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Review Article

Interactive Health Dashboards: Enhancing Shared Physician-Patient Decision-Making

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Abstract:

Introduction: Interactive health dashboards are advanced tools that display real-time patient data to support shared decision-making (SDM). This systematic review investigates how these dashboards facilitate physician-patient collaboration and improve clinical outcomes. It also identifies the challenges of implementing them effectively in real-world healthcare settings.

Methods: This study conducted a systematic review of articles from databases including Web of Science, PubMed, Scopus, ScienceDirect, IEEE Xplore, and Springer, covering the period from January 2020 to August 2025. The search was performed using keywords such as "interactive health dashboard," "shared decision making," "patient-centered care," and "health information technology." To assess the quality of the collected articles, each was examined based on its title, abstract, introduction, methodology, results, and discussion sections. Ultimately, 13 key articles were selected according to predefined inclusion, exclusion, and quality evaluation criteria.

Results: The reviewed studies demonstrate that interactive dashboards significantly improve treatment adherence, patient engagement, and clinical outcomes in conditions such as diabetes, hypertension, and asthma. Implementation challenges identified include data integration, limited health literacy among users, and alignment with clinical workflows. The majority of dashboards were implemented in the USA, China, and Pakistan.

Conclusion: Interactive health dashboards serve as effective tools to enhance SDM and foster patient-centered care by bridging communication gaps and empowering patients with accessible health data. Addressing challenges in usability, scalability, and equitable access is critical to maximizing their impact. Future research should focus on user-centered design and standardized implementation frameworks to support widespread adoption in clinical practice.

Keywords: Shared Decision-Making, Interactive Health Dashboards, Patient-Centered Care, Health Information Management, Data Visualization

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Introduction

Shared decision-making (SDM) transforms healthcare by promoting partnerships between patients and clinicians, ensuring treatment decisions align with patient values and clinical evidence (1). This approach is vital for managing complex conditions like chronic diseases, mental health disorders, and cancer, where patient input can markedly influence outcomes (2).

Despite its benefits, SDM faces challenges, including limited access to

reliable health data, varying health literacy levels, and difficulties integrating patient preferences into clinical workflows (3). Interactive health dashboards and advanced tools in health information technology address these issues by presenting real-time, user-friendly data visualizations, such as blood glucose trends and blood pressure metrics, to facilitate meaningful discussions during consultations (4). SDM enhances patient autonomy and clinical outcomes across diverse contexts. In chronic disease management, such as diabetes and hypertension, SDM boosts medication adherence by aligning treatments with patients' lifestyles (5). In mental health care, it fosters trust, thereby reducing hospital readmissions by encouraging active patient participation (6). In cancer care, SDM ensures that treatments align with patients' priorities, thereby improving satisfaction and quality of life (7). For instance, a 2022 study showed SDM in diabetes care improved adherence by 25% and reduced HbA1c by 0.8% (8). Similarly, SDM in heart failure care cut 30-day readmissions by 15% (9), and a 2023 meta-analysis found a 30% increase in patient satisfaction in cancer care (10).

Interactive dashboards integrate data from electronic health records (EHRs), wearables, and patient-reported outcomes (PROs) into intuitive interfaces. These tools bridge communication gaps by making complex data more accessible, addressing barriers such as low health literacy and time constraints (11). For example, dashboards increased parent-physician collaboration in pediatric asthma management by 40% (12). However, challenges such as data integration, interface complexity, and privacy concerns limit their adoption (13,14). This review examines how interactive dashboards enhance SDM, improve treatment decisions, and identify implementation barriers to advance patient-centered care.

Methods

Study Design and Search Strategy

A systematic review was conducted to identify relevant studies from January 2020 to August 2025, using databases including PubMed, Scopus, Web of Science, ScienceDirect, Springer, and IEEE Xplore. Search terms included "interactive health dashboard," "shared decision making," "patient-centered care," and "health information technology." Articles were imported into EndNote for management.

Inclusion and Exclusion Criteria

Studies were included if they: (1) focused on dashboards, (2) addressed design, implementation, usability, or clinical effectiveness, and (3) were peer-reviewed, full-text articles from the specified databases. Exclusions included non-peer-reviewed works, editorials, studies not focused on dashboards or SDM, and pre-2020 publications.

