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ARTICLE



## Investigating the antecedents of perceived threats and user resistance to health information technology: a case study of a public hospital

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### ABSTRACT

Health information technology (HIT) can improve the quality of healthcare, but improvements are likely to be hindered if physicians and nurses resist HIT. In response, this study investigates the antecedents of the perceived threats to HIT and user resistance by examining the organisational factors, the personal traits of users, HIT-related factors, and the factors related to the interaction between physicians, nurses, and the organisation. By building on an in-depth case study of a public hospital, the study develops a conceptual model. The main findings of the study suggest that perceived dissatisfaction and loss of professional autonomy are the main perceived threats of HIT for physicians and nurses. Furthermore, five factors that influence these perceptions are identified, and they include related knowledge, management support, user involvement, system performance, and social influences. The study will ensure a better understanding of the phenomenon, as it will contribute to identifying the core reasons for resistance.

### ARTICLE HISTORY

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### KEYWORDS

User resistance; health information technology; perceived threats

## Introduction

A wide range of evidence recognises the potential of Health Information Technology (HIT), such as Computerised Patient Order Entry (CPOE) and Electronic Medical Record (EMR), which improve the quality of healthcare delivery by reducing medical errors, lowering healthcare delivery costs, and improving service management (Bogaert, Van Oers, Van Oyen, & Health, 2018; Carvalho, Rocha, van de Wetering, & Abreu, 2019). Despite the evident benefits of HIT and support from the government (e.g. funding, incentives), HIT failure is very high and hospital adoption of HIT remains low (Norton, Rodriguez, Shortell, & Lewis, 2019; Vitari & Ologeanu-Taddei, 2018). A number of studies have indicated that user resistance is a root cause of HIT failure (Barrett, 2018; Handayani, Hidayanto, Pinem, Sandhyaduhita, & Budi, 2018). To benefit from new HIT projects and to increase HIT adoption, user resistance must be mitigated (Hsieh & Lin, 2018; Samhan, 2018). Being aware of the factors that influence user resistance and recognising resistance behaviours will help managers better manage new HIT projects (Ngafeeson & Midha, 2014; Smith, Grant, & Ramirez, 2014).

In the information system (IS) literature, there are a significant number of studies that focus on IS resistance compared to studies that focus specifically on user resistance to HIT (Samhan, 2015). Several unique characteristics make it especially challenging to manage and overcome user resistance to HIT (Samhan, 2015). The unique organisational and political culture in hospitals make HIT user resistance different from user resistance to other types of IT implementation. Consequently, the reasons, behaviours, and responses to user resistance to HIT would differ from other IT user resistance (Bhattacharjee & Hikmet, 2007). The unique characteristics of hospital settings are (1) the power held by physicians in hospitals, as physicians have more freedom of choice in using a given system compared to other types of IT users (Handayani et al., 2017); (2) the fact that physicians and nurses have well-defined roles in the hospitals and are continuously interacting with each other (Lapointe & Rivard, 2005); and (3) the fact that physicians and nurses have a sensitive job where patient welfare is crucial and resources are often constrained, so they face considerable pressure to provide quality healthcare (Poon et al., 2006). There is a heightened need to understand the problem of physicians and nurses' resistance to HIT. Shedding light on this problem will improve the chances of increasing HIT adoption and its continuous use, thereby creating the possibility of achieving the promised improvements in healthcare.

In IS literature, users' resistance is viewed as the outcome of a conscious and reasoned decision based on their perceptions about IT, such as perceiving IT as a threat (Bhattacharjee & Hikmet, 2007; Lapointe & Rivard, 2005; Lin, Lin, & Roan, 2012), perceived compatibility (Bhattacharjee & Hikmet, 2007; Laumer, Maier, Eckhardt, & Weitzel, 2016a), perceived ease of use (Bhattacharjee & Hikmet, 2007; Laumer et al., 2016a), and perceived inequity (Lin et al., 2012). While there is a relatively large body of literature that examines how user perceptions influence user resistance, there is a dearth of research that addresses how user perception is formed (e.g. Esmailzadeh, Sambasivan, Kumar, & Nezakati, 2015; Laumer, Maier, Eckhardt, & Weitzel, 2016b). Moreover, several researchers have called for further studies in order to identify the factors that contribute to user perception and user resistance (Ali, Zhou, Miller, & Ieromonachou, 2016; Hsieh, 2015; Laumer et al., 2016b).

