

# Nurses' Experiences with an Electronic Tracking System in the Emergency Department: A Qualitative Study

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**Purpose:** A dashboard is an electronic screen that is located at the most visual point in a department and displays concise patient data. The use of a dashboard has been reported in assisting task coordination and communication among end-users, providing the informatics department with accurate data to measure metrics and enhance quality improvement programs. It improves decisions making and makes services more efficient. There is a need to know more about the nursing experience with this new tool and the changes in the way services are provided in an emergency department. The aim of this study is to explore Nurses' Experiences with an Electronic Tracking System in the Emergency Department (dashboard).

**Methods:** A qualitative descriptive approach with narrative analysis was used. Ten nurses who worked in ED at King Abdul Aziz Specialized Hospital in Taif participated. The study took place from December 2021 to April 2022. Data were collected through semi-structured interviews.

**Results:** Nurses' experiences with the ED dashboard were categorized into four main themes: clinical performance, quality of service, and metrics; leadership and management; digital transformation; and financial issues. The electronic tracking system helps in minimizing individual time and effort, facilitates patient identification, increases nurses' awareness of the patient status in the ED, updates the quality indicators, and helps in enhancing quality improvement programs.

**Conclusion:** The electronic tracking system created a paradigm shift in healthcare services. The nurses were satisfied with the electronic tracking system.

**Keywords:** digital technology, digital health, emergency department, tracking system, dashboard

## Introduction

A variety of medical conditions and injuries must be treated in the ED. The ED is usually overcrowded, which contributes to difficulties in providing timely and safe treatment.<sup>1</sup> However, the transformation of the health system in Saudi Arabia when it comes to improving patient access to care has made the time required to complete triage, assessments, and treatments in the ED the main indicator for hospital performance. The Ministry of Health's target is that 86% of patients be triaged, assessed, and treated in less than four hours. With overcrowding and extensive data control in the ED, treating and positioning patients within the target time frame can be challenging. The situation in the ED is constantly changing; therefore, utilizing technology has had an impact on the quality of the services provided. The ever-changing circumstances require a real-time tracking system. The potential for an electronic tracking system—called a dashboard—to improve patient safety, decision-making, efficiency, and workflow has been reported.<sup>2,3</sup>

The dashboard is the main electronic screen located at the most visual point in the department.<sup>4</sup> The dashboard displays data from the main hospital electronic system, where the basic patient health history and updated data are located.<sup>4</sup> These data are generated by the hospital health system and visualized by the dashboard; the data can be used by nurses and other healthcare providers to assess the current status of the ED, patient volume, staff performance, and

patient clinical situations, hence providing an overview to clinicians and managers that can help them in making decisions.<sup>5</sup> This advanced tool is being used to show concise patient information in a more useful way.<sup>4</sup> A visualized dashboard offers an easy and accurate way to sort, analyze, and manage patients' health information and helps medical teams stay updated about the patients' real situations.<sup>6</sup> This could assist in providing better health services that are consistent with international standards in less time.<sup>6</sup> The ED dashboard can work in conjunction with a reporting application to support data-driven processes, supporting hospital improvement projects by providing access to the necessary data through the system, and helping to provide safe, timely, efficient, and cost-effective emergency care.<sup>7</sup>

The continual development of a unit-based nursing dashboard and awareness of its importance in the development of quality nursing care within organizations has led to the successful implementation and evolution of unit-based nursing dashboards.<sup>8</sup> Frazier and Williams et al concluded that the dashboard facilitates and improves the quality of patient care. The organization usually emphasizes the improvement of the dashboard and tracking process to keep information available in ways that are efficient and beneficial. The application and active use of the visualized dashboard can increase aliens' compliance with regulations and standards, which plays an integral part in the development of nursing quality programs within an organization. Single electronic screens have helped in task coordination among end-users by providing a higher quality of communication and giving the informatics department an accurate picture to measure the metrics that enhance the quality improvement process.<sup>7,9</sup>