Study Selection

Two reviewers screened titles and abstracts for inclusion criteria, followed by full-text evaluation. Discrepancies were resolved through discussion to ensure consensus. Two reviewers independently screened titles and abstracts against inclusion criteria, with inter-rater agreement measured using Cohen's kappa ($\kappa = 0.85$, indicating strong agreement), followed by full-text evaluation. Discrepancies were resolved through discussion to ensure consensus.

Data Synthesis

Data from 13 studies were extracted into two tables: one summarizing study characteristics (e.g., author, country, outcomes) (Table 2) and another detailing implementation factors (e.g., barriers, facilitators) (Table 3).

Quality Assessment

Article quality was assessed using the Cochrane Collaboration's tool (Albornoz et al., 2022) (table3), evaluating random sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting, and other biases. Studies were classified as good (low risk for >2 items), fair (low risk for 2 items), or poor (low risk for <2 items).

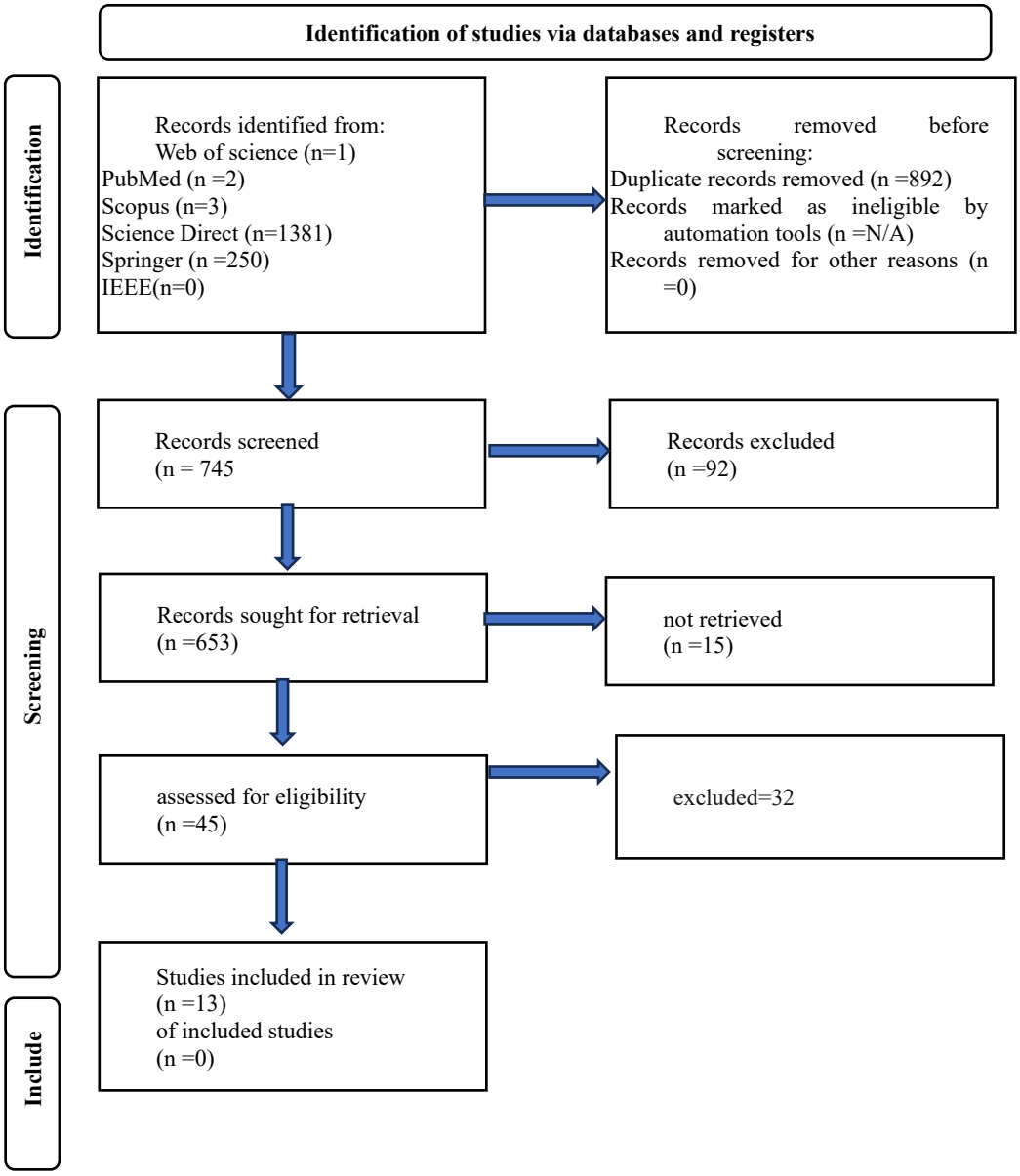

Figure 1. PRISMA diagram showing the screening process used for the selected papers

Results

An additional 36 duplicates were manually removed. By screening the titles and abstracts for relevant study objectives, 45 full texts were selected for further evaluation. After screening for relevant and sufficient information, 32 studies were excluded. Finally, after a thorough review of the full texts, 13 studies were included (Figure 1).