Therefore, it is the objective of this study to investigate the circumstances that lead physicians and nurses to perceive HIT as a threat, thus leading to user resistance. In doing so, this paper is derived from Bhattacharjee and Hikmet's (2007) model, which indicates that a perceived threat leads to resistance, which leads to change. This study extends the current understanding of user resistance by deconstructing perceived threats to HIT, identifying the antecedents of perceived threats and aiming to answer the research question: What are the organisational, personal, HIT-related, and interactional factors between physicians, nurses, and their organisations that lead physicians and nurses to perceive HIT as a threat?

The study will help hospital managers better understand user resistance, create the right policies and actions to mitigate resistance, increase the likelihood of HIT adoption, and ensure the continuous use of HIT. With the rising cost of healthcare (Einav, Finkelstein, & Mahoney, 2018; Kohli, Devaraj, & Ow, 2012) and considering that IT investments represent a substantial percent of organisations budgets (Chaudhry et al., 2006; Joia, Gradwohl de Macêdo, & Gaete de Oliveira, 2014), understanding user resistance and the antecedents of user perception is crucial since resistance is a major obstacle to HIT implementation (Kruse, Kristof, Jones, Mitchell, & Martinez, 2016).

## Theoretical background

This section will define user resistance, provide an overview of prior user resistance research, discuss the different user resistance behaviours, and give an overview of user resistance theories.

### *Understanding user resistance*

It is important to clearly define the phenomenon under study to give meanings to words and to manage readers' expectations (Dunleavy, 2003; Eisenhardt, 1989). Hence, in this section, user resistance is defined. The term resistance is a transdisciplinary issue that has been used across IS reference disciplines, including psychology, sociology, and change management (e.g. Hollander & Einwohner, 2004). Therefore, in order to understand the subject, it is necessary to define user resistance more precisely. There are a number of different definitions for user resistance in the IS literature. However, for the purposes of this paper, user resistance is defined as: 'the behavioural expression of a user's opposition to change(s) associated with IS implementation' (Alohali, O'Connor, & Carton, 2018, p. 5). This definition is apt as it describes user resistance as a behaviour that negatively affects IS implementation. Therefore, it will support the intended topic of user resistance to HIT.

There are different types of user resistance behaviour. Resistance behaviours can be covert or overt; thus, it is vital for researchers and organisation managers to understand the different types of user resistance behaviours in order to overcome the problem and implement the appropriate implementation strategy (Lapointe & Rivard, 2005). On the one hand, covert resistance behaviour is when users show inaction or a lack of interest in the new system (Coetsee, 1999; Lapointe & Rivard, 2005; Selander & Henfridsson, 2012). Furthermore, users exhibiting covert resistance will try to distance themselves from the situation or use humour to describe their displeasure with the system (Lapointe & Beaudry, 2014; Laumer & Eckhardt, 2012). Covert resistance is a problem for large organisations because it is hard to recognise and will prevent organisations from getting the most out of their employees and the new system (Lapointe & Beaudry, 2014).

On the other hand, overt resistance behaviour can range from passive to active to aggressive resistance (Lapointe & Rivard, 2005). First, passive resistance behaviour is a mild form of opposition to change where users slow down changes by persisting in their use of the previous behaviours (Coetsee, 1999; Lapointe & Rivard, 2005). For example, users will intentionally miss system training sessions, delay finishing assigned tasks, and make an argument in favour of the advantages of using the old system (Lapointe & Rivard, 2005; Meissonier & Houzé, 2010). Second, in active resistance behaviour, users practice strong but not destructive behaviours (Coetsee, 1999), such as forcefully complaining about the new system, refusing to use the new system, and not complying with managers' requests (Lapointe & Rivard, 2005; Lapointe & Beaudry, 2014). Lastly, aggressive resistance is the most extreme type of resistance; users resort to disruptive and destructive behaviours with the objective of blocking the situation and preventing the implementation of the new system (Meissonier & Houzé, 2010; Rivard & Lapointe, 2012). Organisations must understand the differences between the different user resistance behaviours to be able to respond to the resistance. Moreover, it is important for researchers to understand the different types of resistance behaviour as it will help them to identify user resistance when conducting their research.

