16].

The regional health directorates in Saudi Arabia have garnered positive recognition, with close to 75% having fulfilled the JEE, reflecting a proactive stance in health governance. Given the rising frequency of public health challenges and outbreaks in the region, it is of paramount importance that the nation fortifies its strategy by leveraging robust empirical foundations to update or establish comprehensive health security and national response plans. This strategic foresight will be instru-

mental in strengthening Saudi Arabia's resilience in public health [17, 18].

The comprehensive analysis conducted in this study highlighted that up to the year 2017, there were significant opportunities for improvement within the emergency preparedness management systems of Saudi Arabia. This underlines the importance of continued development in action plans and response capacities, ensuring that the nation is well equipped to handle future public health challenges. This calls for a collective approach and different stakeholders to combine for the sustainment of the infrastructure, public health capacities, and also the processes for the implementation of the KPIs and health performance management system at the national level [19].

Thus, the regional and national preparedness KPIs were evaluated and a performance management system was implemented. Thereby, the NPI was updated after COVID-19 to have more than the basic 16 standards (28 specific for MoH and 20 standards for the regional health directorates). Hence, the preparedness score was increased to 82% in the year 2022 with an annual change of 2.50%. It is important to monitor the progression of IHR implementation regularly based on the components of the IHR evaluation framework which includes JEE every four to 5 years [20].

This study has highlighted areas for strategic enhancement in the implementation of IHR and emergency preparedness across various levels within the nation. Initially, it was observed that certain public statutes require

Table 3. Feedback responses of NPI coordinators (*n* = 11)

Details	Frequency	Percent	*p* value
Gender			
Males	5	45.5	0.016
Females	6	54.5	
Age group			
20–30 years	7	63.6	**0.038**
31–40 years	4	36.4	
Working experience			
1–5 years	8	72.7	0.082
6–10 years	3	27.3	
From your point of view, the National Preparedness Index (NPI) supported enhancing health emergencies preparedness			
Agree	11	100	**0.045**
To some extent	0	0	
Disagree	0	0	
From your point of view, the follow-up and support from NPI team played important role in NPI score improvement			
Agree	11	100	**0.045**
To some extent	0	0	
Disagree	0	0	

	Most effective	Least effective	*p* value
From your point of view, what are the most effective performance management system's elements in the national emergency preparedness index project			
NPI targets setting	8	3	**0.000**
The development and sharing of regular reports for leaderships	0	11	
Regular follow-up meetings with NPI regional health directorates coordinators	4	7	
Advisory support sessions NPI regional health directorates coordinators	1	10	
Escalation to regional health directorate leaderships if targets not met based on the planned timeline	0	11	
Escalation to regional health directorate leaderships if targets not met based on the planned timeline	0	11	
Training of NPI element's owners and NPI regional health directorate coordinators	3	8	

modernization to fully align with IHR mandates. Additionally, there is a need to augment financial allocations to facilitate the seamless enactment of these health regulations. Furthermore, the research underscored the necessity for a robust health infrastructure capable of efficiently detecting, evaluating, reporting, and managing public health events and emergencies [21].

For instance, a resilient health system requires a collective effort at the multi-sectoral level and from all the stakeholders involved for a long period. Multidisciplinary coordination is desired for the im-

plementation of IHR through an alert, responsive, efficient, and facilitative system. Thus, establishing national focal points for the IHR is essential, and countries should create national public health institutes to coordinate with these national focal points and ensure the integration of IHR. Saudi Arabia is poised to further strengthen its public health system by strategically channeling resources toward health security enhancements. By addressing pivotal health security issues and implementing comprehensive strategies, the nation aspires to advance toward the attainment of universal

health coverage. This approach reflects a commitment to the highest standards of health and well-being for all citizens and residents [22].

Nevertheless, the JEE tool is a globally recognized method for the assessment of countries' capacities and capabilities to encounter public health threats. The evaluation instrument presents some limitations; however, these challenges are surmountable and provide a valuable opportunity for refinement. By adopting the World Health Organization (WHO) expert recommendations, any impediments can be transformed into catalysts for advancing public health practices. Moreover, some form of weighing and standardization is required for the proper use of JEE presentation and analysis, especially when aggregating JEE indices, for the avoidance of biased and subjective indices of JEE [15].

