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Optimizing Health Information Management: Performance of a Dashboard for Teaching Hospitals of Ahvaz Jundishapur University of Medical Sciences

Fatemeh Forghani, Amirabbas Azizi, Ahmad Azizi*

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* ***Correspondence to***: *Ahmad Azizi, Department of Health Information Technology, School of Allied Medical Sciences, Ahvaz Jundishapur University of Medical Sciences, Postal Code: 61357-15794, Ahvaz, Iran. Phone: +98 61 3311 2680 Email:* azizimaster@gmail.com

About the authors:

Fatemeh Forghani; MSc in Health Information Technology, Student Research Committee, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

Amirabbas Azizi; BSc, MSc, PhD in Medical Informatics, Associate Professor, Department of Health Information Technology, School of Allied Medical Sciences, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

Ahmad Azizi; Lecturer of Medical Record Education, Department of Health Information Management, School of Allied Health Sciences, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

ABSTRACT

Health Information Management (HIM) is vital for hospitals, enabling data collection, storage, and retrieval. Its effectiveness is often hindered by fragmented records, info overload, and poor decision-making. This study aimed to design and evaluate a performance dashboard for HIM in the Teaching hospitals of Ahvaz. This practical study was executed in three stages: (1) identifying key performance indicators (KPIs) via a literature review and expert consultations, (2) designing and developing the dashboard with QlikView, and (3) assessing usability using heuristic checklists and think-aloud methods. The dashboard integrated 47 KPIs, identified through a structured conceptual model and developed using QlikView, featuring interactive visualizations for health information management. While the evaluation found the dashboard useful, it also highlighted usability issues in control, error prevention, and visibility, indicating a need for improved data presentation and readability. Dashboards have proven to be essential tools in healthcare. From the perspective of hospital managers, the designed Health Information Management dashboard provides a clear, real-time view of key operational data, like patient wait times, admission trends, and record completion rates. This allows managers to quickly spot problems, make smarter decisions about staff and resources, and ultimately improve the efficiency and quality of their department's services.

Keywords: Quality Indicators, Health Care, Data Visualization, Health Information Systems, Decision Support Systems, Teaching Hospitals, Dashboard Systems

INTRODUCTION

In today's world, information is recognized as a fundamental element in the development of organizations (1). This is particularly evident in healthcare institutions, where comprehensive, relevant, and timely information underpins all management activities (2). As a critical discipline, Health Information Management (HIM) encompasses the implementation, maintenance, and oversight of information systems that facilitate the production, recording, storage, retrieval, analysis, and dissemination of healthcare data. These processes are essential for ensuring the efficiency and effectiveness of healthcare organizations (3). Therefore, given the significance of managing this vital asset, establishing a dedicated and well-structured Health Information Management (HIM) is imperative (4, 5). Health Information Management (HIM) contributes to the management and planning of healthcare facilities and medical services, as well as to research initiatives and the compilation of healthcare statistics, making it indispensable for maintaining accurate and accessible health information (6).

Despite its importance, healthcare organizations increasingly struggle with various forms of information disorder, such as information overload, inaccurate data, fragmented records, and data misalignment (7). The complexity of utilizing data effectively in both managerial and clinical decision-making is compounded by the sheer volume of data, the need to integrate information from multiple sources, and a lack of proper organization. These challenges can lead to errors (8) and delays in service delivery (9).

Dashboards are extensively utilized in healthcare settings, serving as powerful tools for data visualization, performance monitoring, and decision support. By presenting complex data in an intuitive and structured manner, they facilitate evidence-based practices, enhance workflow efficiency, and optimize resource management. These tools incorporate visual elements such as charts, graphs, and color coding to simplify data interpretation, making critical information more accessible and actionable (10, 11). Essentially, dashboards aggregate data from various health information systems and display Key Performance Indicators (KPIs) in a concise, comprehensive, and insightful format. This enables healthcare managers to assess performance at a glance, identify underlying issues, and implement corrective measures to improve operational efficiency (12). Performance dashboards, as a strategic tool for managing organizational performance, consolidate essential data on achieving institutional goals into a single interface. They allow managers to effectively measure, monitor, and optimize performance, ensuring alignment with strategic objectives (13).