## **Overview of user resistance theory**

This section presents common themes in existing user resistance theory and explains how this study extends user resistance literature.

There are various perspective theories on user resistance that have improved our understanding of this complex phenomenon. Largely, people feel stressful and fearful of change, and a new IT event such as HIT implementation exposes users' tendencies to dislike change (Laumer et al., 2016b; Marakas & Hornik, 1996). Several user resistance theories explain how users evaluate change and decide to resist (e.g. Joshi, 1991; Kim & Kankanhalli, 2009; Klaus & Blanton, 2010; Laumer et al., 2016b; Marakas & Hornik, 1996). Earlier models of user resistance suggested that individuals evaluate the change in terms of inputs and outcomes (e.g. Joshi, 1991). If individuals believe that the outcomes are less than the inputs, they will resist the change (Joshi, 1991). However, it is difficult to measure change with only inputs and outputs. To combat this difficulty, recent user resistance models have explained that users evaluate change by determining the switching benefits and switching costs (Kim & Kankanhalli, 2009) and by evaluating their situation compared with other employees in similar positions (Klaus & Blanton, 2010).

Moreover, a significant number of user resistance theories consider the role of user perception as an important factor in user resistance. For instance, some theories have suggested that user resistance is shaped by perceived threat (Bhattacharjee & Hikmet, 2007; Lapointe & Rivard, 2005; Lin et al., 2012), perceived value (Samhan & Joshi, 2017), perceived compatibility (Bhattacharjee & Hikmet, 2007; Laumer et al., 2016a), and perceived dissatisfaction (Ngafeeson & Midha, 2014). These theories have indicated that users will resist the new system when they perceive it as a threat or perceive that it will have a negative impact on them, their work, or their position within the organisation.

Some theories have indicated that user perception is a subjective process that develops through the interaction between initial conditions and an object of disturbance, such as a new system (Lapointe & Rivard, 2005; Laumer et al., 2016a). Few researchers have attempted to examine the initial conditions that lead the user to perceive a system negatively. For example, Laumer et al. (2016b) explained that personality traits such as routine seeking, emotional reaction, short-term focus, and cognitive rigidity are some of the conditions that directly affect how users perceive new systems and decide whether to resist or accept them.

This research will propose a model (Figure 2) and will identify the antecedents that impact perceived threats. In addition, the research will deconstruct how physicians and nurses might perceive the implementation of new HIT as a threat. The developed model builds on and extends user resistance theoretical models, such as models of Bhattacharjee and Hikmet (2007), who theorised that the perceived threat of HIT is a key element of user resistance to HIT. In short, the model examines the antecedent of physicians and nurses' perception of HIT. In the next section, the model of the antecedent of a perceived threat to HIT is introduced.

## **Model development (the antecedent of perceived threat to HIT)**

On the basis of Bhattacharjee and Hikmet (2007), it is theorised that user resistance to HIT will be influenced by their perception of HIT as a threat. Due to an extension in prior work, this paper identifies the antecedents of perceived threats to HIT and examines how

physicians and nurses perceive HIT as a threat. User resistance literature suggests that there are four major factors influencing user perception and user resistance to technology; they are personal factors, organisational factors, system factors, and factors related to the interaction between the people, the system, and the organisation. Each factor is subsequently discussed.

### ***Personal factors***

In the context of this study, personal factors refer to internal and external aspects of people, such as their personality traits, cognitive style, demographics, and education (Markus, 1983). The effect of personal factors and individual characteristics on user perception and attitude are well recognised in IS literature (e.g. Hawryszkiewicz & Binsawad, 2018; Robb & Shellenbarger, 2014). User perception of the technology can be influenced by a number of individual characteristics, such as confidence level with the technology, background, and social environment (Klaus & Blanton, 2010; Laumer et al., 2016b). The complexity of HITs makes it crucial for users to be comfortable with using computers (Bhattacharjee & Sanford, 2006). Studies have indicated that users who are more familiar with HIT feel more confident when using the system (e.g. Bhattacharjee & Sanford, 2006; Robb & Shellenbarger, 2014). In contrast, users who did not believe in their ability to use the system felt emotional, anxious, and uncomfortable in the workplace and were more likely to resist the system (Esmailzadeh et al., 2015; Poon et al., 2006). This study aims to identify and explain how personal factors can cause physicians and nurses to perceive HIT systems as a threat.