Hospitals are currently subject to budgetary and legal restrictions that require major changes in hospital management practices. Several private companies seeking to achieve comprehensive management have also emerged, borrowing specific technologies or approaches from the business world and integrating them into the framework of hospital organizations.<sup>7</sup> Strategic analysis, an establishment plan, and activity-based accounting are examples of methods transferred to the hospital system.<sup>3</sup> All these borrowed approaches exemplify a desire by management and supervisory authorities to promote a system of regulation and management based on more transparent and objective criteria.<sup>17</sup> In ED, the dashboard could help each manager in making decisions and help in monitoring the department. Evolving from its initial form of using financial information, the dashboard now integrates more diversified indicators: quantitative, physical, and qualitative. This tendency to use more indicators is much stronger in hospitals.<sup>1</sup>

Busy healthcare teams can obtain a cursory idea of a patient's information by having a fast check-in dashboard. Researchers around the world have mentioned several important points that explain the benefits of dashboards.<sup>7</sup> One of the most prevalent is data gathering, as mentioned by Dowding et al. A dashboard is a great tool for reprocessing and evaluating the data and formulating the best decision for the patient's health status. This tool allows team members to be engaged in the continuity of care.<sup>8,10</sup> It can also help improve the efficiency and quality of healthcare services.<sup>5</sup> Buttigieg et al showed different types of dashboards, including strategic, operational, and tactical dashboards; they reviewed the multiple uses and main characteristics of this tool, outlining in detail how dashboards support organizations in assessing their performance and reporting trends that help raise awareness of a problem. Thus, the findings report the availability of the best, most cost-effective solution. The researchers also found that the introduction and early training of dashboards increased effective communication among different departments and professions.<sup>2</sup>

To understand the important aspects of making dashboard applications successful within a health organization, it is necessary to focus on the main approaches for dashboard applications, including the exploratory approach, reporting approach, and systematic approach.<sup>11</sup> Skorka et al highlighted that to have a sustainable dashboard, it is imperative to continuously add value to the unit dashboard to obtain the most benefit for users and enable insights. Applying a dashboard with a specific goal is challenging. Staib et al developed an operational dashboard to show the process of different measurements, such as a 4-hour rule compliance rate, coupled with clinically important outcomes and measurements of inpatient mortality. The ED dashboard has been found to help both the ED and inpatient unit teams in improving both efficiencies of care and patient outcomes.<sup>12</sup>

Some researchers have had positive experiences with dashboard utilization, stating it has a positive effect on nursing performance and the quality of holistic health services.<sup>10</sup> However, some studies have argued for the limitations and weaknesses of implementing dashboards. Ulaganathan et al's research used close observations and personal interviews, finding nurses' temporal use of the dashboard totaled 3 minutes and 10 seconds out of 59 hours of system interaction. The nursing participants justified this poor practice as a lack of training in practical implications.<sup>13</sup> Other studies have

also mentioned several limitations.<sup>2,11</sup> Many boundaries, for instance, have been noted during the use of dashboards, such as a lack of acceptance by the medical team, data overload caused by excessive monitoring of KPI, a lack of financial and human resources, instability of medical terminology used in electronic health records, and clinician anxiety.<sup>7,14</sup> Further studies are required to fill these gaps and explore the experiences of different departments with dashboards. There are also only a few studies of the financial metrics used in dashboards in countries where there is a national health insurance model.<sup>2</sup> Knowledge about the use of the dashboard reflects experiences in several hospital departments. This information has effects on quality improvement programs, experiences, and processes of care, which are mainly drawn from descriptive studies. Furthermore, there is a paucity of empirical evidence reflecting or discussing emergency nurses' perceptions and experiences with electronic tracking systems in Saudi Arabia. In Saudi Arabia, dashboard applications are still considered new technology, hence requiring additional effort to achieve a high quality of care, patient satisfaction, medical team performance, and staff satisfaction.<sup>10</sup> However, ED nurses' experiences with introducing visualized information in the form of clinical dashboards and the effect on nursing performance, care processes, and outcomes are unclear. Knowledge of dashboard characteristics, such as the type of graphical display and method of presentation to users, can help nurses in their everyday practice.<sup>5,6</sup> However, the body of literature on the nature of the experience of emergency nurses using a dashboard has been limited.<sup>10</sup> We need to know further about the nursing experience with this advanced tool and how the electronic tracking system made a change in the services provided in an emergency department. We aim to explore Nurses' Experiences with an Electronic Tracking System in the Emergency Department (dashboard).