Consequently, the in-depth appraisal of Saudi Arabia's emergency preparedness, governance, and response aptitude, in conjunction with the application of KPIs, constitutes a compelling impetus for policy and operational refinement. This meticulous scrutiny provides foundational technical acumen essential for the country to amplify its public health infrastructure. Moreover, it propels the endeavor toward the attainment of optimal compliance with the IHR, ensuring the highest echelon of readiness is met across all evaluative criteria and norms [23, 24]. Yet, this could be achieved through decisive leadership, clear prioritization, judicious investment in resources, and steadfast commitment – qualities that the Kingdom of Saudi Arabia has demonstrated and continues to exhibit. The nation's response to the COVID-19 pandemic stands as a testament to its capability to effectively mobilize and implement such strategies.

This study is crucial for policymakers for several reasons. The study provides empirical evidence on the effectiveness of performance management systems in enhancing disaster preparedness. This allows policymakers to make informed decisions based on proven strategies that have shown significant improvement in readiness scores. The findings can guide policymakers on optimal resource allocation. Understanding which elements of the performance management system are most effective helps in directing resources toward initiatives that yield the best outcomes. The results from the study offer a solid foundation for developing new policies or refining existing ones related to disaster management and health emergency preparedness. By demonstrating measurable improvements in preparedness, the study supports greater accountability and transparency in how disaster preparedness initiatives are implemented and evaluated. Policymakers can use the insights gained from the study to plan strategically for future public health emergencies, ensuring that the health system is better equipped to respond effectively.

In comparison to other studies, the limited dataset in this analysis presents a unique opportunity to refine the approach to data examination using more sophisticated statistical methodologies. This would enhance our understanding of the determinants influencing the JEE performance within Saudi Arabia. Future research endeavors are thus encouraged to harmonize the computation of JEE metrics and enable a thematic synthesis of these indicators. Moreover, this analysis serves as a preliminary step, not as a conclusive verification of the JEE, and does not seek to establish a causal relationship between the JEE outcomes and their implications.

This study aligns with Saudi Vision 2030 and contributes significantly toward achieving its objectives in the following ways. Saudi Vision 2030 places a strong emphasis on developing a robust healthcare system to ensure the well-being of its population. This study, by enhancing disaster preparedness through the implementation of performance management systems, directly supports the vision's goal to build a resilient healthcare infrastructure capable of responding to emergencies effectively. One of the overarching goals of Vision 2030 is to improve the quality of life for all residents. Efficient management of health emergencies, as improved through this study, helps mitigate the impact of such emergencies, thereby safeguarding public health and enhancing community well-being. Vision 2030 also aims to improve transparency and accountability in governance. The use of performance management systems in disaster preparedness, evaluated in this study, fosters a transparent and accountable approach to emergency management, aligning with the governance improvements targeted by the vision. The vision encourages innovation across all sectors, including public health. This study contributes by identifying and implementing innovative strategies in the management of health emergencies, thereby enhancing public service delivery in line with Vision 2030 objectives. Finally, Vision 2030 includes objectives to extend Saudi Arabia's international collaborations. The methodologies and outcomes of this study could serve as a basis for international cooperation in public health and disaster management, promoting knowledge exchange and capacity building [12].

Conclusion

The comprehensive evaluation of Saudi Arabia's public health readiness and essential capacities has demonstrated varied levels of preparedness across different regions and indicators. However, it unequivocally indicates an overall strengthening in these areas. The JEE scores are pivotal, serving as indicators of this progressive improvement in

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emergency preparedness capabilities. The significance of the JEE extends beyond simple evaluation; it offers a sophisticated framework to effectively measure the outcomes resulting from investments in fundamental public health functionalities. This analysis showed that while progress is evident, there are still crucial areas requiring further enhancement to bolster fundamental public health functions and emergency preparedness. This necessity is particularly apparent when the indicators are benchmarked against those of other nations under the WHO oversight. The ongoing efforts and targeted strategies currently in place are crucial for addressing these areas of improvement and ensuring alignment with international standards. Such measures are essential not only for meeting immediate health security needs but also for the strategic long-term strengthening of the public health system in alignment with global practices.