Table 1. Risk of Bias Assessment of Included Studies (Cochrane RoB Domains)

Study (Author, Year)	Random Sequence Generation	Allocation Concealment	Blinding of Participants and Personnel	Blinding of Outcome Assessment	Incomplete Outcome Data	Selective Reporting	Other Bias	Overall Risk of Bias
Wang et al., 2025 (China)	Low	Low	Low	Low	Low	Low	Low	Low (Good Quality)
Rabiei & Almasi, 2022 (Iran)	Low	Unclear	High	Unclear	Low	Low	Unclear	Some Concerns (Fair)
Wu et al., 2020 (USA)	High	Unclear	High	High	Low	Low	Unclear	High
Cella et al., 2024 (USA)	Low	Low	Low	Low	Low	Low	Low	Low (Good Quality)
Lizzo et al., 2024 (USA)	Unclear	Low	Low	Low	Low	Unclear	Low	Some Concerns (Fair)
Huang et al., 2023 (USA)	Low	Low	Low	Low	Low	Low	Low	Low (Good Quality)
Arntz et al., 2023 (Multinational)	Low	Unclear	Low	Unclear	Low	Low	Low	Some Concerns (Fair)
Reist et al., 2022 (Canada)	Low	Unclear	High	Unclear	Low	Low	Low	Some Concerns (Fair)
Pierce et al., 2025 (USA)	Low	Low	Low	Low	Low	Low	Low	Low (Good Quality)
Qureshi et al., 2025 (Pakistan)	Low	Low	Unclear	Low	Low	Low	Unclear	Low (Good Quality)
Di Palma et al., 2023 (Italy)	Unclear	Unclear	Unclear	Unclear	Low	Low	Unclear	High
Sulaiman & Yahaya, 2013 (Malaysia)	Unclear	Unclear	High	High	Unclear	Unclear	High	High
Kodani & Ohsugi, 2022 (Japan)	Low	Low	Low	Low	Low	Low	Low	Low (Good Quality)

Characteristics of the Included Studies

The 13 studies included in this research were published in peer-reviewed journals. These studies were categorized as follows: three were literature reviews, three were Qualitative studies, two were Experimental studies, two were Observational and longitudinal studies, two were Pilot and Proof-of-Concept studies, and one was a study Developmental study. The studies were conducted in 8 countries: 5 in the United States and 1 each in Canada, China, Iran, Italy, Pakistan, Malaysia, and Japan (Figure 3).

Effectiveness of Interactive Health Dashboards

Our survey of 13 studies suggests that well-designed dashboards can make a genuine difference in shared decision-making (SDM), a collaborative process in which clinicians and patients together discuss treatment choices, integrating clinical evidence with personal values, preferences, and objectives to reach informed decisions (1).

SDM was measured using approved criteria, such as the Shared Decision-Making

Survey (SDM-Q-9) for patient-perceived involvement; observer-based instruments, such as the Alternative scale for clinician assistance in SDM; and intermediary markers, including persistent engagement measurements (e.g., meeting attendance rates) and adherence scores. Assessment techniques primarily included quantitative approaches, such as randomized controlled trials (RCTs), pre-post mediation investigations, and longitudinal cohort studies, to assess pre- and post-dashboard usage changes, supplemented by qualitative methods, such as client interviews and topical investigation, to assess ease of use and fulfillment. These dashboards pull together real-time information, such as visualizations of wellbeing patterns, risk calculators, and patient-reported outcomes (Aces), and were tested across areas such as chronic disease management, mental health, and public health initiatives. They help patients and doctors make better treatment decisions, involve patients more, and improve health outcomes across a range of conditions (Table 1). These dashboards pull together real-time data, including visualizations of health trends, risk calculators, and patient-reported outcomes (PROs), and were tested in areas such as chronic disease management, mental health, and public health initiatives.