## Materials and Methods

The current study was conducted using a qualitative descriptive approach and narrative analysis. Ten participants from nursing staff who worked in EMS at King Abdul Aziz Specialized Hospital in Taif. There are 43 nurses in the ED we have studied. all of whom have a license to practice nursing. The choice was random and according to the desire of the participants in the study. The participant data were included shown below in Table 1. The study took place from December 2021 to April 2022. Data were collected through semistructured interviews until data saturation had been achieved. The data were analyzed via qualitative narrative analysis.

The present study used qualitative descriptive research with a narrative analysis approach. Conventional content analysis in qualitative research is used when there is a lack of knowledge about the concept under investigation. This is why this approach was determined to be the most appropriate. Ten participants of the emergency nursing staff were selected and invited to participate in this study. Personnel who were willing to share their experiences and were able

**Table 1** Participant Characteristics

Variable	Experience in the ED	Nationality	Age	Sex	Qualification (Degree)	Eligibility
Participant 1	12	Saudi	37	M	Master's	License in nursing practice
Participant 2	10	Saudi	34	F	Bachelor's	License in nursing practice
Participant 3	6	Saudi	36	F	Bachelor's	License in nursing practice
Participant 4	5	Saudi	29	F	Bachelor's	License in nursing practice
Participant 5	13	Philippine	46	F	Bachelor's	License in nursing practice
Participant 6	5	Philippine	36	F	Bachelor's	License in nursing practice
Participant 7	8	Indian	25	F	Bachelor's	License in nursing practice
Participant 8	12	Indian	36	F	Bachelor's	License in nursing practice
Participant 9	8	Indian	32	F	Bachelor's	License in nursing practice
Participant 10	7	Saudi	37	F	Bachelor's	License in nursing practice

to narrate their interactions with the system, provide more information, and help clarify the concept were selected. The number of samples depended on the point of data saturation. Data saturation was achieved when the ideas of the patient were repeated and nothing new was extracted. Inclusion criteria were a minimum of 5 years of experience in the ED, willingness and motivation to share experience-based knowledge, and the ability to provide additional information about the nursing experience with an electronic tracking system in the ED. Data were collected through semi-structured interviews. All interviews were conducted by the first author. The interval was between April 2022 and June 2022. Each interview lasted from 45 to 60 minutes. All interview sections were in the lecture room in the ED after arrangements had been made with the head of the department and participants. Consent was obtained from each participant. Participants were informed about the purpose of the study, and that the informed consent included publication of anonymised responses. This study was reviewed and approved by the Ethics Committee of the Research and Studies Department in the Directorate of Health Affairs, Taif. IRB registration number: KACST, KSA: HAP-02-T-067. Approval number: 707 on 20/03/2022.

The interviews were audio-recorded with the participants' awareness and permission. A list of interview questions was created based on the data extracted from the literature review and references. The main focuses of the interview questions were on nurses' experiences with a dashboard in clinical performance, quality of service and metrics, leadership and management with dashboard applications, and digital transformation and financial issues. The interview guide and questions are shown in Table 2. The participants were thanked for their participation at the end of each interview. The interview transcripts were created after the completion of all interviews. To maintain data confidentiality, the main author assured the participants that their information would remain private and would be used for research purposes only. The main author and her team tried not to interfere with participants' information and experiences. The research team did not make any judgments based on the given information and data, and full acceptance of the participants' experiences was maintained. The interview questions were reviewed by an expert from Taif University and an expert senior staff member in the ED.

## Results

Based on the literature review, four major themes were identified. Each theme has multiple subthemes that were generated from the interview data. Table 3 illustrates the themes and subthemes.