However, for dashboards to be truly effective, they must be continuously refined to meet user-defined goals and expectations, necessitating ongoing evaluation and improvement (14). A critical aspect of dashboard design is usability, which encompasses factors such as ease of use, efficiency, and user satisfaction, and is thus a critical success factor (15, 16). This study introduces a novel contribution by designing and evaluating the first dedicated performance dashboard for Health Information Management (HIM) departments in the Teaching hospitals of Ahvaz, Iran. While performance dashboards exist in various clinical and administrative domains, no such tool has been previously developed specifically for HIM functions in this context. Therefore, to achieve an optimal design, this study applied

established usability evaluation criteria throughout the dashboard's development process. (15).

Therefore, this study aimed to bridge this gap. The successful implementation of the proposed dashboard is expected to transform HIM practices in Ahvaz's teaching hospitals. Prior to its adoption, these departments likely grapple with fragmented data sources, delayed reporting, and reactive decision-making, relying on manual aggregation of indicators. This can lead to inefficiencies in record processing, obscured performance trends, and hampered strategic planning. In contrast, the post-implementation scenario promises a consolidated, real-time view of KPIs through interactive visualizations. This shift would enable proactive management, swift identification of bottlenecks (such as in medical record completion or coding accuracy), and data-driven interventions to enhance departmental efficiency. Ultimately, by providing HIM managers with an intuitive tool for continuous monitoring, the dashboard can facilitate a measurable transition from a state of information disorder to one of informed control, directly contributing to improved operational outcomes and, consequently, better support for patient care services.

Objectives

This study aimed to design and evaluate a performance dashboard for health information management in teaching hospitals located in Ahvaz, a metropolitan city in southwestern Iran.

METHODS

This applied study was conducted in three phases: (1) identification of KPIs and requirements, (2) design and development of the dashboard software application, and (3) evaluation of the developed software application. This section details the methodology adopted in each phase.

Phase 1: Identification of KPIs and Requirements

The objective of this phase was to identify and prioritize KPIs for developing a performance dashboard for hospital HIM departments. A systematic literature review was conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist to ensure comprehensive data extraction (17).

Searches were conducted across multiple electronic databases, including Scopus, Web of Science, PubMed, and the Persian-language databases SID, Magiran, and CIVILICA. The search strategy combined medical subject headings (MeSH) terms and relevant keywords associated with dashboards and HIM. The search period covered all the available literature up to July 2024. Two researchers independently performed the search and article retrieval and resolved discrepancies through discussion with a third researcher. Relevant articles were retrieved through manual searches using Google Scholar.

The inclusion criteria were Publications in English or Persian, Original research articles and review papers, and full-text availability. The exclusion criteria included conference papers, theses, manuscripts, books, and booklets. Studies published in languages other than English or Persian.

The retrieved articles were imported into EndNote for duplicate identification. Titles and abstracts were screened, and irrelevant articles were excluded. Full-text reviews were

conducted according to inclusion and exclusion criteria, resulting in the final selection of studies.

Subsequently, a structured questionnaire was constructed to translate the extracted indicators into concrete dashboard requirements. A five-point Likert scale (1 = least essential, 5 = most essential) was used to rate the necessity of each indicator. The questionnaire comprised 60 key indicators across four main domains: admission, storage and retrieval, health data classification, and statistics.

The Content Validity Ratio (CVR) was used to determine the necessity of each indicator based on expert opinions, following Lawshe's method. The Content Validity Index (CVI) was used to assess the relevance, clarity, and simplicity of each indicator with a threshold of 0.79 for inclusion. Reliability testing was conducted by calculating Cronbach's alpha to assess the questionnaire's internal consistency.

Subsequently, the validated questionnaire was completed by 34 HIM experts across various roles, including department managers, medical records specialists, statisticians, and professionals in health information technology, with items averaging ≥ 3.5 on the Likert scale and prioritized for dashboard development. The main criteria for participant selection included their experience and knowledge of health information management, as well as their willingness to participate in the study.

Phase 2: Dashboard Design and Development

A conceptual model for the dashboard was designed using VISIO 2021, incorporating elements derived from the needs assessment. The modeling process included the Operational Model, use case diagrams illustrating system functionalities and user interactions; the Structural Model, class diagrams depicting entity relationships and responsibilities; the Behavioral Model, sequence diagrams demonstrating system operations and interactions; and the Object-Oriented Conceptual Model, a comprehensive representation integrating operational, structural, and behavioral components.

The dashboard software application development followed a structured, multi-step process: Data Collection & Storage, where data were gathered from hospital information systems in Ahvaz Teaching hospitals and stored in Excel 2021; Data Organization, where the data were cleaned, structured, and integrated in Excel for subsequent analysis; and Dashboard Prototype Development, where QLIKVIEW 2017 was employed for designing the interactive dashboard, featuring performance indicators, visual analytics, and data representation.