This endeavor is not just about reaching a set benchmark but also about continuous improvement and adaptation to new challenges, ensuring that Saudi Arabia remains equipped to handle future public health crises effectively. This alignment with international standards and commitment to ongoing enhancement directly supports the goals of Saudi Vision 2030 by building a resilient health system that contributes to the nation's overall prosperity and well-being. The JEE tool, developed by the WHO, is widely recognized for its structured and comprehensive approach to assessing a country's capacity to handle public health threats. The JEE serves as a critical mechanism for nations to gauge their readiness and response capabilities systematically, and it is essential for continuous public health improvement.

Statement of Ethics

The study was approved by the Central Institutional Review Board of Ministry of Health, Saudi Arabia, via reference number 22-31 M (dated: 01-06-2022). Written informed consent was obtained from the participants.

Conflict of Interest Statement

The author has no conflicts of interest to declare.

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Author Contributions

The author, Hisham Hassan Ali Dinar, contributed to design the study, analysis of the data, preparation of the manuscript, and also in approval of the final manuscript.

Data Availability Statement

The data that support the findings of this study are not publicly available as they contain information that could compromise the privacy but are available from the corresponding author, Hisham Hassan Ali Dinar (hisham.alidinar@gmail.com), upon reasonable request.

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Intention of Retention and Its Predictors among PHC Workers in Buraidah, Saudi Arabia

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Abstract

Introduction: The turnover of healthcare professionals is seen to be a significant contributor to the shortage of healthcare personnel. This study aimed to evaluate the level and predictors of retention intention among primary health workers (PHWs) in Buraidah, KSA. *Methods:* This cross-sectional study was conducted among primary healthcare workers in Buraidah, Qassim between the period from October 2023 to March 2024. Data were collected using an online self-administered questionnaire. The used scales in the study were the Job Autonomy Scale (JAS) and the Anticipated Turnover Scale (ATS). Data were analyzed using SPSS version 21.0. *Results:* A total of 194 healthcare workers were enrolled in this study; there were 50.5% males and 35.1% physicians. The mean ± SD of turnover intention was 37.2 ± 7.92 out of a maximum possible score of 75. The mean score of turnover intention was significantly affected by job title ($p < 0.001$), education level ($p = 0.005$), marital status ($p = 0.004$), attending certificate programs ($p = 0.002$), work method autonomy ($p < 0.001$), and total autonomy score ($p = 0.008$). Multivariate analysis revealed that the predictors of turnover intention were other job titles B 8.53 (95% CI: 6.17–10.89), ever married B −3.87 (95% CI: −5.80 to 1.94), and not attending certificate programs B −5.55 (95% CI: −8.46 to −2.63). Job autonomy did not show any association with turnover intention. *Conclusion:* Turnover intention was a significant problem among PHW in Buraidah, Saudi Arabia. The predictors of turnover intention included job title, marital status, and attending or having certificate programs. There is a need to address the issue of turnover intention among PHWs to ensure the provision of quality primary healthcare services to the population.

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Introduction

Primary healthcare centers (PHCs) are the patient's first point of communication with the healthcare system. Many countries use health indicators to evaluate the effectiveness of their primary healthcare system [1]. In both statements, primary healthcare is recognized as a key component of enhancing health and health outcomes and the cornerstone of a successful and responsive healthcare system [2].

Primary health workers (PHWs) are direct providers of PHC, and the number of PHWs directly influences the quality, quantity, and outcomes of PHC. Health professionals who are properly qualified, talented, motivated, and devoted should deliver these services with compassion,

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respect, and dignity [3]. However, primary healthcare facilities worldwide are confronting major labor shortages [4], not just in low- and middle-income countries [5] but also in developed nations.

