Communications of the Association for Information Systems

Volume 55 Paper 11

8-6-2024

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Recommended Citation
Tazkarji, M., Van Slyke, C., Hamadeh, G., & Junglas, I. (2024). To Use or Not to Use! Working Around the Information System in the Healthcare Field. Communications of the Association for Information Systems, 55, 279-301. https://doi.org/10.17705/1CAIS.05511

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Cover Page Footnote

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This article is available in Communications of the Association for Information Systems: https://aisel.aisnet.org/cais/vol55/iss1/11

Communications of the Association for Information Systems

Research Article DOI: 10.17705/1CAIS.05511 ISSN: 1529-3181

To Use or Not to Use! Working Around the Information System in the Healthcare Field

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Abstract:

Workarounds are a part of everyday work life. Sometimes workarounds are viewed as being harmful to organizations, but many workarounds are undertaken in good faith. Rather than being a form of resistance, workers engage in workarounds in an attempt to perform their work effectively and efficiently. Often, workarounds are a response to system limitations, situational restrictions, or habit.

In this article, we investigate the nature of workarounds as witnessed in the context of electronic medical records (EMR) by nurses working in a large hospital. By identifying the goals, structures, perceived needs, and consequences of each workaround, we offer a better understanding of these workarounds along with a recommended approach to deal with these practices effectively—not only for healthcare but also for a broad array of work settings.

Keywords: EMR, Types of Workarounds, Healthcare Information Technology, Password Sharing, Workaround Consequences.

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1 Introduction

Over the past two decades, electronic medical record (EMR) systems have attracted the attention of researchers, healthcare organization managers, and federal governments. These systems have replaced the old, paper-based methods, in organizing, storing, and accessing medical records electronically. By using EMR systems, healthcare providers are able to input data directly into the system, access patient data and documented treatments, as well as communicate with each other through the system. The introduction of EMR systems has increased the speed and accuracy of obtaining patient history and documenting patient status while reducing errors and offering greater security and better access to patient information (Sykes et al., 2011). All these benefits have led to a rapid growth in EMR adoptions, which led the EMR industry to exceed $30 billion in revenue in 2018 (EMR 2019: The Market for Electronic Medical Records 2019).

Regulations have also fueled the growth of EMR adoptions. In the US over 80% of hospitals have adopted and implemented an EMR system (Jiang et al., 2023) mainly because of government initiatives, such as the Health Information Technology for Economic and Clinical Health (HITECH) Act that offered around $27 billion in subsidy (Burde, 2011) aimed at increasing the efficiency and quality of care.

Despite this rapid growth, studies have found that while both governments and healthcare organizations have spent billions of dollars on EMR implementations, most primary users—that is nurses and physicians—often work around the system to do their jobs (Hassidim et al., 2017; Kandaswamy et al., 2022, Tazkarji, 2020). Are these workarounds caused by the healthcare providers' non-acceptance of the EMR system? Or are other factors at play?

In the information systems field, non-acceptance of a system has historically been linked to the absence of either usefulness (i.e., Does the system help in getting a job done?) or ease of use (i.e., Is the system effortless to use?), or both (Davis, 1989). In our case study, we found that nurses do accept the EMR system and view it as acceptable, necessary, supportive, and effortless to use—yet, nevertheless, 80 percent of nurses worked around the EMR system. This widespread use of workarounds by the largest group of healthcare providers (nurses) has been reported/found/determined to undermine the quality of health care (Fraczkowski et al., 2020).

Why do good people who are using systems they value still use workarounds? This was the problem/question that guided our research.

We use a qualitative approach to dissect the workarounds practiced by nurses working at a major hospital. By doing so, we aim to achieve the following objectives:

- Develop a better understanding of the specific reasons behind engaging in workarounds.
- Investigate the different stages of the workaround decision process and the factors affecting the decision to engage or not engage at each stage.
- Uncover the positive and negative consequences of both engaging and not engaging at the individual, group, and organizational levels.
- Reveal factors that might lead to bypassing stages of the decision process.

2 Practiced Workarounds

2.1 Working around an Information System

When using information systems, workarounds are a prevalent and persistent phenomenon (Soffer et al., 2023). Employees not using a system as intended have long been the bane of many IT departments and executives alike. Workarounds are conscious adaptations of work activities that are not anticipated by management or designers (Laumer et al., 2017). Instead, workarounds are developed and put into practice by employees who perceive obstacles and bottlenecks when trying to achieve work goals. Often, these adaptations are viewed as indispensable. They are manifestations of the gap between "work as imagined" and "work as performed" (Patterson, 2018).

Constraints and the potential for accommodation are critical to the emergence of workarounds (Alter, 2014; Zamani et al., 2021). The perceived constraint creates the felt need for a workaround, and the

workaround provides the accommodation that affords the individual a way to overcome the constraint and continue pursuing the relevant goal (Soffer et al., 2023). Finding ways to work around the system is therefore not always driven by resistance to the implementation and functionality of an information system. Employees, while trying to carry out their work, may be faced with what they view as unnecessary obstacles, stemming from system controls, poorly implemented or no longer suitable features, or other system deficiencies (Bartelheimer et al., 2023; Wong et al., 2022; Malaurent et al., 2020). In an effort to effectively and efficiently complete their work tasks, employees may attempt to work around these obstacles through a variety of means, including violating policies, appropriating data fields or other system components, or finding ways to circumvent controls altogether. Workarounds often result in the creation of shadow systems and shadow processes that are unsanctioned and pose threats to data and system integrity, security, and privacy (Spierings et al., 2017).

But, giving workers a carte blanche for creating and implementing workarounds also signifies that workarounds are not all bad. A workaround can be an early warning that existing processes and systems are subpar or broken. They also have a diagnostic value, pinpointing how work and systems can be improved (Sheaff et al., 2020). This dual nature of workarounds represents a significant challenge for managers. Viewing workarounds as universally negative and treating them as such (Tucker et al., 2020; Rathert et al., 2012) likely ignores the potential benefits.

2.2 Explaining Workarounds at the Workplace

The literature has outlined various conceptual models to explain workarounds. Alter (2014), for example, lays out several necessary conditions for workarounds to come into being. First, there must be existing ways of doing work. These ways may include constraining elements, such as specific practices, policies, or processes. Second, there must be goals related to a particular work situation. These goals may be organizational or personal in nature. Third, there must be a perceived constraint in the achievement of such a goal, such as an obstacle, exception, anomaly, management expectation, or structural constraint. Finally, the individual must have the ability to conceive of and carry out a workaround that affords the worker the ability to overcome the constraint. Even though Alter (2014) dissected the necessary conditions of workarounds in detail in his study, his model does not describe exactly how workarounds occur (Davison et al., 2021). While he emphasizes separating management from designer intentions and highlights the role of designer-management communication in analyzing workaround intentions, his model does not account for different individual and group practices that trigger the need for workarounds (Davison et al., 2021).