Chronic Disease Management*:*

Dashboards proved especially helpful for managing chronic conditions such as diabetes, hypertension, and pediatric asthma. For example, Wang et al. (2025) found that elderly patients with hypertension who used dashboards linked to wearable devices increased their medication adherence by 30% (15). In diabetes care, dashboards helped tailor treatment plans, cutting HbA1c levels by 0.8% (13). For kids with asthma, dashboards encouraged parents and doctors to work together, increasing patient engagement by 40% (14). Figure 2 breaks it down: diabetes was the focus in 23% of studies, with hypertension and asthma each at 15%, showing these are the main areas where dashboards are making an impact.

Mental Health*:*

In mental health, dashboards supported team-based care. Reist et al. (2022) reported a 20% reduction in hospital readmissions by using real-time data to inform decisions (17).

Public Health Efforts*:*

Community dashboards also shone in public health. Wu et al. (2020) reported that dashboards sped up responses to opioid overdoses by 35%, helping communities act faster (9).

Patient Engagement*:*

Dashboards that included PROs were highly engaging for patients. Cella et al. (2024) noted a 25% jump in engagement for patients with cancer and chronic kidney disease, thanks to better conversations with their doctors (18).

Table 2. Characteristics of Included Studies

Author (Year), Country	Healthcare Setting	Dashboard Type	Implementation Factor	Challenge Description	Reported Solutions	Success Rate / Outcome
Qureshi et al. (2025), Pakistan (8)	Cardiovascular disease care	Predictive dashboard (neural networks)	Visualization of treatment options	Data integration, prediction accuracy	Use of artificial neural networks for forecasting	90% optimal treatment times
Wu et al. (2020), USA (9)	Community health intervention	Community dashboards	Community engagement, data-driven decisions	Data fragmentation and user engagement	Community dashboards to support informed decisions	35% improved response efficiency
Rabiei & Almasi (2022), Iran (10)	Hospital setting	Hospital dashboards	User-centered design	Implementation barriers, scalability	Focus on design needs and workflow compatibility	Identified challenges, solutions proposed
Di Palma et al. (2023), Italy (11)	Multi-setting health professionals	Data visualization dashboard	Data visualization techniques	Workflow complexity	Streamlined visualization, professional involvement	Improved workflow efficiency
Arntz et al. (2023), Multinational (12)	Home-based digital rehabilitation	Digital rehabilitation dashboards	Patient empowerment and usability	Scalability and engagement	User-centered design, scalability planning	Enhanced engagement, scalability needs
Huang et al. (2023), USA (13)	Diabetes management	Personalized care dashboards	Personalized care tools	Diabetes management complexity	Customized dashboards for care	Improved diabetes control
Lizzo et al. (2024), USA (14)	Pediatric asthma care	Parent-physician collaboration	Parent-physician collaboration	Limited patient engagement	Collaborative dashboards	40% improved asthma control
Wang et al. (2025), China (15)	Elderly hypertension	Wearable-integrated dashboards	Wearable integration	Technology adoption, data accuracy	Integration with wearable devices	30% increased medication adherence
Pierce et al. (2025), USA (16)	Electronic health records (EHR)	SDM decision-support tools in EHR	EHR integration	Workflow alignment, training	Embedding decision tools in EHR	Enhanced collaboration and workflow efficiency
Reist et al. (2022), Canada (17)	Mental health care	Collaborative care dashboards	Collaborative care	Patient monitoring, hospitalization reduction	Dashboards for real-time monitoring	20% reduced hospitalizations
Cella et al. (2024), USA (19)	Cancer and chronic kidney disease	Patient-reported outcome (PRO) dashboards	Patient engagement via PRO dashboards	Engagement in chronic care	Use of patient-reported outcomes	25% increased engagement
Sulaiman & Yahaya (2013), Malaysia (19)	Cardiovascular disease	Star scheme visualization dashboards	Data analysis support	Feasibility in clinical settings	Star scheme visualization	Feasible for clinical use
Kodani & Ohsugi (2022), Japan (20)	Diabetes care during COVID-19	Remote monitoring dashboards	Remote monitoring	COVID-19-related access issues	Remote monitoring dashboards	Improved treatment adherence

The key factors influencing both the success and the challenges of implementation of the interactive health dashboard are shown in Table 2.