Phase 3: The Software Application Evaluation

The dashboard was evaluated through two usability assessment methods:

A heuristic evaluation, a standard usability inspection method, was conducted by usability experts to assess the dashboard's compliance with Nielsen's 10 usability heuristics. Four experts in health information management and medical informatics independently evaluated the dashboard. In this method, the evaluator assesses the dashboard's features against established standards and identifies each item as a usability problem. To collect data, a standard usability checklist (18) was used, and its validity was confirmed. To ensure the checklist items' reliability, evaluators discussed all items in meetings and reached consensus on a uniform interpretation. In addition, they independently rated the severity of the issues based on the five-point scale. The independent evaluators' issues were

consolidated into a single list after duplicates were removed, and the average severity of the remaining issues was calculated. During the evaluation, each identified software application issue was assigned a severity level according to Nielsen's usual procedure: no problems, very minor issues, minor issues, major issues, and very major issues, corresponding to severity scores of 0, 1, 2, 3, and 4, respectively. Problems were categorized as no problem (0.0-0.5), minor issue (0.6-1.5), minor issue (1.6-2.5), major issue (2.6-3.5), and very major issue (3.6-5). The issues found in the software application and their severity levels were recorded and analyzed using SPSS version 24.

The think-aloud method was used to evaluate the dashboard's usability in real time. Ten HIM staff members from educational hospitals were asked to interact with the software application while continuously verbalizing their thoughts, observations, and actions. Participants were prompted to explain what they were doing, what they were seeing, and what they were interpreting. All sessions were audio-recorded, and supplementary notes were taken in a Word document for later analysis

Ethical Statement

This study received ethical approval from the Ethics Research Committee of Ahvaz Jundishapur University of Medical Sciences with reference number IR.AJUMS.REC.14020459.

RESULTS

Phase 1: Identification of KPIs and Requirements

At this stage, a review of relevant databases identified 16 articles for inclusion in the study. KPIs and essential information required for developing a health information management dashboard were identified and extracted. The findings from the literature review were then structured into a questionnaire designed to gather expert opinions from professionals in the Health Information Management (HIM) department.

The content validity of the performance indicators for the Health Information Management (HIM) department was assessed. Based on a sample size of 34 participants, the minimum acceptable Content Validity Ratio (CVR) was determined to be 0.31. Consequently, indicators such as the number of hospital net autopsies, hospital gross autopsies, successful physician notifications, and unsuccessful physician notifications did not meet the validity threshold and were therefore excluded from the study. Furthermore, because the minimum acceptable Content Validity Index (CVI) was set at 0.62, all remaining indicators were deemed valid. The questionnaire's reliability was also confirmed, with a Cronbach’s alpha coefficient of 0.76, indicating acceptable internal consistency. The selected KPIs for the health information management dashboard, along with their CVR values, mean scores, and approval status, are detailed in Table 1.

TABLE I. SELECTED KPIS FOR THE HEALTH INFORMATION MANAGEMENT DASHBOARD

#	KPIs	CVR	Mean (Out of 5)	Approval/ Not approval
	Admission			
1	Total number of admissions categorized by appointment methods	0.58	3.6	Approved
2	Number of outpatient records created	0.88	4.2	Approved
3	Number of inpatient records created	0.94	4.8	Approved
4	Rate of insurance booklet misuse relative to the total number of patients	0.41	3	Not Approved
5	Average waiting time for outpatient admission	0.70	3.7	Approved
6	Average waiting time for inpatient admission and bed reservation	0.82	3.5	Approved
7	Number of intra-hospital patient transfers	0.70	4.2	Approved
8	Number of inter-hospital patient transfers	0.82	4.2	Approved
9	Number of patient deaths	0.88	4.6	Approved
10	Number of hospital net autopsies	0	-	Not Approved
11	Number of hospital gross autopsies	0.05	-	Not Approved
12	Number of successful physician notifications	0.05	-	Not Approved
13	Number of unsuccessful physician notifications	0.05	-	Not Approved
14	Number of successful notifications to patients or their families	0.41	2.7	Not Approved
15	Number of unsuccessful notifications to patients or their families	0.41	2.7	Not Approved
16	Number of patients transferred to other hospitals	0.88	3.4	Not Approved
	Information Storage and Retrieval			
17	Number of stored medical records	0.88	4	Approved
18	Number of retrieved medical records	0.88	3.9	Approved
19	Number of controlled medical records	1	3.5	Approved
20	Number of tracked medical records	1	3.8	Approved
21	Average medical record archiving duration	1	3.7	Approved
22	Number of discharged records subjected to quantitative review	1	4.3	Approved
23	Number of discharged records subjected to qualitative review	1	4.2	Approved