Other researchers describe how employees either used alternative IT tools or used a system differently than intended by its designers, concentrating on how process-centered workarounds were developed and performed by employees to skip the “designated path” of a business process with a certain objective in mind (Bartelheimer et al., 2023; de Vargas Pinto et al., 2018; Outmazgin & Soffer, 2016; Weinzierl et al., 2021).

Another study examined the interaction between the enterprise system, employees, and the IT tools that employees developed to use as workarounds (Spierings et al., 2017). Adopting a case study approach, the authors conclude that employees fall into one of four categories: (a) Employees with little or no access to IT resources have no choice but to submit to the enterprise system, (b) employees with sufficient access to IT resources can dismiss the system, (c) employees with the ability to develop an IT tool will build a system and keep it hidden (what is the difference between B & C) - (what does B use once they have dismissed the system?), and (d) employees who have both IT capabilities and access to IT resources will construct an alternative (defiant) system.

A canonical action research approach was used by researchers examining the conflict that arose at a French organization’s overseas’ Asian branch where employees dealt with differences between standardization and localization (Maluaurent & Avison, 2016). The standardized practices pertained to European standards, and the localized practices to Asian standards (i.e., the way Asian employees are used to performing tasks). Hence, Asian employees resorted to working around prescribed best practices through local customizations of their organization’s ERP system (Malaurent & Avison, 2016). The authors observed three workaround types: (a) creating a parallel system, or shadow system, through the usage of spreadsheets, (b) performing data adjustments of statistical key figures coefficients justified by the existence of different accounting formulas in France and Asia, and (c) splitting invoices into smaller invoices so that amounts remained under the approval threshold, thus bypassing the need for supervisor approval. The study concluded that workarounds can be managed and embraced by companies that

implement ERP systems and that workarounds can present themselves as solutions to overcoming cultural differences in a multicultural setting.

Yet another study, based on a literature review of 60 articles drawn from the basket-of-eight top IS research journals and 24 conference proceedings, created a roadmap for future research on workarounds (Ejnefjail & Agerfalk, 2019). Among other things, the study proposed that a workaround represents an alternative path to the same goal of a "blocked" system path, thus prioritizing fulfilling business tasks over system (IT) processes.

A study adopting a multiple case study approach looked at three organizations to identify how workarounds diffuse in organizations (Bartleheimer et al., 2020). The authors concluded that workarounds function as generative mechanisms for bottom-up renovations of organizational processes, meaning that workarounds act as structures that cause organizations to fine-tune their processes.

While the current literature sufficiently agrees that workarounds can lead to improvements, it does not explain why employees that are accepting of an information system and satisfied with it, nevertheless, resort to workarounds. Nor does the existing literature account for different organizational contexts. Certain contexts, such as high uncertainty industries and fields/sectors that entail risks to human lives, are under-researched. Generalizing workaround models and existing theories to these fields risks over-simplifying the complex nature of workarounds. To grasp the full picture of workarounds in such sectors, we chose a process-oriented approach that allows us to understand factors affecting each stage of the workaround decision and behavior process, starting from the need for workarounds to the consequences of engaging in workarounds.

Also, the mechanisms describing the diffusion of workarounds are still under-investigated and under-researched (Davison et al., 2019; Zamani et al., 2021). Alter's model, for example, describes the diffusion of workarounds by considering different factors affecting the decision to engage in workarounds but falls short in describing how workarounds exactly occur or whether they involve group or individual activities (Davison et al., 2021). Alter's model also does not account for context-specific factors that apply to healthcare service providers operating in high-risk environments that are affected by habituation, radical changes, and multilevel risks. All these factors are uniquely associated with context (Davison et al., 2021). Hence, it is imperative to explore these contexts in order to understand how these workarounds are decided upon and implemented.

2.3 Workarounds in the Context of Health Information Technology

The fast-paced environment, in which workarounds often occur, simultaneously provides a starting point and sets a frame (Blijleven et al., 2022). The environment determines the way in which workarounds can form the extent to which workarounds are accepted and the nature of the potential risks and benefits associated with them (Ejnefjail & Agerfalk, 2019). The level of pressure perceived in the environment, the complexity and dynamism present in the environment, the importance of cohesion among employees, as well as cultural influences are just some of the factors that define the context (Bryman et al., 1996; Cummings et al., 2007). Complex environments often carry a need to negotiate multiple simultaneous threads of activity, which may bring about more workarounds. They also make it more difficult to prejudge the possible consequences of workarounds, both positive and negative.

Due to the persistent nurse shortages in hospitals, nurses increasingly face heightened workloads (Peters, 2023), thus exerting time pressures on nurses who then resort to workarounds to save time. An example comes from the administration of drugs. It is common to require an elaborate procedure in which one nurse reads information from the patient's wristband to another nurse. Then the administering nurse reads the medication information to the confirming nurse who verifies that the information matches the order. However, it is not uncommon for a busy administering nurse to become frustrated by not being able to find an available colleague and works around the procedure by administering the medication without verification. Errors in such cases result in severe outcomes.

Hospital contexts are notorious for being complex and dynamic environments where pressure is put on workers to accomplish tasks in a timely manner (Hosseini et al., 2022; Ulrich et al., 2022). Hospitals represent dynamic, often chaotic, and pressure-filled contexts, demanding rapid and effective communication and coordination (Bentz et al., 2023; Raeissi et al., 2023). Healthcare professionals often must negotiate multiple, simultaneous threads of activity; and, obstacles to any one of these only threaten the continuity of the others and the lives of patients. Put differently, hospital contexts are intolerant of

system-induced roadblocks and inevitably invite often creative workarounds from employees when proper system routines are absent.

Numerous researchers have studied workarounds practiced by healthcare providers and both the factors affecting these working arounds along with the consequences of these workarounds. One of these studies zoomed in on the types of EMR-related workarounds and their consequences (Boonstra et al., 2021). Other studies focused on reasons for engaging in workarounds. Patterson (2018), for example, identified different ways of how healthcare workers seek out workarounds when dealing with information systems. They either try to circumvent workflow steps within the system, or use text fields in the system that were intended for other purposes, or they use locally developed, manual processes instead of the ones prescribed by the system (Patterson, 2018). Another study, using grounded theory to inductively investigate the factors that influence physicians' use of workarounds (Reiz & Gewald, 2016), found that physicians are primarily driven by a better fit between system and task.

While these studies illustrate the richness of workarounds in healthcare and the range of responses to systems, ranging from avoidance to appropriation, they simultaneously showcase that workarounds are under researched (Barrett & Stephens, 2016; Debono et al., 2013) and poorly measured (Fraczkowski et al., 2020).

Complex and dynamic contexts, such as hospital settings, provide fertile grounds for the creation of workarounds. Often, these workarounds can turn into "shadow systems", unnoticed and unsanctioned by management.