The health system in Saudi Arabia, like that of many other nations throughout the world, is experiencing serious issues as a result of rising demand for health services as the country's population grows, high healthcare expenditures, inequitable access, and concerns about the quality and safety of care [6]. In the KSA, the sector is undergoing rapid reform as part of Saudi Arabia's Vision 2030, by implementing three pillars that will lay the groundwork for successfully achieving this vision: facilitate access to health services, improve the quality and efficiency of health services, and promote health risk prevention. Saudi Arabia has moved its investment and attention away from secondary and primary sectors [7].

Turnover, or retention, is identified as the act of quitting, and it is of critical value in human resource management and the retention of present employees [8]. Retention intention (RI) is the likelihood of an employee leaving their job within a certain time frame [9]. RI is regarded as one of the most accurate indicators of turnover behavior [10]. Previous research has looked at the predictors that determine the RIs of PHWs. Several predictors, such as demographic characteristics, work fulfillment [11], work-related stress [12], exhaustion [13], work-life balance, interpersonal communication, and patient violence, were reported. While these characteristics have undoubtedly been connected to RI, several researchers have focused on issues other than work. Han and Humphreys discovered that key community integration factors influence overseas-trained doctors' decision to stay or leave a rural community in Australia [14]. Stewart et al. [15] discovered that community satisfaction is an important predictor of intent to leave among rural and remote registered nurses in Canada; and Chao et al. [10] and Lu et al. [9] discovered a significant correlation between work-family conflict and the TI of PHWs in Taiwan and Guangdong.

There has been minimal investigation into the predictors of Saudi Arabia's PHW turnover. Furthermore, the major focus of the research has been on job satisfaction rather than turnover. On the other hand, healthcare professionals must understand PHWs' intentions to stay and the causes of their departure. Internationally, research has focused on the relationship between organizational variables such as social support from direct supervisors, social support from coworkers, autonomy, and organizational commitment and intention to stay. Therefore, the present study aimed to evaluate the prevalence and predictors of RI among PHWs in Buraidah, KSA.

Review of Literature

Turnover is when workers quit an organization to pursue other opportunities [16]. Employee RI displays their desire to quit their present work within a specific time frame. Work role and stress, workplace violence, work environment and experience, organizational system and climate, job satisfaction, and burnout are all related [17].

A study from China analyzed the desire of general practitioners to leave their jobs and revealed that the average turnover intention score for general practitioners was 15.40 out of 24 and 78.35% of them reported a moderate or higher degree of turnover. The probability of leaving a position among the participants was associated with male gender, higher education, a temporary work contract, a reduced level of job satisfaction, and increased levels of emotional exhaustion [18].

Almalki et al. [19] investigated the correlation between PHC nurses' quality-of-work-life and turnover intention in Saudi Arabia. The findings indicated that respondents were unsatisfied with their work lives, with over 40% reporting a desire to leave their present PHC facilities.

Recently, Al Muharraq et al. [20] investigated the relationship between workplace bullying and nurse turnover, the prevalence of workplace bullying, and the desire to leave among nurses. A strong turnover intention was demonstrated by 31.7% of the participants. It was discovered that age had an inverse relationship with workplace bullying. There was a significant positive relationship between workplace bullying and the desire to leave.

Methods

Study Design and Population
This was a cross-sectional study conducted at the PHCs of Buraidah, Qassim between the period from October 2023 to March 2024. Buraidah is the capital of the Qassim region with an estimated population of more than 677,000 people, the half of region's total population. The study was conducted on PHWs. There are about 45 functional PHCs in Buraidah.

Sample Size
Due to the finite and relatively small population of eligible PHWs in Buraidah, we opted for a census approach. This ensured that data were collected from all relevant individuals, providing the most comprehensive and accurate picture for our study.

Sampling
Participants in the study were selected conveniently. All the workers who have been working in the PHC centers for at least 1 year were eligible to participate in the study. Interns, students, and locum staff were excluded. The principal investigator visited each of the PHCs in Buraidah after obtaining permission from the

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PHC center's manager. Eligible healthcare workers were given a brief description of the study and its objectives and invited to participate in the study.