24	Number of organized records	1	3.9	Approved
25	Number of scanned records	1	3.8	Approved
26	Number of disposed inpatient records	0.81	4.1	Approved
27	Number of disposed outpatient records	0.70	4.3	Approved
28	Number of administrative letters responded to	0.76	4.7	Approved
29	Average response time to inquiries	0.88	4.3	Approved
30	Number of records received in the archive unit	0.88	4.1	Approved
31	Number of incomplete records	0.94	3.9	Approved
32	Average time to correct incomplete records	0.76	3.5	Approved
33	Number of incomplete archived records	0.88	3.8	Approved
34	Number of missing records	1	4.5	Approved
	Health Data Classification			
35	Average time for coding disease diagnoses in medical records	0.76	3.6	Approved
36	Average time for coding surgical procedures in medical records	0.94	3.6	Approved
37	Average time for coding both diagnoses and surgical procedures together	0.88	3.6	Approved
38	Number of records coded based on medical procedures	0.76	3.8	Approved
39	Number of records coded based on external causes of injuries	0.94	3.9	Approved
40	Number of records retrieved for research purposes	0.88	3.7	Approved
41	Number of successfully submitted records to SEPAS	0.94	4.3	Approved
42	Number of unsuccessfully submitted records to SEPAS	0.94	4.3	Approved
43	Overall rate of diseases by body systems	0.94	3	Not Approved
44	Rate of diseases categorized as desired	0.94	3.1	Not Approved
	Statistics			
45	Number of outpatient visits per physician	0.88	3.2	Not Approved
46	Total number of surgical operations	0.88	3.9	Approved
47	Number of canceled surgeries	0.82	4	Approved
48	Reasons for surgery cancellations	0.76	3.2	Not Approved
49	Number of natural births	0.88	4.2	Approved
50	Number of cesarean deliveries	0.94	4.2	Approved
51	Ratio of natural births to cesarean sections	0.94	4	Approved

52	Average patient length of stay	0.88	4.1	Approved
53	Number of discharges with patient consent	0.76	4.3	Approved
54	Reasons for discharge with patient consent	0.76	3.2	Not Approved
55	Number of performed medical procedures	0.76	3.5	Approved
56	Number of responses to internal statistical requests	1	3.9	Approved
57	Number of responses to external statistical requests	1	3.9	Approved
58	Number of responses provided to researchers on statistical data	0.88	3.7	Approved
59	Number of deaths within 24 hours	0.94	4.5	Approved
60	Number of deaths after 24 hours	0.94	4.5	Approved

Based on the literature review, 60 KPIs were considered for dashboard development, and after expert opinion surveys, 47 indicators were selected. The dashboard KPIs were categorized into four main groups: admission indicators, information storage and retrieval indicators, health data classification indicators, and statistical indicators, each comprising several sub-indicators.

Phase 2: Dashboard Design and Development

In the second phase, the design and development of a dashboard software application were undertaken, with a focus on establishing a conceptual model that defines the system's environment and functionality. To achieve this, Visio was used to create flowcharts and UML diagrams, including use case, activity, and sequence diagrams, to illustrate the dashboard's structure and interactions.

After developing the conceptual model, the dashboard was implemented in the QlikView development environment. The dashboard's primary interface is structured into four main categories, each serving as an entry point to a set of sub-indicators. Users can interact with these indicators to access detailed performance metrics, which are visualized through a range of chart types. The developed dashboard provides an analytical overview of patient admissions, record management, and transfer processes. Bar charts illustrate trends in inpatient admissions and record creation volume, categorized by type and time period. Gauge charts visualize the average waiting times for both hospitalized and outpatient patients. Additionally, tabular representations summarize patient transfer data, including interhospital and internal transfers, as well as the number of patient mortalities by year and month. These visual components enhance data-driven decision-making within the Health Information Management Department and the Admission Unit. The developed dashboard offers an analytical overview of the Data Classification Unit, enabling visualization of key metrics related to medical coding. A line chart shows the average coding time across categories, while a bar chart shows the monthly volume of coded records. Additionally, a tabular representation summarizes the number of records transmitted to the Sepas System each month. Furthermore, a tree map provides a detailed visualization of the distribution of records retrieved for research purposes, categorized by the time period. The dashboard provides an analysis of data storage and retrieval

processes. It includes the "bar chart," which visualizes trends in document storage, retrieval, and processing over time, and the "line chart," which compares the number of disposed medical records. Additionally, the "pie chart" illustrates the number of responded letters across different months, and the "tables" show scanned records, missed records, and the number of qualitative and quantitative reviews.