**Table 2** Interview Guide and Questions

Domine	Question	References Used
Clinical Nursing Practice	<ul style="list-style-type: none"> <li>• From your perspective, how can the dashboard affect the daily process of care?</li> <li>• Do you feel this advanced tool can help nurses in the performance of patient care?</li> <li>• What are the positive and negative points of the dashboard application in the ED?</li> <li>• Do you think the current method of data presentation can aid everyday practices?</li> </ul>	[2,9–12,14,15]
Nursing Quality	<ul style="list-style-type: none"> <li>• Do you feel the dashboard can affect the quality of nursing services in the ED?</li> <li>• How much can dashboards help in quality improvement projects?</li> <li>• Do you agree that an electronic tracking system will affect the quality metrics?</li> </ul>	[2,6,8,11,16]
Leadership and Management	<ul style="list-style-type: none"> <li>• How much can dashboards help in managing situations inside the ED?</li> <li>• Do you feel that the dashboard supports leader decision making?</li> <li>• How can this tool help in staff allocation, performance competences, and increased awareness about all present patient service outcomes?</li> <li>• Tell me more about your experience with it.</li> </ul>	[1–3]
Electronic Issues and Digital Transformation	<ul style="list-style-type: none"> <li>• What are the limitations of dashboard use from your experience?</li> <li>• What are the limitations of dashboard use from your experience?</li> <li>• Is there any backup plan in case of a system shutdown?</li> <li>• What is the effect of financial support on such advanced tools?</li> </ul>	[1,2,4,7,9,17]

**Table 3** Themes and Categories Extracted from the Analysis

Theme	Subthemes
Clinical Nursing Practice	<ul style="list-style-type: none"> <li>• Effect on the daily process of care</li> <li>• Performance of patient care</li> <li>• Increased staff awareness of the patient in the ED</li> <li>• The experience of staff and positive and negative points of dashboard application in the ED</li> </ul>
Nursing Quality	<ul style="list-style-type: none"> <li>• Effect on quality of nursing services in the ED</li> <li>• Help in quality improvement projects</li> <li>• Effect on quality metrics</li> </ul>
Leadership and Management	<ul style="list-style-type: none"> <li>• Dashboard support of leader decision making</li> <li>• Clinical competences of staff with dashboards</li> <li>• Staff assignment and allocation</li> <li>• Staff performance improvement program</li> </ul>
Electronic Issues and Digital Transformation	<ul style="list-style-type: none"> <li>• Current methods of data presentation</li> <li>• Financial issues</li> <li>• Limitations of application</li> </ul>

## Clinical Nursing Practice

The data analysis indicated that dashboards in the emergency department are very useful for nurses in clinical nursing practice. More specifically, it impacts the daily nursing process and patient nursing care while increasing the nurse's awareness about the patient's conditions.

### Effect on the Daily Process of Care

The presence of the dashboard and electronic system helped make things easier, and receiving and discharging patients could be carried out in a very systematic process. The nursing staff could provide the necessary medical services to the patient from a triage point, which identifies and justifies the patient's right to be in the ED based on their priority and health status.

The patient does not enter the emergency room or be examined until he passes the screening and triage point; then, all his data are entered into the electronic system. (P.3)

Because the length of stay in the emergency department is one of the major challenges that nurses face daily in the emergency department, the experiences of the participants indicated that the dashboard is very helpful in monitoring the length of the stay.

We can monitor the time of stay of the patient depending on the dashboard. Sometimes, we get lost without the dashboard. (P.8)

It was found to be very helpful in many daily tasks, such as nursing documentation, as illustrated by some of the participants.

There is an assigned nurse or charge nurse to triage the patient; then, I write the vital sign in the system, and then, I will take care of my patient. Then, after all the procedures, I will go through the computer to documentation. (P.7)

The other benefits of the dashboard in the emergency department involved making patient identification easier, which helped in facilitating the process of the endorsement more easily.

With this system, it is easy to identify the patient. It helps save data, which makes the endorsement between nursing easier. (P.4)

The nursing staff made sure of the patient's identity: the patient who was sicker based on the data would appear on the dashboard.

If we open the dashboard, we can trace the patients who are very sick. (P.5)

## The Clinical Performance of Patient Care

The dashboard helped facilitate access to the patient's medical histories and medication information. This availability of data helped reduce the time required to take a patient history and clinical examination, thereby reducing the time needed to address the patient's situation. The presence of patient data was fully accessible and easy to reach if there was, for example, a desire to analyze or request a type of radiation, and it was also easy to trace the patient in the event of abnormal results. This made the task of follow-up lab results easier as well because the results appear automatically on the main screen in the ED when approved. During the patient's presence in the health facility, all medical staff could access the update once it was added.