Although workarounds are often enacted with good intent, they can be dangerous as they can even aggravate the misfit in the usage of EMR systems (Van Offenbeek et al., 2022). For example, as noted above, circumventing medication controls can lead to errors in dosage and administration, putting patient lives at risk. As a result, there is considerable interest in understanding the causes and consequences of healthcare workarounds. Thus, a qualitative approach allows us to dig deeply into this phenomenon and uncover factors and situations affecting nurses who engage in workarounds.

3 Research Method

In order to get a better understanding of the processes accompanying workaround decisions, a case study approach was applied (Yin, 2009; Eisenhardt, 1989). This allowed us to keep track of the factors affecting every step of nurses' workaround decision process. This method also allows for a deeper understanding of the industrial context, organization, and involved practitioner-related factors (Jenasena et al., 2023) and to "take industry seriously" (Chiasson & Davidson, 2005).

Workarounds seem particularly important in clinical healthcare settings. In fact, nurses are sometimes touted as "masters of workarounds" (Debono et al., 2013; Bianchi et al., 2022; O'Hara et al., 2022). The complex, pressure filled, dynamic environment that characterizes many clinical settings, coupled with the need for clinicians to work together closely and effectively makes clinical healthcare a potentially rich setting for examining workarounds.

3.1 Case Setting

Our case study examines one of the three largest private healthcare providers in the Middle East, consisting of 18 medical facilities across the Kingdom of Saudi Arabia, the United Arab Emirates, and the Kingdom of Bahrain. With a total revenue exceeding $2.2 billion in 2023, the group is recognized as one of the most successful healthcare organizations in west Asia (Writer, 2022). With over 30 years of experience in the healthcare sector and over 30,000 employees, the group annually provides approximately three million patients with comprehensive, customer-centric care, supported by major investments in human capital, research, and tech tools.

The group prides itself on having developed its EMR system fully in-house and has recently won an award for the best EMR adoption and application from the International Association for Information Systems and Management of Health Care (HIMSS). That association also scores hospitals on electronic record adoption, using an eight-level digital maturity scale. Scores, ranging from 0 to 7, are based on clinical outcomes, patient engagement, and clinician use of EMR technology to strengthen organizational performance and health outcomes across patient populations (Dane, 2022). Recently, the group's hospitals achieved a score of 7, the highest.

As required by the IRB (Institutional Review Board), we contacted the general manager of the medical group to introduce the study we intended to do and its main objectives; this individual, who was authorized to provide permission for the study, granted that permission and the study proceeded. As soon as we received approval from him to interview nurses at one of his main facilities in Riyadh, the capital of Saudi Arabia, we prepared a draft of the interview questions, updated the IRB application to ensure confidentiality and protection of participants' privacy, and revised the consent form that was to be signed by every participant before the interview. The consent form explained to them the main objective of the study, the way data will be collected (via face-to-face interviews), recorded (via voice recorder), stored, and disposed of. The form also assured the participants of a policy of total confidentiality. Interviews were conducted in a closed office with one nurse at a time. On average, every interview took between 20 and 30 minutes. At the end of every wave of data collection, the interviewers transcribed the interviews and shared them with the rest of the researchers. We commenced with the first round of interviews as soon as we obtained IRB approval.

3.2 Data Collection

To better understand the workarounds practiced by frontline workers, we interviewed a total of 24 female nurses using a semi-structured interview guide over 18 months (see Appendix A for more detail). Nurses are the healthcare provider group that spends the biggest amount of time with patients (Butler et al., 2023; Wainwright et al., 2022). Their job is complex and filled with uncertainty. Their utmost objective is to save lives. The best way to achieve this objective is through patient prioritization and delivering the highest quality of care possible. The reason we selected nurses is that nurses spend way more time with patients than any other healthcare provider group (Butler et al., 2018). Our sample consisted of nurses working at only one branch to try to understand the workarounds practiced by nurses working in the same work environment and under similar conditions.

As mentioned in the previous sub-section, we had a total of three rounds of data collection where the interviewers transcribed interview data and shared it with the rest of the team after each round. Despite the advantages of face-to-face interviews (Salazar, 1990), there are some disadvantages, including interviewer bias. We attempted to reduce interviewer biases through several measures. First, we used open-end questions to get accurate responses. The interviewers also avoided summarizing the collected data to avoid making subjective inferences. The interviewers also avoided emphasizing certain questions or intentionally spending more time on certain questions to mitigate the chances that interviewers might unintentionally influence respondents' answers. The interviewers also avoided rapidly shifting from one question to the other to prevent giving participants any impression reflecting the importance or nonimportance of any question or concept. One last measure taken was informing interviewers of the role and expectations of the respondents so that the interviewers can clarify to respondents the whole interview process beforehand (Cannel et al., 1977).

After collecting data, transcripts were produced by the interviewers who listened to the recordings and added their remarks and notes to the transcripts which facilitate adding meaning to the transcripts (Stuckey, 2014). The transcribed data was then imported into QSR Nvivo Qualitative Analysis Software (QSR, 2019). Nvivo's searching feature adds rigor and validity to the analysis process by enabling researchers to perform searches that allow them to locate all instances of a usage (Welsh, 2002). Numerous measures were taken to limit researcher bias in data analysis. In addition to using Nvivo software to manage data, triangulation was also used to confirm themes and conclusions by comparing interview data with side notes, observations, and side talks with nurses and physicians to confirm interim findings. Peer review was also used to validate the conclusions made by the researchers. This was done by sharing the rough draft of the study's analysis along with a step-by-step explanation of our data collection and analysis with an independent researcher who offered her insights and critique of the analysis.

4 Findings

4.1 Initial Analysis

We used Alter's theory of workarounds as a guide to reveal the perceived need for workarounds, the types of workarounds, the selection process, the consequences of both engaging and not engaging in these workarounds, and the proposed steps that can be taken to limit some of these workarounds. The semi-structured interviews allowed us to draw a clear and detailed picture of the types of workarounds that

frontline healthcare workers engage in, along with the reasons behind these workarounds and other factors that contribute to their prevalence.

With workaround engagement being our "concept of interest", we aimed to explore the reasons, types, and consequences of engaging with these workarounds. Coding every round (or wave) of data collection was crucial to induce concepts that can be attached to the data (Urquhart, 2012). After every round of data collection, we performed coding at three levels: open, selective, and theoretical. All coding was performed manually based on interview transcripts, although we used Nvivo to help track and organize the codes. Open coding allowed us to derive meaningful concepts from every phase and every sentence, while selective coding allowed us to group open codes thematically under core categories. This grouping of open-level codes under second-level selective codes or themes (Miles & Huberman, 1994). Finally, the last coding level is theoretical coding which involves establishing relationships between selective codes (Glaser, 1978). Two of the authors independently coded the data at each stage, and then met to resolve any differences in coding. In most cases, the differences were minor. For example, terminology differences existed in which the authors used different words to express the same concept. Once any differences were resolved, we proceeded to the next stage of the process.