Phase 3: The Software Application Evaluation

The "User Control and Freedom" principle accounted for two identified problems with an average severity of 4. Issues related to "Visibility of System Status" were classified as major problems, with an average severity of 2.75. The principles of "Help and Documentation" and "Helping Users Recognize and Recover from Errors" were categorized as minor issues, with average severity ratings of 2.5 and 1.5, respectively. In contrast, no issues were reported under the principles of "Flexibility and Efficiency of Use" and "Aesthetic and Minimalist Design." Among the identified problems, 14 (74%) were detected by all four evaluators, 3 (16%) by two evaluators, and only 2 (10%) by a single evaluator. More than 50% of the identified issues were associated with the three principles: "Prevention of Errors," "Visibility of System Status," and "Help and Documentation."

The evaluation of the health information management dashboard was conducted using the Think Aloud method with 10 staff members from the health information management departments of the Teaching hospitals of Ahvaz. The participants were selected from various units, including health information management, coding, admissions, and health information storage and retrieval, to ensure a diverse range of perspectives on dashboard usability.

Based on user evaluations, the strengths, weaknesses, user challenges, and suggestions for dashboard improvement have been categorized as follows:

Strengths & Weaknesses of the Dashboard

The dashboard effectively uses various charts, including bar, pie, and line charts, to present health-related data and improve clarity, particularly for patient admission, medical records, and response times. Key metrics, such as the number of transferred or deceased patients, were accurately displayed. Users also appreciated the easy access to the required statistical data without additional calculations, and the data provided was generally relevant and met their requirements.

The dashboard has several weaknesses, including the lack of total admission values in the bar chart, which requires manual calculation. Time-related indicators, such as average waiting time, are unclear without specifying units, leading to confusion. The absence of axis labels in some charts makes data interpretation difficult, and small font sizes hinder readability. In addition, some users find line charts unsuitable for certain data, such as disposed records, where bar charts are more effective.

Suggestions for Dashboard Improvement

To improve the dashboard, it is suggested to add total statistics to bar charts for greater accuracy, replace unsuitable charts with bar charts, and include a feature to compare related data. Additionally, time-related metrics should specify units, axis labels should be added to charts, and increasing font size would improve readability and clarity. These results indicate that while the dashboard performs well in some areas, it requires

optimization of data presentation, readability, and navigation features to enhance user experience and improve efficiency.

DISCUSSION

The primary aim of this study was to design and evaluate a performance dashboard for health information management in hospitals located in Ahvaz. In this context, the KPIs and essential requirements for such a system were identified. The findings from the KPI identification revealed several indicators for this department. Monitoring and focusing on these indicators can significantly enhance the department's operational efficiency. Therefore, it is essential to select a set of indicators that are both meaningful and practical.

The development of effective information dashboards requires identifying and selecting appropriate KPIs (19). The results of this study demonstrated that these indicators can be categorized into four main domains for the health information management dashboard. In this study, the KPIs and essential features of the dashboard were identified through a comprehensive literature review and a stakeholder needs assessment.

According to a study by Jebraeily et al. (20), the most critical features for an intensive care unit dashboard include a simple graphical format, charts and tables, appropriate color schemes, single-screen suitability, highlighted key metrics, and user-friendliness.

Ghazi saeidi et al (19). identified the provision of timely alerts and information as the most important features of health dashboards, emphasized ease of use, consistency, an intuitive user interface, and the effective use of colors and charts. These features were also incorporated into the dashboard design in the present study, particularly through the use of data visualization techniques, such as tables, bar charts, and pie charts.

The heuristic evaluation results of the present study revealed that the most prevalent usability issues were related to violations of the principles of "error prevention" and "user control and freedom." Similarly, Azizi et al. (21) assessed the usability of subsystems of patient admission, discharge, transfer, health information management, and nursing information systems. Their findings indicated that "user control and freedom" had the most usability issues (20 items), while "flexibility and efficiency of use" had the fewest (6 items). These results align with those of the present study, suggesting that user autonomy remains a significant usability concern in health information systems.