All the details about the doctors' orders, the required lab sample, the radiation, and everything related to the patient are recorded by time, as well as the nursing notes, and we can know the nurse's care status in evaluating the speed of carrying out the orders, with some exceptions. (P.5)

Everything is saved in the system patient's history, present situation, and plan. This makes it easier for you to search and saves you time to follow up and serve the patient. (P.4)

Nursing documentation had previously been a time-consuming task, and the use of the dashboard and electronic system made it executable in less time. It also helped to minimize the problem of a lack of forms, printers, and printer paper. Nurses could start to document after the patient's identification and examination by the doctor.

The dashboard help us a lot in the documentation process and reduced the handwriting process that was broken because of lack of paper or lack of a printer. (P.4)

Before we were using paper; we were searching for more paper. But today, it is very, very convenient for us. And we can write any time our notes; we can go to another computer. (P.7)

The participants found that the dashboard application trimmed down the time a patient was in the ED, which helped address the issue of overcrowding.

We have not yet reached the required target, but we have increased the speed of accomplishing the task. (P.4)

One participant stated that the dashboard and electronic tracking system facilitated many nursing tasks, such as looking after lab or radiology results, prescribing medication, and discharge orders, hence saving them time and allowing them to meet the patients' health needs.

Before the application of the dashboard and the electronic system, the ED was a little bit busy; it was a little bit difficult to deal with and finish all the tasks. And after the dashboard, it became easy, smooth, and more concentration was on the patient. (P.8)

## Increased Staff Awareness About the Patient in the ED

The presence of brief data about patients on the dashboard, such as file number, name, bed number, labs, and radiology images. By quickly looking at this screen, the nurses could identify which area was busy and where the vacant bed was, helping the charge nurse relocate staff, if needed.

The leader or charge nurse or regular nurse, by one look at the main screen, can know the situation in ED. I can know where the busy case is. Where is the busy area? I can determine how the nurses are performing and what the area that needs some support. (P.8)

It makes work more organized and all the staff, all the doctors, and all the team members aware of the patient. (P.9)

## Positive and Negative Points of the Dashboard Application in the ED

The study participants mentioned strong points regarding dashboard applications and shared their satisfaction with the system. The dashboard allowed leaders to manage and follow the performance of staff while they were in the office by rechecking the admissions, case progress, and discharge documentation. The electronic tracking system provided clear and complete data about all patients in the ED, helped organize cases and staff ideas, saved time, and helped determine



defects of care in other departments, such as delayed lab results or disbursement of certain medications from the pharmacy.

The administrators are keen about the length of patient stay target and make a lot of pressure on staff. (P.2)

The most beautiful thing in the dashboard is clarity for everyone. No need to ask. Just have a fast look or use the system. (P.3)

The positive side is that we can monitor the tool, but the negative side is that we should make all things fast because, if overstaying, know there is an orange color also. So they are always reminding us as assessor. (P.6)

It makes our things easily, very fast and more organized. I like the experience because now we are in need to upgrade our level of care. We need to look after something more important, which is the people's life and quality of the service and outcome. (P.9)

However, the dashboard had some negative aspects. Patients who were discharged did not have an OPD appointment from the ED system to follow their treatment process. Nurses could not delete, add, and modify notes and documentation after entering them into the system. Patients who exceeded the time of stay in the ED would be admitted by an ED consultant as a "FORCED ADMISSION". A scarcity of internet resources and lack of computers and tablets inside the ED compared with the total number of staff who used the dashboard daily was another drawback. The reoccurring shutdown of the system disturbed the harmony of the nurses' work. This hanging in the system forced the staff to revert to the previous system, open manual files, and fill up all the forms again. Once the system turned back on, the process of rewriting files was time-consuming and doubled the nurses' work.