Data Collection Tool and Procedure

A self-administered questionnaire was used to collect the data from participants. A questionnaire was developed after a review of the literature and used validated tools to measure the study constructs, i.e., job autonomy and turnover intention. The questionnaire involved three sections: the first one investigated demographic information such as age, sex, marital status, nationality, job title, education level, and alternate source of income. The second section included the Job Autonomy Scale (JAS) [21]. This scale has nine items grouped into three themes: work method autonomy, work scheduling autonomy, and work criteria autonomy. The responses were collected on a 5-point Likert scale. For each item, domain, and total scale, the mean score was calculated. The maximum possible score was 5, where a higher score indicates high job autonomy. The third part collected data on staff turnover intentions using the Anticipated Turnover Scale (ATS) [22]. This scale has 15 items that are rated on a Likert scale of 1–5. The maximum possible score for ATS is 75, where a higher score indicates higher turnover intention. The questionnaire was transformed into Google Forms for data collection. A link to the questionnaire was provided to each of the eligible participants.

Data Analysis

Statistical Package for Social Studies (SPSS) version 22.0 was used for data analysis. Descriptive statistics were used. Mean scores for all the scales were measured after summing up all the items in the scale according to the standard procedures. Data were checked for normality. Relationships of ATS with other scales and sociodemographic characteristics of the participants were measured using Pearson correlation, t test, and ANOVA. Linear regression was used to measure the adjusted association of turnover intention with sociodemographic variables and, job autonomy. Dummy variables were created for the independent variables with more than two categories. In the first step, univariable linear regression was done. Variables that were either statistically significant or biologically plausible in the univariate were carried forward in the multivariable model. Variables in the final model were retained based on their significance and contribution to the model as judged by R^2 values. A p value ≤ 0.05 was considered significant.

Ethical Considerations

The study protocol was reviewed and approved by the Qassim Regional Bioethics Committee (Approval No. 607/45/5564, date: November 7, 2023). Written informed consent to participate was not directly obtained but inferred by the completion of the survey. The first page of the online survey link contained consent and would proceed further only if the participant agreed. Confidentiality was assured to all participants who agreed to participate in this research.

Results

A total of 194 healthcare workers participated in the study. Half (50.5%) were male. About 69% were 35 years or younger. According to the job, physician (35.1%) and

Table 1. Sociodemographic and professional characteristics

Variable	% (n)
Sex	
Male	50.5 (98)
Female	49.5 (96)
Age, years	
Less than or equal to 35	69.1 (134)
More than 35	30.9 (60)
Job title	
Registered nurse	28.4 (55)
Enrolled nurse	4.1 (8)
Lab technician	6.2 (12)
Clinical officer	4.6 (9)
Nutritionist	5.2 (10)
Physician	35.1 (68)
Counselor	3.6 (7)
Pharmacist	4.1 (8)
CHEW	4.1 (8)
Support staff	4.6 (9)
Education	
Diploma	6.7 (13)
Bachelor	56.2 (109)
Master	13.4 (26)
PhD/board	23.7 (46)
Marital status	
Single	35.1 (68)
Married	62.9 (122)
Divorced	1.0 (2)
Widow	1.0 (2)
Alternative sources of income	
Business	6.7 (13)
Consultation	1.0 (2)
Part-time job	0.5 (1)
None	91.8 (178)
Have you ever attended any certificate programs?	
Yes	13.4 (26)
No	86.6 (168)

registered nurses (28.4%) represented the largest proportion of the participants. The majority of them had a bachelor's (56.2%) followed by those having a PhD/board (23.7%). More than half of the participants were married (62.9%). Approximately (91.8%) of them had no alternative income. Among participants, 13.4% had additional certificate programs (Table 1).

The mean score (SD) of work method autonomy was 3.78 (0.58) and work scheduling autonomy was 3.68 (0.60) out of 5. The mean score of work criteria autonomy was 3.66 (0.61), with a total mean score of 3.71 (0.52). The mean score of turnover intention was 37.2 (7.92) out of a maximum possible score of 75 (Table 2).