Further supporting this finding, Iranmanesh et al. (22) evaluated the usability of home healthcare service software application and reported that "user control and freedom" was a major issue requiring improvement. Several other studies have classified this principle among the most critical usability problems (23-26). The consistency of these findings highlights recurring oversight by system designers in ensuring adequate user control within interactive systems. Effective dashboards and health information systems must empower users by allowing them to undo actions, cancel operations, or exit the system when errors occur, which designers should prioritize (27).

However, findings from Yasemi et al.'s study (28) on the usability of Pharmacy Information Systems (PIS) in Iranian hospitals present a different perspective. Their heuristic evaluation, conducted by 10 usability experts, identified 125 violations, 67% of which were classified as major issues. Unlike the present study, they found that "error

prevention" had the fewest violations, suggesting that the severity of usability problems related to error prevention may vary across systems and user expectations.

The think-aloud method is a widely used user-centered evaluation technique that was also employed in the present study (29). Habibi et al. (30) employed the think-aloud method to assess the usability of a bed information management system (BIMS), during which users identified 80 usability issues, predominantly related to data entry (48%) and UI design (41%). Most problems were minor and resolved independently by users or with facilitator support. Notably, 54% of the issues were addressed by users without facilitator intervention, and participants provided valuable design improvement suggestions, particularly regarding enhanced field layouts, such as the use of sliders. Our findings align with this study, as participants in our evaluation also highlighted UI design flaws, including small font sizes and suboptimal chart layouts, which affected data readability and interpretation.

Similarly, Jebraeily et al. (31) employed think-aloud protocols to evaluate an ICU clinical dashboard, in which physicians and nurses directly provided feedback on its various sections. The reported issues led to improvements, including a chart redesign, repositioning of key indicators, and the addition of essential variables, such as hospitalization reasons and mortality risk percentages. These modifications enhance usability and user interaction with the dashboard. In line with these findings, our study also identified problems with data presentation and readability, prompting a redesign of the charts to improve user comprehension. Overall, our study demonstrated that the think-aloud method is an effective approach for identifying usability issues and providing actionable recommendations for dashboard improvements. The alignment of our findings with previous research underscores the significance of user feedback in optimizing management tools and underscores the need for continuous user-centered design refinements.

This dashboard turns HIM department numbers into clear charts, helping staff make better choices based on facts:

Admission Unit: Sees live wait times and patient transfers. This helps them move staff around quickly when it gets busy.

Archive Unit: Tracks missing or incomplete records. This shows managers exactly where to provide more training or fix a process.

Coding Unit: Compares how long coding takes and how much work there is. This helps plan fair work distribution and specific training.

Senior Managers: Get a big-picture view of key metrics, such as how long patients stay. This helps them write better reports and improve hospital rules

Limitations:

This study has some limitations. First, the dashboard was designed and evaluated specifically for teaching hospitals in Ahvaz, which may limit the generalizability of the findings to other settings, such as private hospitals or other geographical regions. Second, the usability evaluation, though insightful, involved a relatively small sample of HIM staff. A larger and more diverse user group, including clinical managers and IT staff, could provide a more comprehensive assessment. Finally, the study focused on the design

and usability phases; the dashboard's long-term impact on actual decision-making and operational outcomes was not measured.

CONCLUSION

Dashboards have proven to be essential tools in healthcare. From the perspective of hospital managers, the designed Health Information Management dashboard provides a clear, real-time view of key operational data, such as patient wait times, admission trends, and record completion rates. This allows managers to quickly spot problems, make smarter decisions about staff and resources, and ultimately improve the efficiency and quality of their department's services.

For health policymakers and senior leaders, this dashboard serves as a strategic tool. Standardizing and combining data from multiple teaching hospitals enables effective oversight of overall performance, helps evaluate the impact of new policies or guidelines, and identifies broader trends for better system-wide planning. This high-level insight supports informed budget allocation, the development of national performance standards, and systematic quality improvement across the region or country.

Given the ongoing growth of health data, implementing specialized dashboards is now essential for evidence-based management, transparency, and better outcomes. Future research should include longitudinal studies to evaluate KPIs such as record completion time and coding accuracy, and expand to non-teaching hospitals to improve broader applicability. Adding features such as predictive analytics and alerts could enhance usefulness, and integration with hospital-wide or national systems would improve interoperability.