We cannot add over nurses' notes. Once it's already entered into the system, you cannot edit or delete it. (P.7)

We cannot give outpatient clinic appointments using the current ED system. (P.5)

Staff in the ED are still afraid to make mistake with the system because they will be punished. (P.5)

The negative sides of the dashboard are the lack of devices and lack of internet, and the system hangs a lot. (P.3)

## Nursing Quality

### Effect on the Quality of Nursing Services in the ED

The dashboard and quality were the most noticeable themes repeated during the interviews. They noted the nature of quality services. One participant mentioned that nurses providing quality health services would increase if they could make proper documentation in the electronic system. Good documentation led to accurate information that could be used later on by the quality department. The maximum time for the patient to receive care in the ED was 4 hours; this means there was a high level of high motivation to get all processes of care completed on time.

It's affecting the quality of the nursing services. Nowadays, the number of mistakes is becoming less, the number of the procedure done by a mistake to the other patient is dropping, the number of patients who are being assessed by the doctor is increasing. (P.10)

The quality of nursing services becomes better because they have a deadline to finish. (P.5)

All staff will be accountable for any negligence or delay of more than 4 hours. (P.7)

### Quality Improvement Projects

The participants mentioned that the dashboard facilitated detailed data acquisition by the quality department. This data collection process previously took around a month. Through an electronic tracking system, all information was gathered with one click daily, and monthly reports were released faster; an improvement program was then built, depending on the outcome. This enabled workers to judge the present quality of services by specific metrics and make comparisons between the situation before and after using the dashboard application in the ED. Its electronic system helped all participants understand the aim of entering and analyzing data.

The dashboard detects the defects and problems in the nursing service or problems of harmony with other departments and is easy to work with and develop special programs for their development. (P.3)

Um, it helps because that is the one thing for developing when they are already seeing this is the data they can enhance, or they can provide what is lacking for us. (P.6)

It can help in performing quality improvement programs because you know everything's evolving in other countries. They are modern already. I think it's time also for Saudi Arabia to go along with that. (P.8)

## Effect on Quality Metrics

Based on the participants' experiences with the dashboard, the quality department made use of the dashboard by representing the data in the form of metrics and adapting these numbers to create an improvement program. This metric had high accuracy and privacy.

Of course. All the data and all the small data will enter the system, and based on these data, we can produce the metrics. Once we are entering good data, that means we have good metrics, and based on these metrics, we can say whether this hospital is a matching quality or not. (P.9)

Once we have good data, we can know the defect. Then, it will affect the metrics. All departments are needed to respond to represent it at the end of the month and end of the year. (P.10)

## Leadership and Management

### Dashboard Supports Leader Decision Making

The participants indicated that the dashboard helped in general management in the ED because patient data were present, decreasing the time spent making individual rounds between patients. The length of stay program made the final decision by a medical doctor regarding if a patient would stay become mandatory, so the patients would no longer have to wait for anything in the ED without a plan or discharge order. The new electronic system improved leadership skills, increased the control of the staff and clinical process, and enhanced the head nurse's ability to make decisions about staff performance needs.

Oh, if the patient takes more than 4 hours. They are already asking the primary nurses why, and what is lacking for this patient? Why not shift? Why not be discharged like that? We ask the nurses so that we can follow up with our physician to make a decision about the patient. The doctors do anything or discharge. (P.6)

It can support the decision-making skills of leaders, especially if the patient is staying for a long time. Doctors need to do anything to emphasize what is the disposition, what is the decision of the patient. (P.7)

### Clinical Competencies of Staff and Performance Improvement Programs

The electronic system could not measure the skills and capabilities of clinical nursing staff. Practical skills needed to be monitored closely. Head nurses could measure the nursing staff's scientific knowledge of nursing by reviewing notes and examination forms, which reflected current nursing information on diseases, therapies, and patient examination methods. The dashboard helped the leader track nursing mistakes through authentication without causing embarrassment. It also helped develop programs based on training needs. The dashboard assessed the skills of using electronic devices and dealing with advanced systems. However, it did not measure the level of empathy or nursing skills in dealing with patients and their professional ethics; it only reflected theoretical cognitive ability.