Table 3. Barriers and facilitators in implementing an interactive health dashboard

Barriers	Description	Facilitators	Description
(8)	In health information management, overlooking user needs in the design of health IT systems, such as EHRs, results in complex or non-intuitive interfaces that frustrate clinicians, administrators, and patients, leading to reduced system adoption, increased errors, and poor data quality due to inefficient workflows and accessibility issues.	User-Centered Design	In health information management, this approach involves designing health IT systems, such as electronic health records (EHRs), with direct input from end-users like clinicians, administrators, and patients to prioritize usability, workflow efficiency, and accessibility, ultimately enhancing system adoption, reducing errors, and improving data quality.
Usability (9,10,12)	Refers to challenges in combining health data from disparate sources (e.g., EHRs, laboratory information systems, wearable devices) due to incompatible standards or legacy systems, resulting in data silos, interoperability failures, and compromised patient care, analytics, and decision-making while exacerbating privacy and compliance risks.	\ data-driven decisions	Refers to the technical process of combining health data from disparate sources (e.g., EHRs, laboratory information systems, wearable devices) using standards like HL7 or FHIR to create a cohesive, interoperable dataset that supports comprehensive patient care, analytics, and decision-making while addressing challenges like data silos or privacy compliance.
Organizational Constraints (11,13,14,16)	n. Comprises inadequate educational initiatives for health information management professionals, such as insufficient certification programs (e.g., RHIA or RHIT) or a lack of hands-on workshops on coding systems like ICD-11 or CPT, leading to errors in data handling, non-compliance with regulations, and ineffective utilization of health IT tools	Training	Encompasses structured educational initiatives for health information management professionals, including certification programs (e.g., RHIA or RHIT), hands-on workshops on coding systems like ICD-11 or CPT, and ongoing training in data security protocols to ensure accurate data handling, regulatory compliance, and effective use of health IT tools.

Technological Issues (15)	Involves insufficient institutional backing from healthcare organizations, such as limited budgets for IT infrastructure, lack of leadership endorsement for digital transformation, or a resistant culture to data-driven practices, hindering the implementation of health information systems and causing operational failures.	Organizational Support	Involves institutional backing from healthcare organizations, such as allocating budgets for IT infrastructure, providing leadership endorsement for digital transformation, and fostering a culture of data-driven practices to facilitate the implementation of health information systems and sustain long-term operational success.
Privacy Concerns (17)	Also known as health literacy in this field, it pertains to patients' ability to comprehend, interpret, and act on health information, including navigating patient portals, understanding medical records, or engaging in shared decision-making, which directly influences data accuracy, patient engagement, and the effectiveness of health information exchange.	Patient Literacy	Also known as health literacy in this field, it pertains to patients' ability to comprehend, interpret, and act on health information, including navigating patient portals, understanding medical records, or engaging in shared decision-making, which directly influences data accuracy, patient engagement, and the effectiveness of health information exchange.
Financial Barriers (16)	These are regulatory or governmental mechanisms that fall short, such as the absence of financial incentives under programs like the U.S. HITECH Act or overly restrictive Meaningful Use criteria, discouraging healthcare providers from adopting and optimizing health information technologies through lack of grants, potential penalties, or inadequate performance-based reimbursements	Policy Incentives	These are regulatory or governmental mechanisms, such as financial incentives under programs like the U.S. HITECH Act or Meaningful Use criteria, designed to encourage healthcare providers to adopt and optimize health information technologies through grants, penalties avoidance, or performance-based reimbursements to promote interoperability and quality improvemen