Data analysis accompanied data collection in our study. This "theoretical sampling" approach allowed us to use what we learned from the first round of interviews as a guide for our second round and what we learned from the second round also directed our third round due to us constantly comparing and learning from the data (Glaser, 1978). There was a total of three waves of data collection. The second and third waves were designed to more deeply explore particularly interesting insights that emerged in our analysis from previous waves. What marked the end of each wave was an agreement among the research team that data saturation had been reached. Data saturation entails continuously interviewing new participants until data replication and redundancy occurs which triggers the completeness of the data set (Bowen, 2008). The first data collection wave was comprised of ten interviews during which we managed to uncover the nurses' sentiments towards the EMR system and the reasons behind engaging in workarounds. As we analyzed later interviews, we monitored our analysis for new insights. We did this for each round of interviews. When later round one interviews added no new insights, we proceeded to the second wave, which included eight nurses. The second round of interviews concentrated on the steps taken after establishing the need for a workaround and the details of the decision process that led to engaging in workarounds. This round revealed decisions made at every stage of the workaround process along with the factors affecting and triggering the workaround decision. Round 2 also revealed that opting out can appear at different stages of the workaround process. Again, when interviews provided no new insights, we moved to the third round. The third and final wave of data collection involved collecting data from a total of 10 nurses. The goal of this round was to clarify factors affecting the workaround decision and opt-out decision at every level of the workaround process.

4.1.1 Establishing a Baseline: Nurses' Initial Overall Assessment of the System

We started the interview process by asking the nurses about the EMR system. We wanted to know what they knew about the system and how they perceived it. When asked about the EMR system used at the hospital, all nurses expressed positive views about the usefulness and ease of use of the system. For example,

> *"I love our EMR system cause it's like a one-stop-shop that supports all our needs."*
>
> *"It is easy to use and saves time and effort. It is straight-forward and doesn't require extra training and work."*
>
> *"… the time management that EMR helps with …. it gives tips to the nurse to pay attention to the patient like in the case of dehydration."*

While nurses love the system and accept it as a useful and easy to use tool to provide healthcare, 23 out of the total 24 nurses total told us that they regularly engage in workarounds and bypass an expensive, award-winning, and seemingly successful system.

4.1.2 Establishing The need for Workarounds

Recognizing the need for a workaround is where it all starts (Alter, 2014). Rooted in the discrepancy between what the job requires and what the system can provide, nurses feel and acknowledge the need

to work around the system (Van Offenbeek et al., 2024). A typical situation occurs when a nurse has too many cases to attend to and cannot afford to sign into the system to input information after each patient visit. In this case, the nurse realizes that the need to work around the system is based on the need to do her job efficiently, as reflected in the following quotes:

> *"During emergencies and when the system is slow, we have to resort to look for other methods to finish our job."*

> "*Entering data into the EMR requires us to go to a system, log in, and enter data. This is time consuming."*

> *"EMR consumes too much time, and sometimes it even delays the duties given to us by doctors verbally. Simply said, if we are to go and input data after every patient visit, it will take time from the patients."*

At this stage, there are cases where nurses do not perceive any need to work around the system. These are cases where the system supplies nurses with the needed support to fulfill their tasks successfully. The "no perceived need" sentiment is reflected in the following quotes:

> *"Our EMR system has a great impact on healthcare quality as it is designed to secure the relevant data of the patient while, at the same time, allowing the healthcare worker to focus and to give the best quality of care for the patient."*

> *"On most occasions, a workaround isn't needed. Our EMR is a good system, especially with the many revisions they made for it to be efficient to help us not only improve but to help us with our notes, save time, and to be more efficient."*

4.1.3 The Breadth of Available Workarounds

Once a perceived need is established, considering the available practiced workarounds is part of the next phase (Alter, 2014). Available workarounds vary in form and shape and are often witnessed as prospects to choose from. Some entail the option of sharing EMR passwords, as shown below:

> "*Every now and then, in the recovery ward, I forget to write a transfer note or forget to transfer a certain item; and when we are off duty, we send the password to the team leader to open the system and fix transfer notes*."

As an alternative option, nurses stay logged in to their account, as shown below:

> "*To be honest, in the inpatient floor we are all sharing passwords while we witness medication delivery to patients. We just log into one account and use it. The reason behind that is to reduce wasted time*."

> "*When you have new staff who just transferred to the hospital and they don't have system access, either the supervisor shares her password or requests that one of us share passwords with the new nurses for them to be able to put in their notes*."

Yet, other nurses utilize paper for note taking and postpone data entry until the end of the workday:

> "*I have done this on a couple of occasions… I will write down the info on a piece of paper to input it into the system at a later time. We have 24 hours to input patient data in the EMR system*."

> "*Our principle is: Patient before system. If I have too many patients, I will postpone data entry till the end of my shift or even to the next day*."

Others communicate directly with physicians or other nurses to acquire information on patients and their medications:

> "*Sometimes it's not feasible to input patient data into the system due to many circumstances, such as a slow network or having no time to sign in. On these occasions, we either talk to or call the doctor or ask another nurse to give us information about the patient and their meds and status updates*."

Interestingly, new workarounds emerged on an ongoing basis. During COVID-19, for example, when hospitals got overwhelmed with an unprecedented number of urgent cases, traditional processes went out the window. Combined with a talent shortage in their profession, nurses experienced immense pressures

stemming from the sheer number of patients (Jedwab et al., 2022) to process and the emotional and psychological stress (Shen et al., 2020) caused by the high death rate. It also overwhelmed many physicians, which, in turn, drastically limited the amount of communication that could take place between nurses and physicians. To combat this, some nurses improvised a new workaround by using WhatsApp to communicate with other healthcare providers about a patient, such as medications that need to be administered.

Yet another workaround, typical during COVID-19, was sharing credentials with hospital staff. Unlike nurses and physicians who were overloaded with patients, hospital staff could spare some time to go to a computer station and login with the nurse's account to access patient data and share this data with the nurse.

4.1.4 Selection Time: To Workaround or Not to Workaround

In hospitals, the work environment is fast-paced and lives are at stake. An inherent tension emerges between the limited time that is available for nurses to make a decision and the allowed level of autonomous decision-making. The guiding principle for nurses, no matter the option chosen, in our study has been: "Patient before system." But when it came to following through with a workaround selection, nurses chose different options.

4.1.4.1 Option 1: If one does it, then all can do it!

Most of the interviewed nurses mentioned that the decision they make is one that is both acceptable and regularly practiced by the group. The lion's share of workarounds practiced by nurses were either initiated by their superiors or practiced in a group pattern, as the following statements show:

> *"In some instances where the doctors forget to provide a certain medication to the patients and they are out of the office, it is the job of the nurse or the team leader to call the doctor so that he shares his password to enter the medication for the patient with the permission of the doctor."*

> *"That's just the way we do it. For me, it's not the wrong thing to do because if you trust your colleagues, you can give them your password or login to their account. It is against policy, but we all do it."*

The above quotes also reflect immunity due to commonality. When nurses engage in practices that are regularly practiced by the group and, more importantly, viewed as acceptable by the group and its supervisors, they feel immune to being penalized for breaking policies. Simply put, they are engaging in the workaround because all other nurses are doing so, and no matter whether the workaround was an available or a new one, they would assume that the hospital management will not punish them—as long as the decision was made by the group.