Table 2. The mean score of the scales

Domain	Score mean (SD)
Work method autonomy	3.78 (0.58)
Work scheduling autonomy	3.68 (0.60)
Work criteria autonomy	3.66 (0.61)
Total score	3.71 (0.52)
Turnover intention	37.2 (7.92)

Regarding the correlations between the total mean score of turnover intention and other variables, we did not find a significant difference in the turnover intention scores with respect to gender (p value 0.946) and age (p value 0.345). Nurses were found to have the lowest turnover intention 32.9, while other healthcare workers had the highest turnover intention 42.3 (p value <0.001). Regarding the level of education, we found those having a diploma and master's to have the highest score (p value 0.005). According to marital status, the singles scored the highest mean score of turnover intention 39.4 (p value 0.004). There is no significant relationship between alternative sources of income and turnover intention (p value 0.689). We found a significant relationship in the presence of any certificate or program 41.7 (p value 0.002). We used the Pearson correlation coefficient in the autonomy and we found a weak but significant negative relationship between work method autonomy and turnover intention −0.238 (p value <0.001). Also, there was a significant negative correlation between turnover intention and the total autonomy score ($r = -0.19$, $p = 0.008$) (Table 3).

Table 4 presents the results of univariable and multivariable linear regression analysis to assess the association of turnover with various factors. In the univariable analysis, job title, education, marital status, certification, and job autonomy were significantly associated with turnover intention. In the multivariable model, we found that, as compared to nurses, other healthcare workers had higher scores adjusted B 8.53 (95% CI: 6.17–10.89). Education did not show any significant association. Ever-married people had lower turnover intention as compared to singles adjusted B −3.87 (95% CI: −5.80 to −1.94). Alternative sources of income showed no significant association. Those without any additional certificate had a significantly lower score, adjusted B −5.55 (95% CI: −8.46 to −2.63). In the final model, job autonomy had no significant association with total autonomy score adjusted B 1.99 (95% CI: −6.46 to 10.45). Domains within job autonomy also showed no significant association with turnover intention (Table 4).

Table 3. The correlations between the mean score of turnover intention and other variables

Variable	Mean (SD)	p value
Sex		
Male	37.2 (7.58)	0.946
Female	37.3 (8.28)	
Age, years		
Less than or equal to 35	36.9 (8.18)	0.345
More than 35	38.0 (7.29)	
Job title		
Nurse	32.9 (7.66)	<0.001
Physician	36.5 (8.02)	
Others	42.3 (4.62)	
Education		
Diploma	40.9 (5.25)	0.005
Bachelor	36.0 (8.06)	
Master	41.3 (5.45)	
PhD/board	36.7 (8.46)	
Marital status		
Single	39.4 (7.45)	0.004
Ever married	36.0 (7.93)	
Alternative sources of income		
No	37.3 (7.94)	0.689
Yes	36.5 (7.80)	
Have you ever attended any certificate programs?		
Yes	41.7 (5.73)	0.002
No	36.5 (7.99)	
Job autonomy		
Work method autonomy	−0.238[a]	<0.001
Work scheduling autonomy	−0.165[a]	0.022
Work criteria autonomy	−0.109[a]	0.132
Total autonomy score	−0.191[a]	0.008

[a]Pearson correlation coefficient.

Discussion

This study evaluated the level and predictors of turnover intention among PHWs in Buraidah, Saudi Arabia. Turnover intention is the direct antecedent factor of turnover behavior, which is easier to assess and more precise than turnover information provided by those who have already resigned [23].

In the present study, the mean score of turnover intention was 37.2 out of 75. A previous study conducted on general practitioners in China reported a relatively higher mean score of the total turnover intention, 15.4 out of 24 [18]. An online survey among healthcare workers in Saudi Arabia reported the turnover intention score to be 2.92 on a scale of 5 which is slightly higher than our findings [24].