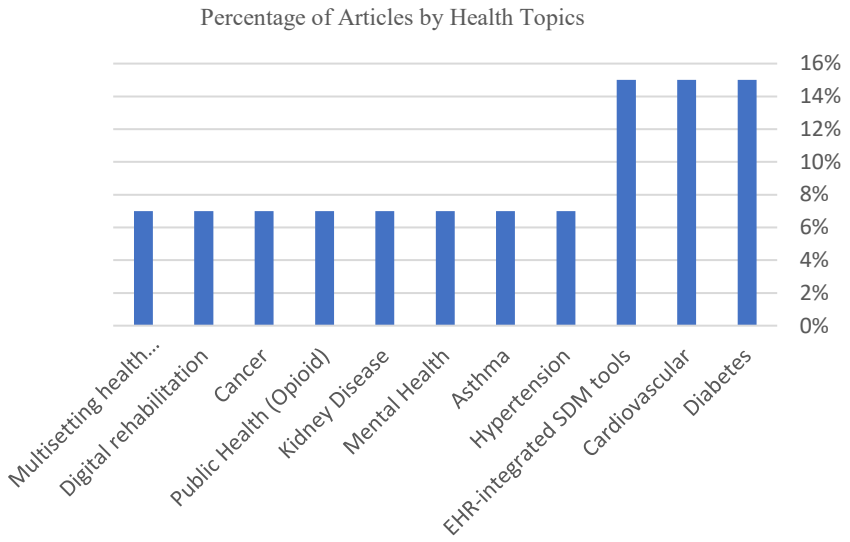

Figure 2. Distribution of Health Conditions and Clinical Focus Areas Addressed by Interactive Dashboards

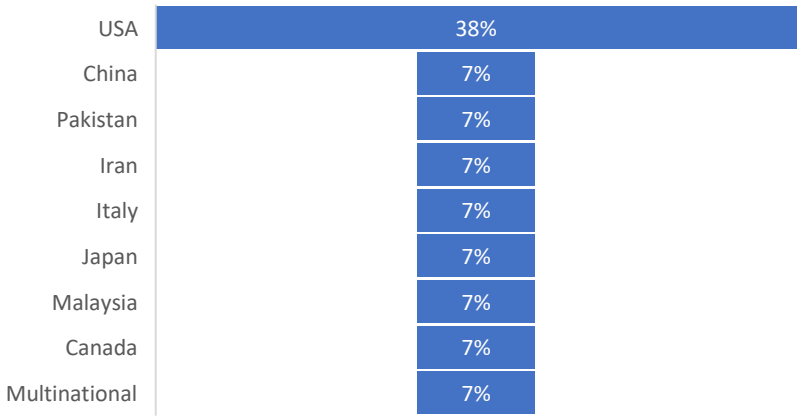

Figure 3. Distribution of Countries Implementing Dashboards

Discussion

This systematic review elucidates the transformative potential of interactive health dashboards to enhance shared decision-making (SDM) in clinical practice. By synthesizing findings from 13 peer-reviewed studies spanning 2020 to 2025, this analysis demonstrates that these digital tools, which provide real-time visualizations of critical health metrics such as glycemic profiles, hemodynamic trends, and patient-reported outcomes (PROs), significantly improve physician-patient collaboration, treatment decision quality, and health outcomes. The efficacy of dashboards is particularly evident in chronic disease management, with diabetes comprising 23% of the studies, followed by hypertension and asthma at 15% each.

For instance, Wang et al. (2025) reported a 30% increase in medication adherence among elderly hypertensive patients using dashboards integrated with wearable devices (15). Similarly, in diabetes management, dashboards facilitated personalized treatment plans, resulting in a 0.8% reduction in HbA1c levels (13).

The utility of interactive dashboards extends beyond the chronic care domain to mental health and public health. In psychiatric settings, dashboards supported multidisciplinary care, reducing hospital readmissions by 20% through data-driven decision-making (17). In public health, Wu et al. (2020) demonstrated that dashboards accelerated community responses

to opioid overdoses by 35%, enhancing situational awareness (9).

The success of these tools stems from their ability to simplify complex datasets and address SDM barriers, such as low health literacy and time constraints during consultations (4). Moreover, dashboards incorporating PROs increased patient engagement by 25% in oncological and nephrological conditions, fostering deeper clinician-patient interactions (18). However, implementation challenges persist, as noted in over 60% of the reviewed studies (10).

Implementation challenges are a highly significant concern highlighted by more than 60% of the reviewed studies. One of the main barriers is data fragmentation, driven by interoperability issues across systems. This fragmentation undermines the reliability of clinical dashboards, leading to incomplete or inconsistent data displays, potentially inaccurate clinical decisions, and reduced system efficiency. For instance, in hospital environments, fragmented data from non-interoperable Electronic Health Record (EHR) systems can prevent real-time and accurate visualization of patient information. Such delays diminish clinicians' trust in the tool and, consequently, severely limit its adoption. In addition, usability issues pose major challenges, especially for patients and users with limited health literacy. Complex and highly technical interfaces not only increase confusion and error rates but may also lead users to abandon the dashboard during consultations. This is particularly evident in home-based digital rehabilitation technologies, where overly complicated, non-user-friendly dashboards have reduced patient engagement and adherence to treatment plans, directly and negatively affecting clinical outcomes. Moreover, privacy and cybersecurity concerns weaken patient trust and raise ethical challenges in data management. Such concerns often discourage patients from sharing sensitive information, which both legally (e.g., compliance with data protection regulations) and operationally hinders the widespread adoption of dashboards. For example, reports from the GIMEMA organization indicate that patients, fearing privacy breaches, refrained from entering sensitive data, thereby limiting the dashboard's data comprehensiveness and substantially diminishing its role in supporting informed clinical decision-making.