4.1.4.2 Option 2: Conditioned Participation

But what if there is a discrepancy between the supervisor's views or the group's practices on one side, and the nurse's views on the other side? The nurse then has to make a choice, either to prioritize the patient or to follow the supervisor's directions, or to follow what is perceived as an acceptable practice by the group. In this case, all the nurses we interviewed made it clear that they would prioritize the patient's wellbeing:

> "*It is the nurse's right, and it is her choice whether she will abide with policies or do what the group does. If there is no urgent need to do so, I won't do what others do or tell me to do and I will do what I see as suitable for the patient*."

> "*I am against sharing my account credentials with anyone, and it is against policies. Yet still it depends on the situation*."

> "*I am against sharing passwords. But to be honest, in the inpatient floor we are sharing passwords while we witness medication delivery to patients. We only do that to reduce waste of time*."

Both options 1 and 2 give the same outcome; engaging in workarounds.

4.1.4.3 Option 3: Not Engaging in Workarounds

Just like the decision to engage, the decision *not* to engage in workarounds has its reasons, along with both positive and negative consequences. One reason can be the absence of a need that never existed in the first place:

> *"The system makes my workload easier since it is like a one stop documentation. The vital information is already automatically stated on our system and all I need to do is to fill it up. We are also entitled to individual training just in case we need any clarification. The system fully supports my needs and allows me to save time and effort."*

Another reason might be that the need for a workaround ceases to exist. This occurs at every level, not only at the selection level. For example, if a nurse wants to write a note on a piece of paper because the system is down, then she changes the approach once the network is restored and the system is online again. Yet another reason is if the nurse discovers an alternative to the workaround, for example, if s/he finds out that instead of postponing data entry until the end of the day, s/he can use the EMR app to enter notes between patient visits. All these situations apply to all nurses, no matter their cultural background.

Opting out late (i.e., after establishing a need, selecting a workaround, and deciding to execute) may also happen. For example, if a nurse decides to work around the system for the sake of spending more time with the patient, s/he may verbally communicate this to another nurse while administering medications. In the end, s/he might choose to not engage in the workaround because by the time s/he reaches the patient, his/her workload has decreased and hence the need to save time ceases to exist.

4.1.4.4 Option 4: Creating New Workarounds

Sometimes, nurses establish a decision to engage in workarounds, yet there are no available workaround options to choose from. In this case, new workarounds are often born. Our study revealed a couple. The first "new workaround" that we observed was nurses calling their fellow nurses from home to input data into the system. According to one nurse:

> "*If I forget to input certain notes on my account and I go home after my shift, instead of waiting until I come back the next day, I will call a colleague and share my password so she can input the data for me*."

Another improvised workaround that we came across involved sharing a physician's password. This happens when nurses want to provide medications to patients but realize that the physician had not inputted the patient's medication details. In this case, nurses contact the physician and ask her/him to share the password, as the following quote shows:

> "*Yes, we do contact the doctor, and they have no choice but to share their password. That's because they forgot to provide a medication, and they are out of the office, so it is the job of the nurse to call the doctor and share his password to enter the medication for the patient with the permission of the doctor*."

Both workarounds illustrate how system improvements can widen the pool of possibilities. For example, if healthcare providers are given access to remote system access (say via an EMR app) the need for both of these workarounds would cease to exist.

4.1.5 Living with the Consequences

The consequences of workarounds were perceived both as positive and negative. On the positive side, nurses perceived themselves to be spending more time with patients. This is beneficial for both, the patient who gets to receive a better quality of care, and the nurse who gets to build a better relationship with the patient which allows the nurse to do a good job by better understanding and serving the patient. It also adheres to the International Council of Nurses' code of ethics (International Council of Nurses, 2001) by prioritizing patient wellbeing and focusing on delivering the best quality of care rather than spending time on other tasks.

Another positive aspect entails the inadvertent provision of a fallback plan should the system ever fail. Put differently, the workarounds nurses engage in train nurses to seamlessly operate when a system goes down, or when emergencies occur. Also, it trains them to save patient data by resorting to writing them down on a piece of paper. Rather than prioritizing patient care and well-being over tasks like data entry by

dismissing the whole activity, recording patient data on paper for later entry into the system enables nurses to safeguard valuable patient information.

On the negative side, nurses perceive the associated responsibility as a major drawback of engaging in workarounds. Nurses are well aware that they are responsible for their accounts, and that they should follow policies and not work around the system:

> "*We need to abide by the different policies of the hospital. Why? Because it is for our own protection and good*."

> "*We should do our best not engage in any workaround, not even with your group or supervisor. It's not a matter of trust, it's a matter of staying in line with hospital policies and staying on the safe side*."

Hence, engaging in workarounds puts nurses at risk of getting written up or even terminated. This holds immense risks for the nurses' future because their residency status depends on keeping the job.

Another risk is habituation. Constantly engaging in certain workarounds can turn this workaround from a mere practice that nurses resort to when needed to a habitual one. With time, workarounds can turn into the way of doing things at the hospital, which, in turn, means that more and more nurses might bypass the system to perform their tasks. By doing so, they might miss out on advancing their skill sets and will not benefit from improved system functionality and refined work processes.

4.2 Updated Process of Workarounds

Based on our initial analysis, findings revealed that workarounds are triggered by various causes, including conflicting organizational and personal goals, system-work misalignments, system and information quality deficiencies, user resistance, and the perceived loss of control and power. We see a duality of causes, with some driven by good intentions, such as the desire to perform work tasks efficiently and effectively, and some by what would be seen as bad intentions by management, such as choosing to use another employee's account rather than logging into one's own account. A similar duality exists when looking at the consequences of workarounds. Outcomes might entail more effective uses of the system but may also lead to a decrease in organizational control and an increase in patient privacy and nurses' job security risks.

Figure 1 includes our findings and shows our updated Alter (2014) model, highlighting the components that we found to be emerging from our data that have been overlooked by prior research.