Table 4. Linear regression analysis of factors associated with turnover intention among PHCs

Variable	Univariable		Multivariable	
	B (95% confidence interval)	p value	B (95% confidence interval)	p value
Sex				
Male	1		–	
Female	0.078 (−2.17 to 2.32)	0.946		
Age, years				
Less than or equal to 35	1		–	
More than 35	1.16 (−1.26 to 3.59)	0.345		
Job title				
Nurse	1		1	
Physician	3.62 (1.21–6.02)	0.003	−0.24 (−3.41 to 2.92)	0.879
Others	9.36 (6.91–11.81)	<0.001	8.53 (6.17–10.89)	<0.001
Education				
Diploma	1			
Bachelor	−4.85 (−9.31 to −0.38)	0.034	−1.58 (−5.33 to −2.16)	0.405
Master	0.46 (−4.71 to 5.63)	0.860	0.57 (−3.77 to 4.92)	0.793
PhD/board	−4.20 (−8.98 to 0.57)	0.084	1.75 (−3.03 to 6.54)	0.471
Marital status				
Single	1			
Ever married	−3.42 (−5.72 to −1.11)	0.004	−3.87 (−5.80 to −1.94)	<0.001
Alternative sources of income				
No	1			
Yes	−0.83 (−4.91 to 3.25)	0.689	−3.23 (−6.74 to 0.27)	0.071
Have you ever attended any certificate programs?				
Yes	1			
No	−5.15 (−8.37 to −1.94)	0.002	−5.55 (−8.46 to −2.63)	<0.001
Job autonomy				
Work method autonomy	−3.26 (−5.16 to −1.36)	<0.001	−3.23 (−6.93 to 0.47)	0.087
Work scheduling autonomy	−0.2.15 (−3.99 to −0.31)	0.022	−3.01 (−8.48 to 2.44)	0.266
Work criteria autonomy	−1.40 (−3.24 to 0.42)	0.132	–	
Total autonomy score	−2.86 (−4.96 to −0.77)	0.008	1.99 (−6.46 to 10.45)	0.642

The majority of the studies focused on turnover intention reported the rate of turnover intention rather than the score of turnover intention. Additionally, there was a focus on nurses more than other specialties. The global prevalence of turnover intention among general practitioners was estimated to be 47% [25]. Based on a systematic review and meta-analysis of PHW in Sub-Saharan Africa [26], it was found that turnover intention was present in 50.47% of nurses. Another Chinese systematic review and meta-analysis enrolled 16 cross-sectional studies that included 37,672 PHWs, and the prevalence of turnover intention was estimated to be 30.4% [27].

In the Saudi Arabian context, a study among tertiary care nurses reported a very high prevalence of turnover intention (94%) [28]. On the other hand, a study among healthcare workers during COVID-19 reported that 32.3% of the workers had turnover intention [29]. Another study among primary care nurses reported the prevalence of turnover intention to be 40% [19]. There are wide variations in the reported prevalence of turnover intention globally as well as locally in Saudi Arabia. These variations can be attributed to differences in: work settings, type of healthcare workers, study tools, and definition of outcomes. Regardless of these differences in the reported burden of turnover intention, findings revealed that turnover intention is a significant problem globally as we found in this study. It is, therefore, necessary for policymakers and planners to develop effective strategies to ensure the retention of workers for effective and efficient care delivery.

A study conducted on primary care doctors in China reported that age, location, job title, work pressure, doctor's position level, and job satisfaction were associated with turnover intention among primary care physicians [30]. In the current study, we found that the mean score of turnover intention was significantly affected by job title, but there was no impact of age on turnover intention. Additionally, we didn't measure job satisfaction or work pressure as we focused on the personal characteristics, but we found an impact of marital status, and job autonomy on turnover intention. This can be explained by the fact that is related to the variation of tools used in our study and the focus of our study on predictors of turnover intention rather than job satisfaction and work conditions.

Based on a previous systematic review, turnover intention was significantly associated with variables including age, gender, education, marital status, and job title [27]. A study from Ethiopia demonstrated that turnover intention was associated with education level, marital status, and age [31]. In the present study, turnover intention was significantly associated with marital status where singles scored the highest mean of turnover intention. On the other hand, and in contrast to the previous study, turnover intention wasn't associated with education and age in our study. On the other hand, a study among nurses in Riyadh also reported no association of age with turnover intention [28].