A key methodological issue is reliance solely on content validity ratios (CVR) and indices (CVI) for KPI selection. While statistically sound, this may create a gap between theory and practice, potentially excluding crucial indicators such as physician notifications or disease rates because they are perceived as operationally irrelevant. This omission could hinder strategic decision-making. Future research should combine validity metrics with qualitative and simulation assessments to ensure KPIs effectively influence management actions.

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Declaration of the Use of Artificial Intelligence Tools

The authors stated that they did not use any artificial intelligence tools in conducting this study and preparing this article.

Contributorship Statement

FF handled data acquisition, manuscript drafting, and statistical analysis. AA oversaw supervision and provided critical revisions of the manuscript. All authors participated in the conception and design, data analysis and interpretation, and administrative and technical support. Additionally, all authors reviewed and commented on the manuscript, sharing responsibility for its content.

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Declaration Of Conflicting Interests

The authors declared there are no conflicts of interest regarding the research, authorship, and publication of this article.

Data Availability Statements

The authors do not have permission to share data. Given that the data used in the research is related to the hospital's Health Information Management unit, maintaining the confidentiality of the information is a basic condition for its collection.

REFERENCES

1. Abdekhoda M, Ahmadi M, Dehnad A, Hosseini A. Information technology acceptance in health information management. Methods of information in medicine. 2014;53(01):14-20. https://doi.org/10.3414/ME13-01-0079
2. Dehghani M, Nooshiravani Y, Shokrizadeh-Bezenjani K, Asgarian A. The problems of health information management departments and their causes in Iran. Health Information Management. 2019;15(6):253-9. https://doi.org/10.22122/him.v15i6.3714
3. Goedert J. Health information management: what a ride it has been. Health Data Management. 2013;21(10):22-4, 6. https://europepmc.org/article/med/24224273
4. Bennett V. Health information management workforce—when opportunities abound. SAGE Publications Sage UK: London, England; 2010. p. 4-6. https://doi.org/10.1177/183335831003900301
5. Haux R, Knaup P, Leiner F. On educating about medical data management. Methods of information in medicine. 2007;46(01):74-9. https://doi.org/10.1055/s-0038-1628137
6. Al Kiyumi RHM, Walker S, Tariq A, Fitzgerald G, editors. Health information management professionals [Present circumstances and future expectations]. Proceedings of the 18th IFHIMA International Congress; 2016: International Federation of Health Information Management Association. https://doi.org/32995420
7. Beasley JW, Wetterneck TB, Temte J, Lapin JA, Smith P, Rivera-Rodriguez AJ, et al. Information chaos in primary care: implications for physician performance and patient safety. The Journal of the American Board of Family Medicine. 2011;24(6):745-51. https://doi.org/10.3122/jabfm.2011.06.100255
8. McDonald CJ. Protocol-based computer reminders, the quality of care and the non-perfectability of man. New England Journal of Medicine. 1976;295(24):1351-5. https://doi.org/10.1056/NEJM197612092952405
9. McDonald CJ, Callaghan FM, Weissman A, Goodwin RM, Mundkur M, Kuhn T. Use of internist's free time by ambulatory care electronic medical record systems. JAMA internal medicine. 2014;174(11):1860-3. https://doi.org/10.1001/jamainternmed.2014.4506
10. Buttigieg SC, Pace A, Rathert C. Hospital performance dashboards: a literature review. Journal of health organization and management. 2017;31(3):385-406. https://doi.org/10.1108/JHOM-04-2017-0088
11. Rabiei R, Almasi S. Requirements and challenges of hospital dashboards: a systematic literature review. BMC Medical Informatics and Decision Making. 2022;22(1):287. https://doi.org/10.1186/s12911-022-02037-8
12. Wilbanks BA, Langford PA. A review of dashboards for data analytics in nursing. CIN: Computers, Informatics, Nursing. 2014;32(11):545-9. https://doi.org/10.1097/CIN.0000000000000106
13. Rabiei R, Bastani P, Ahmadi H, Dehghan S, Almasi S. Developing public health surveillance dashboards: a scoping review on the design principles. BMC Public Health. 2024;24(1):392. https://doi.org/10.1186/s12889-024-17841-2
14. Karami M, Langarizadeh M, Fatehi M. Evaluation of effective dashboards: key concepts and criteria. The open medical informatics journal. 2017;11:52. https://doi.org/10.2174/1874431101711010052
15. Paz F, Pow-Sang JA, editors. Current trends in usability evaluation methods: a systematic review. 2014 7th International Conference on Advanced Software Engineering and Its Applications; 2014: IEEE. https://doi.org/10.1109/ASEA.2014.10
16. Almasi S, Bahaadinbeigy K, Ahmadi H, Sohrabei S, Rabiei R. Usability evaluation of dashboards: A systematic literature review of tools. BioMed Research International. 2023;2023(1):9990933. https://doi.org/10.1155/2023/9990933
17. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. International journal of surgery (London, England). 2010;8(5):336-41. https://doi.org/10.1136/bmj.b2535
18. Pierotti D. Heuristic evaluation-a system checklist. Xerox Corporation. 1995;12:809. Available from: https://rahmatfauzi.staff.telkomuniversity.ac.id/files/2018/01/Heuristic_Evaluation_Checklist_stcsig_org.pdf