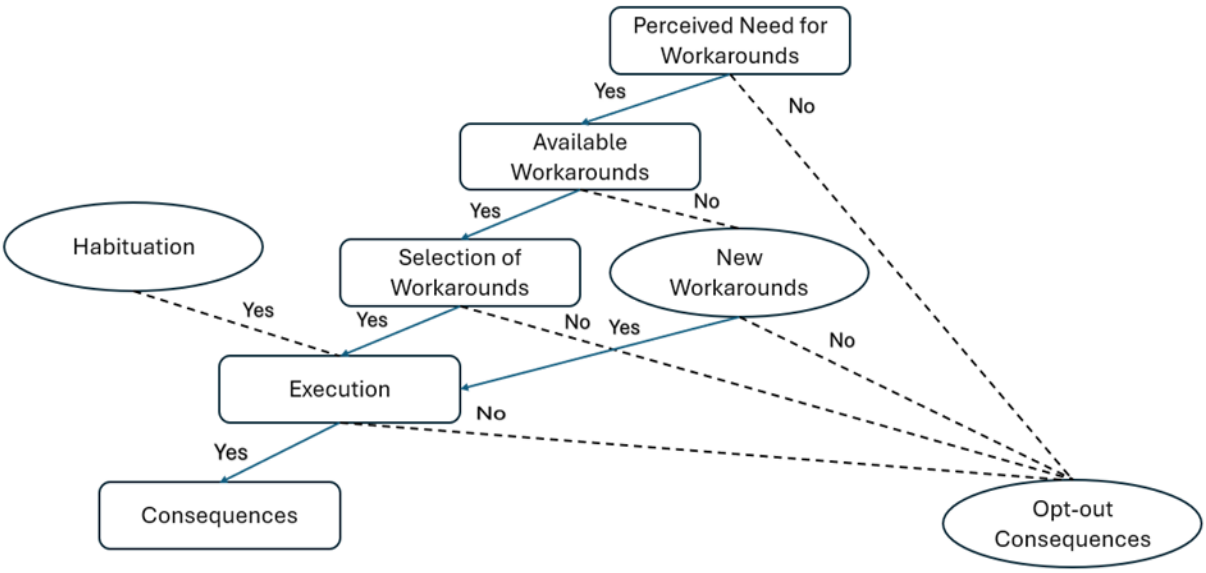

Figure 1. Modified Workaround Model (Based on: Alter (2014))

The oval shaped factors and the dotted lines represent our additions to Alter's original framework. While some of these factors make a valuable addition to Alter's model, others play a broader role in explaining the phenomenon of workarounds. We explain each in detail in the following.

4.3 The Role of Habituation

In our study, we have identified an element that carries significance in a revised model of workarounds. Interestingly, it leads nurses to bypass the perceptive, availability, and selection stages (the top three levels of the process model) entirely and captures the group-initiated patterns of habituation. Habituation refers to nurses engaging in workarounds where nurses' habits lead them to execute workarounds. Habituation is a form of simple, non-associative learning, in which the magnitude of the response to a specific stimulus decreases with repeated exposure to that stimulus (Thompson et al., 1966). This means that due to habituation, nurses will engage in certain workarounds in a chronic and consistent manner without thinking about consequences, or about other alternatives or options. As was evident in the action of keeping the account logged in during emergencies, all nurses made it clear that during emergencies everybody will share one logged in account: "We all share one system during emergencies. Normally one account is used by the entire team in case of emergency." In this case, nurses bypass the first three levels of the model and habituation triggers executing the workaround. Often, they do not perceive the workaround to be an actual workaround as it is so ingrained into their behaviors. This is clearly shown in the following quotes taken from the same nurse in the same interview:

> "*Policies do not hinder emergencies. They work hand in hand. For us as nurses, following policies is not hindering our performance during emergencies. There is no need to break policies*"

> "*During emergencies, we share one system. We are used to doing so. We used to alter our notes on another nurse's account, now we can't, so we use one account. Does it matter who the co-worker is? It does not matter*."

4.4 Justifying the Outcome: Hyperbolic Discounting

A major workaround facilitator is hyperbolic discounting. This factor acts as an enabler that encourages nurses to engage in workarounds at different stages in Alter's (2014) model. Introduced by Samuelson in 1937, hyperbolic discounting assumes that individuals discount utility from all future periods "at a constant rate of time preference" (Samuelson, 1937). Put differently, a person will prefer to take 10 dollars now rather than wait five years to take 20 dollars. Hyperbolic discounting might be the reason why a nurse will choose to ask another nurse about a patient rather than logging into the system herself. The nurse is prioritizing saving time and serving (or even saving in some situations) the patient now and discounting the consequences of working around the system by jeopardizing the patient's privacy. Hyperbolic discounting can also explain why workarounds are practiced by groups and are seen as an acceptable practice, as seen in the quotes below:

> "*For example, if you see a patient gushing blood and you have already used a glove on other patients, if you see severe bleeding, although policy states that you should change gloves, yet in this situation there is no chance to change gloves since it's an emergency event*."

> "*Working around the system only happens if and only if there is an emergency situation, that's when we (as nurses) take over and make the right decision*."

> "*If you trust your colleagues, you give them your password. If you have a new nurse, the supervisor will ask us to share our password with him/her. It is against policy, but it depends [on the situation]*."

4.5 Workaround Prominence

Engaging in workarounds is a complex process that both affects and is affected by individuals (be it patients, nurses, nurse supervisors, or even physicians), groups (the nursing team), and the organization (the hospital). The effect of these three levels varies depending on the situation and the nurse. The fact that working around the system is a common practice employed by different provider groups at hospitals makes the engagement decision easier for nurses. Only 20% of the nurses we interviewed abstained from engaging in workarounds. This smaller group is not affected by peer or supervisor pressures, and they

believe that a nurse should not engage in workarounds under any circumstances, as the following quote demonstrates:

> "*We should learn how to manage our work and finish all pending tasks before we finish our duty. If something urgent happens, extend the time but do not work around the system. Do not break policies*."

4.6 Cultural Anchoring of Workarounds

We noticed discrepancies between Arab nurses and Asian nurses. These differences were obvious in the way they dealt with pressures from the group and from their supervisors. Keeping in mind that the hospital is located in an Arab country and the vast majority of physicians, supervisors, and patients are Arab, Arab nurses were more comfortable defending the workarounds they engaged in. It was also evident that Asian nurses were more heavily influenced by their supervisors and/or the group they worked with than Arab nurses.

Power distance refers to cultural conceptions regarding the degree of power that authority figures hold over subordinates (Hofstede, 1980). Nurses who believe that supervisors should have a great degree of power over nurses have a high-power distance orientation. In our study, it was obvious that Asian nurses who come from collectivist cultures had a higher power distance than those who came from somewhat individualistic cultures. This explains why some nurse groups were more likely to shake off supervisor and group pressures and not engage in workarounds unless they felt the need to work around the EMR system to deliver a higher quality of care.

5 Discussion

A major problem facing the healthcare industry is the shortage of nurses (Alotaibi et al., 2022). This shortage started with the spread of COVID-19 and still continues. Hence, nurses are overloaded with work, and they need to prioritize spending time with patients so as to deliver a high quality of care. This shortage puts added time pressures on nurses who have to serve a greater number of patients on their shifts. Nurses will resort to workarounds to save time and finish the task at hand in the fastest way possible. Yet, do the advantages of engaging in workarounds outweigh the disadvantages? To answer this question, it is important to examine the effects of engaging in workarounds at different organizational levels in more detail.