In a study, intention of turnover was associated with the professional category [32]. Our study was conducted on those working in PHCs; we found that the mean score of turnover intention was significantly associated with job title (professional category), whereas other professional categories scored the highest mean score of turnover intention as compared to nurses. This is an important finding that calls for further research into exploring characteristics and factors among other categories of healthcare workers that increase their turnover intention. Additionally, healthcare managers should also focus on this category of healthcare workers and take appropriate actions to improve their work life and reduce turnover intention.

A previous study from China conducted on medical staff working in rural primary medical institutions found that the predictors of turnover intention based on multilevel logistic regression included a bachelor's degree or above and an intermediate professional title [23]. In the current study, based on multivariate analysis, educational level was not found to be a predictor for turnover intention, but univariate analysis revealed that a bachelor's degree was a predictor for turnover intention. Similar were findings in a study among nurses in a tertiary care hospital in Saudi Arabia where educational status does not influence turnover intention [28].

Financial benefits are important predictors of job satisfaction and turnover intention. A study among nurses and midwives in Ghana revealed that the financial factor represented in salary was a predictor for staying at the organization (AOR = 0.07) [33]. We did not directly measure satisfaction with financial benefits. However, the financial factor was assessed in this study as the presence of alternative sources of income and this factor wasn't a predictor for turnover intention. Similarly, another study among nurses in Saudi Arabia reported no association between salary with turnover intention [28]. This could be due to the fact that in Saudi Arabia as compared to low-income countries or other developing countries, the salary packages are competitive and workers are compensated according to their qualifications and experiences.

Job autonomy can have an impact on the mental health and job satisfaction of healthcare workers. A previous study from Bahrain conducted during the COVID-19 period revealed that turnover intention was positively associated with job autonomy [34]. In the current study, we did not an association between job autonomy and turnover intention. Similarly, a study from China among social workers reported no association between turnover intention and job autonomy [35]. In contrast, other studies among various cadres of healthcare workers reported a negative relationship between turnover intention and job autonomy [36, 37]. It is also reported that job autonomy does not directly affect the turnover intention; rather it moderates job satisfaction and motivation which in turn affects the turnover intention. Future studies should be conducted on a larger sample and consider other factors such as job satisfaction and motivation while evaluating the relationship between job autonomy and turnover intention.

This study is among a few studies conducted among PHWs to investigate turnover intention. The limitations of this study include the small sample size and the limitation of the investigated predictors to personal characteristics. Further studies are recommended to be established and conducted on a larger sample size, and other healthcare settings with the investigations of more predictors for turnover intention including job satisfaction and motivation.

Conclusions

Turnover intention was a significant problem among PHW in Buraidah, Saudi Arabia. The predictors of turnover intention included job title, marital status, and attending or having certificate programs. This calls for ministry, healthcare leaders, and managers to conduct employees' satisfaction and motivation surveys to identify the current status and high-risk groups. There is a need to develop focused programs and initiatives to decrease turnover intention among high-risk professional groups through enhanced autonomy and involvement in decision-making. Third, it is also necessary that adequate opportunities for continuing education and professional growth are provided with clear career development pathways. Finally, large-scale studies are needed to provide robust evidence on the problem of turnover intention and its predictors.

Statement of Ethics

Ethical approval was obtained from the Qassim Regional Bioethics Committee (Approval No. 607/45/5564, date: November 7, 2023). Written informed consent to participate was not directly obtained but inferred by the completion of the survey. The first page of the online survey link contained consent and would proceed further only if the participant agreed. Confidentiality was assured to all participants who agreed to participate in this research.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Adel Alrashdi and Unaib Rabbani conceptualized the study and developed the methods. Adel Alrashdi cured the data. Adel Alrashdi analyzed the data under supervision of Unaib Rabbani. Adel Alrashdi wrote the initial draft, and Unaib Rabbani reviewed and edited the draft. All authors have approved the final manuscript.

Data Availability Statement

The data that support the findings of this study are not available publicly because of complex calculations involved in the measurement of tools. However, data are available on request from the corresponding author.

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