19. Ghazisaeidi M, Safdari R, Torabi M, Mirzaee M, Farzi J, Goodini A. Development of performance dashboards in healthcare sector: key practical issues. Acta Informatica Medica. 2015;23(5):317. https://doi.org/10.5455/aim.2015.23.317-321
20. Jebraeily M, Hasanloei MAV, Rahimi B. Design of a management dashboard for the intensive care unit: determining key performance indicators and their required capabilities. Applied Medical Informatics. 2019;41(3):111-21. Available from: https://ami.info.umfcluj.ro/index.php/AMI/article/view/676
21. Azizi A, Maniati M, Ghanbari-Adivi H, Aghajari Z, Hashemi S, Hajipoor B, et al. Usability evaluation of hospital information system according to heuristic evaluation. Frontiers in Health Informatics. 2021;10(1):69. https://doi.org/10.30699/fhi.v10i1.271
22. Iranmanesh M, Shafiei E, Mehrolhassani M, Hajesmaeel-Gohari S. Usability Evaluation of a Mobile-Based Application to Provide Home Health Services Using Heuristic Method. Journal of Health and Biomedical Informatics. 2021;8(2):208-17. Available from:http://jhbmi.ir/article-1-595-en.html
23. Inal Y. Heuristic-based user interface evaluation of the mobile centralized doctor appointment system: A case study. The Electronic Library. 2019;37(1):81-94. https://doi.org/10.1108/EL-06-2018-0114
24. Islam MN, Karim MM, Inan TT, Islam AN. Investigating usability of mobile health applications in Bangladesh. BMC medical informatics and decision making. 2020;20:1-13. https://doi.org/10.1186/s12911-020-1033-3
25. Cho H, Powell D, Pichon A, Thai J, Bruce J, Kuhns LM, et al. A mobile health intervention for HIV prevention among racially and ethnically diverse young men: usability evaluation. JMIR mHealth and uHealth. 2018;6(9):e11450. https://doi.org/10.2196/11450
26. Stonbraker S, Cho H, Hermosi G, Pichon A, Schnall R. Usability testing of a mHealth app to support self-management of HIV-associated non-AIDS related symptoms. Nursing Informatics 2018: IOS Press; 2018. p. 106-10. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6310175/
27. Abasali SZ, Salehian F. Heuristic Usability Evaluation of Web-based COVID-19 Management Dashboard. Journal of Payavard Salamat. 2024;18(3). Available from: http://payavard.tums.ac.ir/article-1-7723-en.html
28. Yasemi Z, Rahimi B, Khajouei R, Yusefzadeh H. Evaluating the usability of a nationwide pharmacy information system in Iran: Application of Nielson's heuristics. Journal of Clinical Research in Paramedical Sciences. 2018;7(2). https://doi.org/10.5812/jcrps.80331.
29. Yen P-Y, Bakken S, editors. A comparison of usability evaluation methods: heuristic evaluation versus end-user think-aloud protocol–an example from a web-based communication tool for nurse scheduling. AMIA annual symposium proceedings; 2009: American Medical Informatics Association. https://doi.org/20351946
30. Habibi MRM, Khajouei R, Eslami S, Jangi M, Ghalibaf AK, Zangouei S. Usability testing of bed information management system: A think-aloud method. Journal of advanced pharmaceutical technology & research. 2018;9(4):153-7. https://doi.org/10.4103/japtr.JAPTR_320_18
31. Jebraeily M, Valizade MA, Rahimi B, Saeidi S. The development of a clinical dashboard for monitoring of key performance indicators in ICU. Journal of Iranian Medical Council. 2022;5(2):308-17. http://dx.doi.org/10.18502/jimc.v5i2.10469