Table 1. Positive Consequences of Workarounds

Individual	Group	Organization
• More time with customers (patients) • Maintain good relations with co-workers • Backup data • Increased Collaboration • Positive effect on employee tenure • Build better relationships with customers (patients)	• Promotes a sense of comradery • Stay focused on core objectives (patient wellbeing) • Higher sense of belonging • Job security	• Higher quality of service • Promote a customer-centric (patient care) culture • Increase (Patient) loyalty • Increase trust in the organization • System and Process Enhancement (Diagnostic benefits)

Table 1 displays the positive consequences of engaging in workarounds at the individual (the nurses), group (nurse groups), and organizational level (the hospital).

At the individual level, we found that workarounds deliver a high quality of care. The main reason why nurses choose to become nurses in the first place is to take care of "sick people" and prioritize the wellbeing of patients.

Engaging in workarounds allows nurses to achieve this goal by enabling them to spend more time with patients which paves the way to taking better care of patients and building good relationships with

patients. Workarounds also help nurses build better relationships with co-workers who take part in these practices. Another positive consequence of workarounds is backing up patient data when the system is down. Workarounds also help nurses maintain good terms with their supervisors. This happens when the supervisor asks the nurse to engage in some practiced workarounds and expects the nurse to engage in these practices. Hence, by pleasing the supervisor, the nurse secures tenure through a favorable appraisal.

At the group level, workarounds can contribute to group cohesion. Workarounds that are practiced by supervisors or the entirety of the nursing group often go hand in hand with good relationships. It reflects positively on the nurse's relationships and collaboration with co-workers, the nurse's continuity at the hospital, and the overall work environment. Following the group's practices also increases the nurse's sense of belonging to the group which promotes the nurse's sense of job security. Engaging in workarounds promotes a sense of comradery and common purpose and yields a healthier work environment overall that promotes teamwork and collaboration.

At the organizational level, workarounds contribute to the soft factors of the organization. The organization can be sure that patients are prioritized which leads to delivering a higher quality of care resulting in increasing patients' trust in the hospital and its staff. At the organizational level, workarounds are a means to solicit system requirements. In addition to enabling the organization to promote a culture of patient prioritization and delivering a better quality of care, workarounds play a key role in enhancing system processes by acting as a diagnostic tool. By documenting and studying practiced workarounds, hospitals can better understand the misalignment between best practices and system processes. Analyzing the practiced workarounds and using them as a diagnostic tool makes it possible for hospitals to better understand system limitations. Upon studying the workarounds practiced by nurses, hospitals can enhance both the EMR system and the implemented processes.

Our findings agree with previous studies on the positive consequences of workarounds. Previous studies agree with our findings that workarounds such as writing on a piece of paper (Saleem et al., 2009), asking other nurses verbally for medication instructions (Halbesleben et al., 2010), and collaborating with the team (Boonstra et al, 2021 even if that means sharing one account while performing the tasks are necessary for delivering high quality patient care, promoting a higher sense of belonging and comradery among nurses, and increase collaboration. Our study also complements previous studies that propose using workarounds to enhance existing processes (Bianchi & Ghirotto, 2022; Halbesleben et al., 2013). We believe that by understanding workarounds, we can use this knowledge to diagnose and enhance existing processes and procedures. Our findings also agree with previous studies which found that workarounds enable nurses to do their jobs efficiently by dedicating more time to patients and focusing on patient wellbeing (Lee & Lee, 2021).

Table 2. Negative Consequences of Workarounds

Individual	Group	Organization
• Psychological pressures • Responsibility issues. • Workarounds becoming a habit.	• Negative effect on team spirit • Normalizing workarounds as group practice. • Group Pressures	• Violating Policies • Jeopardizing customer (patient) data and wellbeing. • Social and Legal Consequences.

In contrast, Table 2 summarizes the negative consequences of practiced workarounds. Just like positive consequences, negative consequences apply to all three organizational levels. It is important to understand and account for these consequences to be able to assess the overall cost of engaging in workarounds.

At the individual level, workarounds come at a price. Nurses often suffer from psychological pressures when engaging in workarounds that entail breaking security policies. It puts nurses under pressure because of being responsible for possibly jeopardizing patient privacy and because of getting written up or even getting fired for breaking policies. Also, should workarounds become habits and nurses replace existing processes with those workarounds nurses will begin to perform their tasks in a different way contrary to what management planned. Hence, nurses will be held responsible for any mishap that takes place.

At the group level, workarounds can turn into stressors. If, for example, members of the group are not comfortable engaging in certain workarounds that the group engages in regularly, this might negatively affect unity, morale, and team spirit. Group pressures exerted on nurses to fulfill tasks the way other group members do can create a stressful group environment. Another negative consequence is normalizing certain workarounds as a team practice and branding the system as a "useless" system. This sentiment gets embedded into the group culture and becomes hard to reverse—even if the system was upgraded to accommodate nurses' needs and eliminate any need for workarounds.

At the organizational level, workarounds can violate policies. The prevalence of workarounds within the hospital reflects a violation of organizational policies (including but not limited to security policies) which leads to organizational chaos due to the non-standardization of processes. Workarounds such as verbally communicating patient information or writing down patient information and updates on a piece of paper jeopardize the privacy of patients. This puts the hospital at risk of getting sued by patients whose privacy gets breached. One last negative consequence is a social one. When hospital staff threaten the privacy and wellbeing of patients by sharing patient data outside the EMR system (and sometimes in the presence of nonmedical staff) this will negatively affect the image and the reputation of the hospital.

Our main objective is to examine workarounds by considering the circumstances, reasons, and consequences of working around the EMR system. We explored the different steps of the workaround process so as to understand the decisions that nurses make at every step of this process. We focused on personal, group, and organizational considerations in the form of facilitators and deterrers at different stages of the workaround process. Our findings confirm numerous previous research on the negative consequences of workarounds in the healthcare field. Workarounds can be associated with negative patient outcomes when nurses avoid processes (Tucker et al., 2017). Our results both confirm that and further explain that the reasons for this avoidance of processes could be habit or group/individual pressure. We also show that some workarounds can have positive perceived consequences in the short term such as spending more time with patients and negative consequences in the long term such as legal consequences. These findings reinforce numerous studies from different industries that found that workarounds can be good in the short term but harmful in the long term (Yli-Huumo et al., 2015; Wolf & Beverungen, 2019). Another negative consequence of workarounds that we pointed out is breaching business processes and policies. This negative consequence also confirms results from previous studies (Boudreau & Robey, 2005; De Vargas Pinto et al., 2019).