### ***Organisational factors***

Organisational factors, in this study, refer to factors related to the culture, structure, or management of the organisation (Ali et al., 2016). IS literature shows that large IT projects, such as HIT, lead to some significant changes in organisations, such as changes in culture, the job structure, and the work routines of employees (e.g. Bhattacharjee, Davis, & Hikmet, 2013; Laumer et al., 2016a; Maier, Laumer, Eckhardt, & Weitzel, 2013). Employees will resist these changes if organisations are unable to manage change or encourage their employees to accept changes (Dezdar & Ainin, 2011; Ludwick & Doucette, 2009). Active and supportive managers that motivate employees, communicate openly and honestly, lead by example, and involve the employee in decision-making are critical to the success of HIT implementation and user satisfaction. (Boonstra & Broekhuis, 2010; Grublješič & Jaklič, 2015). Typically, managing change associated with the implementation of HIT is complicated. Lapointe and Rivard (2005) argue that physicians and nurses tend to be sensitive about changes in the work environment, thus making it difficult to implement HIT in hospitals. This study aims to identify organisational factors and explains how these factors can lead physicians and nurses to perceive a HIT system as a threat.

### ***HIT-related factors***

HIT-related factors refer to factors related to the system itself. In IS literature, factors related to the system itself include the design of the interface, the reliability of the system, complexity of the system, compatibility of the system with the existing work requirements, and the security

of the system. These all influence users' perceptions and behaviours (Angst & Agarwal, 2009; Bhattacharjee et al., 2013). In a healthcare context, physicians and nurses work in an intense environment; they are often overworked and under constant stress (Silver, 2016; Wen et al., 2016). Therefore, it is very likely that complex, unreliable, and incompatible HIT will increase users' mental workload, cause frustration, and lead to resistance (Boonstra & Broekhuis, 2010; Gagnon et al., 2016). The HIT factors are subjective and depend on the users' abilities to use technology and their practical experience with it. It can be said that physicians and nurses who are more familiar with HIT are more likely to find it easy to use and will find it quite useful (O' Connor & O' Reilly, 2018). This study aims to identify HIT-related factors and explain how these factors can lead physicians and nurses to perceive HIT as a threat.

### **Interaction factors**

Interaction factors refer to factors related to the interaction between characteristics that is related to the people, the organisation, and HIT (Markus, 1983). The introduction of large IT projects, such as HIT, changes the dynamic of the organisation and can lead to changes in the relationship between physicians and nurses (Lapointe & Rivard, 2005; Laumer et al., 2016a; Markus, 1983; Menachemi, Rahurkar, & Tarver, 2015). Interaction factors are the factors related to the interaction between people. For example, in IS literature, social influences (such as colleagues' opinions) are a key predictor of user behaviour (Eckhardt et al., 2009). Moreover, research suggests that colleagues' opinions are one of the most important references for people in terms of their opinion about HIT (Kim & Kankanhalli, 2009). At the same time, interaction factors could be related to the interaction between the organisation and the people. For instance, IS literature discusses trust as an essential component of the relationship between employees, the organisation, and leaders (Oreg, 2003). Furthermore, it is argued that trust has a direct effect on individuals' behaviours and intentions (Boonstra & Broekhuis, 2010; Wu et al., 2008). Studies have shown that an increase in trust between employees and the organisation is more likely to lead to an increase and willingness to accept organisational decisions and to decrease the likelihood of conflicts (Oreg, 2003). This study aims to identify the interaction factors that cause physicians and nurses to perceive a HIT system as a threat and to adopt a stance of user resistance.