We cannot evaluate this stuff by using an electronic tracking system and dashboard because I need to be on the bedside to be present during performance so I can guide them. I can mentor them, I can teach them, or I can at least have some idea about their current performance. but I can evaluate the stuff partially in the documentation by using note in the electronic tracking system. (P.9)

The dashboard cannot evaluate performance because it means skills or more practical issue. It is a needed observation by the head nurse to see the performance or skills. The dashboard cannot measure or cannot show what is good performance or performance. (P.10)



## Staff Assignment and Allocation

The dashboard only showed the number of patients inside the ED, meaning the number of nurses and doctors did not appear. The distribution of nursing tasks occurred in advance by monthly schedules prepared by the head nurse. The leader in the ED could monitor staff nursing skills in the documentation without interference or disturbance. The control panel helped the nurse know the patient quantity in each part of the department and provided a helping hand to colleagues in case of increased work pressure, here without returning to the board. However, modifying the tasks between the nurses was done manually.

The dashboard will not affect the organizing of the staff inside the emergency department. As a charge nurse, I did this task manually. (P.3)

The dashboard never has a relationship in the distribution of nurses inside the emergency areas. (P.2)

If a head nurse or charge nurse of the ED finds that there is a more crowded area than others, they can reorganize the staff according to their experiences in dealing with cases and CPR, and there is no need to refer to the dashboard. (P.3)

## Electronic Issues and Digital Transformation

### Current Methods of Data Presentation

The dashboard showed the following data: file number, patient name, lab number, laboratory samples, and radiology requests. The participants saw the data as sufficient because it was fundamental and vital to emergency doctors and nurses. The concise data encompassed what they needed to know, so there was no need to add more features.

These data appear on the dashboard. The patient's name, file number, bed, the icon for laboratory samples, and X-rays are also shown, which is mostly sufficient. (P.5)

All I need about a patient I can find. I am completely satisfied with the current shape of the dashboard. (P.2)

We need to add an icon for consultations. (P.4)

### Financial Issues

Everyone had benefited from the digital programs provided by the Ministry of Health, which facilitated patient services. The Ministry of Health has been keen to integrate technology with health services. The medical community has been receptive to this; however, new technology is expensive and requires enormous amounts of money for construction and maintenance. It also requires human resources and engineers working around the clock to avoid faults that cause delays in emergency care. Training programs are also necessary for teaching staff to use new systems effectively.

When talking to the participants about the limitations of the use of electronic tracking systems, they discussed a lack of financial support and material capabilities. Staff resistance to new programs could affect the outcomes. The cause of this resistance may be the lack of information on and importance of advanced electronic systems, a lack of computer skills, and problems related to English because the electronic system only supported English. Other limitations mentioned included department leaders being required to use the new system because it was made mandatory by the ministry, fear of committing mistakes or anxiety about proper use, distrust among the nursing staff, a lack of internet and frequent internal shutdown problems, a lack of training, and personal rejection of changes to the previous protocols.

## Discussion

The current study explored nurses' experiences with electronic tracking systems in the ED at King Abdul Aziz Specialized Hospital, Taif. A comprehensive analysis of the participants' experiences revealed four basic themes: nurses' clinical performance, quality of service and metrics, leadership and management, and digital transformation and financial issues.

The current study found that the dashboard helped nurses carry out tasks, beginning with complete and clear patient identification during triage. During patient check-in to the emergency treatment room, their data were confirmed and appeared in the dashboard automatically, as follows: name of the patient, bed number, file number, lab work, and radiology requests.

This accurate identification was seen as vital to preventing mistakes, and it was consistent with international safety goals. Reports were more accurate and were collected in record time, showing that the dashboard could improve patient safety and reduce the risk of adverse events.<sup>6</sup> The length of stay metric was initiated to ensure that the patient did not exceed 4 hours in the ED. During this time, the ED team must assess and treat the patient. We need to set up some ideas regarding these metrics. Length of stay aims to reduce the time patients need to be in the ED. This puts pressure on staff, pushing them to strive to meet a deadline rather than provide quality care, may reduce patient satisfaction and deprive the patient of their right to a clear explanation of their condition, and reduce the opportunities for health education by keeping the focus on meeting targets rather than on the purpose of the organization. This is consistent with what has been found in previous studies that have focused on the important link between key process measures and their impact on patient outcomes.<sup>5,7,12</sup>