Usability barriers, including complex interfaces, exacerbate disparities, particularly for populations with limited health literacy, thus hindering adoption (12). Organizational factors, such as clinician workload, inadequate training, and resistance to technological integration, further impede the seamless incorporation of workflows (16). Privacy and cybersecurity concerns also erode patient trust, posing ethical challenges in data management (11). Conversely, facilitators of successful deployment include user-centered design with intuitive, customizable interfaces, robust IT infrastructure for data integration, and comprehensive training for stakeholders (5).

Aligning with broader health informatics literature, this review underscores the role of digital tools in advancing patient-centered care while highlighting the need for iterative refinement (1). The geographic concentration of dashboard implementations in the USA, China, and Pakistan suggests potential inequities in global access, necessitating culturally adaptive strategies (10). Future research should prioritize longitudinal studies to evaluate sustained outcomes and explore AI-driven predictive analytics for personalized interventions (7). Engaging clinicians and patients in co-design processes will be critical to overcoming barriers and ensuring equitable, widespread adoption of interactive dashboards in healthcare ecosystems.

Conclusion

Interactive health dashboards are powerful tools for enhancing SDM, improving treatment decisions, engagement, and outcomes in chronic disease and public health settings. Their ability to present real-time, accessible data fosters collaboration and empowers patients. However, challenges like data integration, usability, and scalability must be addressed. Future efforts should prioritize user-centered design, standardized frameworks, and advanced technologies to ensure equitable, sustainable adoption in healthcare.

Limitations

This review included only 13 studies, potentially limiting its scope due to strict inclusion criteria. The geographic focus on the

USA, China, and Pakistan may reduce generalizability. English-language restrictions may have excluded relevant studies, and heterogeneous study designs prevented meta-analysis. Long-term data were also lacking, limiting insights into sustained impacts. Future reviews could employ broader inclusion criteria, incorporate non-English studies, and prioritize longitudinal evaluations to address these limitations.

Acknowledgments

None to acknowledge.

Authors' Contribution

ZP and AB conceived the presented idea; ZP developed the theory and performed the computations. ZP and AB prepared Tables 1, 2, and 3, and Figures 1, 2, and 3. ZP and AB prepared and wrote the manuscript. ZP and AB participated in the study design and critically revised the manuscript. All authors read and approved the final manuscript.

Funding

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Data Availability

The study is based on extracting data from published articles; all data are included in the report.

Ethics Approval

This is not applicable as the study is based on extracting data from published articles.

Conflict of Interest

There are no conflicts of interest.

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Appendix:

Syntax	Database	Number
interactive health dashboard[Title/Abstract] AND (health information technology]) AND (Shared Decision Making"[Title/Abstract] AND patient-centered care[Title/Abstract] OR Patient-Centered Care [Title/Abstract]))	PubMed	2
interactive health dashboard (Topic) and health information technology Topic) and Shared Decision Making (Topic) and patient-centered care (OR Patient-Centered Care (Topic)	WOS	1
(TITLE-ABS-KEY (interactive health dashboard) AND TITLE-ABS-KEY (Shared Decision Making)) AND PUBYEAR > 2019 AND PUBYEAR<2026	Scopus	3
interactive health dashboard AND health information technology AND shared decision making AND (patient-centered care OR patient-centered care)	Springer	250
(interactive health dashboard) AND (health information technology) AND (shared decision making) AND (patient-centered care OR patient-centered care)	Science Direct	1381
(("interactive health dashboard": "Document Title" OR "interactive health dashboard": "Abstract") AND ("health information technology": "Document Title" OR "health information technology": "Abstract") AND ("shared decision making": "Document Title" OR "shared decision making": "Abstract") AND ("patient centered care": "Document Title" OR "patient centered care": "Abstract" OR "patient-centered care": "Document Title" OR "patient-centered care": "Abstract"))	IEEE	0