Dissecting nurses' workaround decisions pave the way to understanding how new workarounds are created and how habituation and hyperbolic discounting impact workaround decisions. We believe that by examining why and how nurses work around a system that they accept and perceive as useful and easy to use we provide both researchers and practitioners with a holistic understanding of workarounds, along with their effect on individual nurses, nurse groups, and the hospital. While we selected Alter's theory of workarounds to achieve our research objectives, another model that we could have used to describe and group causes of practiced workarounds is Koppel et al.'s (2008) five categories of probable workaround causes. Koppel's model groups workaround causes under five broad categories, namely environmental, technological, organizational, patient, and task (Koppel et al., 2008). Other viable theories that we could have used to study workarounds practiced by nurses are the extended technology acceptance model (Baysari et al., 2018), complexity theory (Rack et al., 2012), actor network theory (Cresswell et al., 2012), and information theory (Carrington & Effken, 2011). Although all of these are viable, we chose Alter's (2014) theory as a starting point because of its comprehensiveness coupled with its specific focus on IT-based workarounds. However, we agree with Alter (2014) when he notes that different theoretical starting points may provide interesting avenues for deriving additional insights into workarounds.

6 Research Implications

Our findings make three main contributions to the IS workarounds research body. First, while existing studies approach the practice of workarounds as a process, they fall short in explaining factors at each step of the process and how these factors affect the decision to engage in workarounds. Our study dissects these factors and sheds light on the composite nature of the workaround practice along with its multi-decision process accompanying it.

Second, we have talked about how previous studies have discussed both the positive and negative consequences of engaging in workarounds. Yet, they have not discussed these opposing consequences at different steps of the workaround process at the different levels involved in these workarounds. Our

amended model addresses how opting out at different stages can have different consequences for the nurses (individuals), the nurse team (groups), and the hospital (organization).

Third, while previous researchers have addressed the different stages of workarounds, they fall short in incorporating workaround facilitators and context-specific enablers. In our study, the role of habituation was accounted for as a facilitator. Another factor that could explain the prevalence of breaking organization policies by working around the EMR system is hyperbolic discounting. By accounting for these factors, we provide IS researchers with a model that can be used to explain the practice of workarounds in fast-paced organizational contexts.

7 Practitioner Implications: What Should Hospitals Do?

Understanding the full scope of workarounds is paramount for hospital management, as it allows them to effectively address the challenges they pose. Hospitals need to thoroughly comprehend the reasons behind these workarounds, their consequences on patient care and operational efficiency, and the external pressures that may drive their adoption. Once this understanding is achieved, hospitals can categorize workarounds into three main groups (Good, Bad, and Ugly workarounds) to devise appropriate strategies for managing them.

In the category of good workarounds, hospitals recognize their essential role in delivering high-quality care, particularly in critical situations such as emergencies or when encountering limitations within existing systems. These workarounds often serve as indispensable solutions to immediate problems, highlighting areas where processes can be refined, and systems can be improved. By studying these workarounds, hospitals can identify areas for enhancement, potentially leading to system upgrades or process optimizations.

Conversely, the bad group encompasses workarounds that pose significant risks to patient health and privacy. Examples include informal sharing of patient information among healthcare workers or resorting to paper-based records, which increase the likelihood of errors and compromise patient confidentiality. Recognizing the urgency of halting these practices, hospitals must implement immediate measures to replace them with more secure and compliant alternatives, safeguarding both patient well-being and data integrity.

The Ugly category comprises deeply ingrained workarounds that are difficult to eliminate, often deeply embedded in established workflows and practices. While these workarounds may not pose immediate risks, they can impede progress toward more efficient and compliant operations. Addressing these workarounds requires a nuanced approach, balancing the need for change with the potential resistance from staff accustomed to these practices. With targeted training initiatives and incentivization strategies, hospitals can gradually transition away from these workarounds towards safer and more standardized procedures, ultimately improving overall quality of care and operational effectiveness.

8 Limitations and Suggestions for Future Research

The nurses interviewed were either Arabs (non-citizens) or Southeast Asians (also non-citizens). All interviewees were considered “residents,” mainly sponsored by the medical group. Losing their job could unequivocally mean that they would lose their residency status and would have to leave the country. Future research can interview local nurses (citizens) to explore if there exist differences in factors affecting the workaround decision process between citizens and non-citizens. Another limitation lies in the fact that we performed a single case study of one branch of the hospital which can limit generalizing the results. Future studies can perform multi-case studies that enable researchers to compare and contrast results and increase the generalizability and applicability of the research to different contexts. One last limitation is the use of a single model (Alter’s Theory of Workarounds) which constrained us from exploring different approaches and models. Although we amended the model by adding “constructs” and paths to it, our results confirmed the model’s main stages. Future research can use different theories, models, and concepts to explore the workaround phenomenon in different contexts. One last limitation is that despite measures taken to limit researcher bias, the interpretive nature of this study entails researcher bias that affects both data collection and analysis.

9 Conclusion

Despite the significant investments made by governments and healthcare organizations in adopting electronic medical record (EMR) systems to enhance patient care and operational efficiency, the persistence of workarounds undermines these objectives. While workarounds may temporarily address limitations, they ultimately hinder the intended benefits of costly EMR implementations. Despite nurses' positive perceptions of the system's utility and ease of use, they still resort to workarounds. It is crucial for hospital management to comprehensively understand the various types of workarounds employed by healthcare professionals, along with their reasons and consequences. Only with this understanding can management effectively address and accommodate workarounds, ensuring that the full potential of EMR systems is realized in delivering higher quality care and improving communication across stakeholders.

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Appendix: Research Methods

This study is part of a bigger project that the authors have been conducting for over two years. The project's goal is to understand noncompliance with organizational policies among healthcare provider groups. To delve deep into various contexts and factors affecting these behaviors, we used qualitative methods (interviews and observations).

The Interviews

The total sample we interviewed consisted of 24 nurses distributed over three groups (10+5+9). In 2021, we interviewed the first group. We started with general questions to better understand the general work environment and the system used. We then narrowed down our questions for the second batch to target the phenomena we were interested in. After collecting data from the second group, we analyzed the data along with side notes and the notes from the co-author's observations and prepared the third interview guide which was focused and specific. By using semi-structured interviews consisting of a set of open-ended questions, we were able to solicit detailed information about the different workarounds practiced at a big hospital. In-depth interviews allowed us to draw a comprehensive picture of workarounds practiced at the hospital along with their accompanying conditions and consequences. Here are the workaround related questions that we asked:

What are your thoughts about the EMR system used at the hospital? What do you like about it? What do you dislike about it? Does it facilitate your work? How? What features do you like the most and which ones do you dislike the most? Do you think that using the EMR system ever gets in the way of effectively taking care of your patients? If yes, please explain.

Do you feel you need to spend more time with patients? How do you manage and balance between your time with patients and your time working on the system? Are there occasions when nurses need to work around the system to get the job done? Does abiding to policies hinder your performance in certain situations? How? Is your current EMR system cumbersome? How much time does it consume per day? How much effort does it take to finish tasks on the system? Why (factors affecting that)? Does the system make your job easier or harder? How?

What activities have you or your co-workers engaged in to overcome system limitations? Are there any other circumstances where nurses work around the system? Please give examples. Please specify the conditions under which working around or by-passing the EMR system is acceptable/needed.

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