The nurses also benefited from the dashboard in daily nursing care and documentation. The electronic systems helped nurses write their notes faster, saving time spent handwriting medical forms and files that could be spent providing care to patients. The dashboard also helped nurses find medical orders without having to wait for doctors to fill out paperwork, track lab results, and improve staff awareness of critical patient issues, ultimately improving daily patient care. A similar conclusion was reached by Stone-Griffith and Tan et al.<sup>7,15</sup>

Gathering information manually from the clinical area to produce reports could be challenging, but the electronic tracking system enabled the quality department to submit reports relying on data taken from the dashboard. ADA'A (general quality indicator controlled by the ministry of health in Saudi Arabia) is a performance indicator that measures the productivity of a health setting. In the current study, its reports became more accurate, and data were collected in record time. New indicators were created to optimize patient care and help clarify the weaknesses and strengths of medical regulations and staff. The DOOR TO ECG is an indicator of the exact time needed for patients who report chest pain to receive an electrocardiograph. DOOR TO DOCTOR measures the time needed for each patient to meet a doctor and perform a physical assessment by the ED team. DOCTOR TO DECISION measures the time needed by the doctor to make a final decision regarding patient health. These and other metrics have given stakeholders extensive data about the status of the ED. In the current study, this information was used to monitor performance and drive quality improvement efforts. According to Jeffs, Beswick,<sup>17</sup> and Pestana,<sup>1</sup> an electronic tracking system can allow stakeholders to obtain relevant information regarding hospital productivity and carry out an analysis of the KPIs, providing better knowledge of the state of the organization; Stone-Griffith<sup>7</sup> supported the idea of sorting and saving data in a database or application for the same reason. They believed that the dashboard and reporting application is the best tool to measure, analyze, and store ED data to aid in improvement programs.

Another category of nurses' experiences with the dashboard was leadership and management. The dashboard supported leaders within the ED with general knowledge about what happened as soon as they looked at the list of patients. It also contributed to the knowledge of staff skills in electronic documentation, which was considered an important part of clinical competencies and as reflecting their scientific skills through the nursing notes in the system. By follow-up and continuous monitoring of performance and documentation in the system, leaders can evaluate the staff's level of knowledge and set up training based on deficits. They were able to gain insights into the role of leadership in creating the conditions for a supportive learning environment at all levels.<sup>9</sup> Decision-making is a basic skill in the critical area. By using the electronic system, leaders had immediate access to information, aiding them in making informed decisions. This skill and its relation to electronic systems were also found in a previous study, which discussed how clear and available data can help in making decisions and dealing with emergencies through enhancing awareness.<sup>6</sup> Providing support for decisions through accurate evidence can increase leader strength in general management, helping provide real-time feedback to healthcare providers when problems arise.<sup>14</sup>

In the present study, the electronic system was still new and needed more support and development. Several studies have mentioned issues that slow down and decrease the effectiveness of dashboard applications. It is evident from the literature that any setting requires a solid financial and technical foundation; without it, dashboards will not survive.<sup>2,5</sup> The current study identified many obstacles that could delay the success and completion of the dashboard application project. A lack of financial and human resources, lack of technical support, frequent internet shutdowns, difficulty in shifting from paper files to electronic files, and stiff resistance in adapting to change may make this experience difficult, and high costs during installation can lead to reduced opportunities for improvement.

Further studies on staff preparedness in implementing the new system, quality metrics correlated with nurses' performance, limitations of dashboard use in the ED, the negative side of introducing the multi-electronic system in one setting, and the effectiveness and efficiency of existing electronic systems should be conducted.

## Limitation

This study faced one limitation, which is the small size of the samples, due to the Nursing staff being busy during working hours.

## Conclusions

The results of the present study have shown that electronic tracking systems have created a paradigm shift in healthcare services in the ED for nurses at the King Abdul Aziz Specialized Hospital in Taif. The dashboard minimized staff time and effort, facilitated patient identification with the tracking of lab and radiology results, increased the nursing team's awareness of the current status in the ED, changed quality indicators, and helped enhance the quality improvement program with accurate data. Despite all the limitations of use, the nurses were satisfied with using the advanced tool. Further studies on the preparedness of staff to acquire the new technological system, quality metrics for nurses' performance, limitation of dashboard use in the ED, and effectiveness and efficiency of existing electronic systems should be conducted.

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## Disclosure

The authors report no conflicts of interest in this work.

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