### **Perceived threats**

Perceived threats can be defined as users' fear of HIT implementation because of expected negative consequences (Bhattacharjee & Hikmet, 2007; Lapointe & Rivard, 2005). Researchers have suggested that perceived threats can lead to emotional pain and perception of a dangerous situation; thus, it is considered a major cause of user resistance (e.g. Bhattacharjee & Hikmet, 2007; Hsieh, 2015; Lapointe & Rivard, 2005; Lin et al., 2012). IS researchers have explored a number of perceived threats that lead to user resistance. For example, some users perceive IT as a threat because of fear for the security of their job (Meissonier & Houz , 2010), fear of losing power (Lapointe & Rivard, 2005), fear of changes in their work routine and habits (Lin et al., 2012), loss of status (Klaus & Blanton, 2010), loss of control over strategic organisational resources (Bhattacharjee & Hikmet, 2007), and loss of revenue (Hsieh, 2015). In a healthcare context, physicians and nurses are sensitive to the possible risks of HIT, such as the fear that HIT will negatively impact their



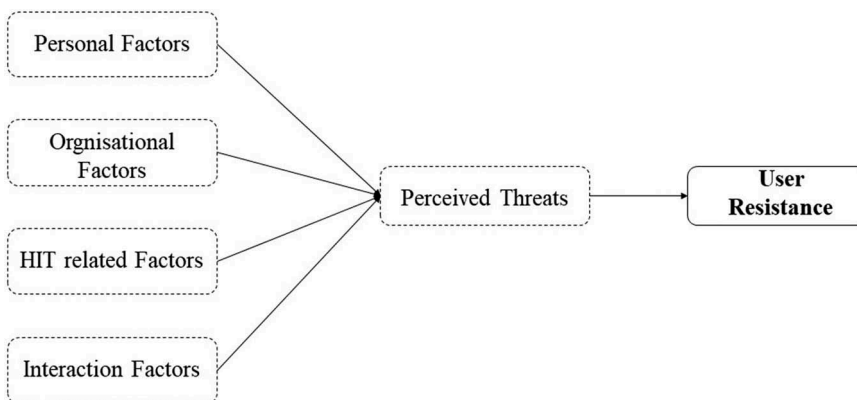
job performance (Phichitchaisopa & Naenna, 2013) or the fear that system flaws can put patients at risk (Cocosila, Archer, & Yuan, 2009; Smith et al., 2014). This study will aim to identify perceived threats to HIT and explain these threats.

To summarise, the literature indicated that perceived threats are influenced by personal factors, organisational factors, HIT-related factors, and factors related to the interactions among physicians, nurses, and their organisations (Figure 1). Subsequent sections identify these factors in detail.

## Methodology

A single exploratory case study approach was used to meet the objective of this study – to investigate the circumstances that make physicians and nurses perceive HIT as a threat, leading to user resistance – and to develop theories from qualitative data (Eisenhardt, 1989). The case consists of a large hospital in the Middle East that has implemented and used HIT for less than a year, allowing physicians and nurses to retrieve or enter patients' data, enter and observe treatment plans, and request and obtain test results. The research context and the case study will be presented in detail later.

To answer the research questions and to understand people's complex, ambivalent, and changing behaviours, a rich data set is required. Previous studies used quantitative methods to study user resistance, while those studies have answered what influence user resistance (e.g. Bhattacharjee & Hikmet, 2007; Klaus & Blanton, 2010), this study examine why some people chose to resist a system. Moreover, user resistance can be best observed and analysed using qualitative methods. User resistance can be covert or overt (Lapointe & Beaudry, 2014; Selander & Henfridsson, 2012), requiring a nuanced qualitative approach which captures meaning by allowing the staff to express resistance without obstructing the organisation (Cassell & Symon, 2004). Hence, a qualitative research method was selected to answer the research questions. A qualitative research method can produce data from which processes, relationships, and richer explanations about how and why processes and outcomes, such as user resistance, can occur (Bhattacharjee, 2012a; Cassell & Symon, 2004).



**Figure 1.** The antecedents of perceived threats and user resistance.



This research will examine the antecedents of the perceived threats and user resistance after the implementation (6–12 months after initial adoption). User resistance before implementation and during the early stages of implementation is very high and well documented because of the widespread disruption of existing processes (Meissonier & Houz , 2010). Furthermore, a dearth of research focuses on the phase after implementation (Alohalı et al., 2018), and by addressing this gap in existing research, we will be able to examine the longer term and non-implementation related factors that could lead to user resistance and potential system abandonment (Eden, Sedera, & Tan, 2014; Fryling, 2015).

A large public hospital was chosen due to several unique characteristics. For example, there is likely to be internal tension in a hospital where physicians and nurses have professional autonomy while administrative support is managed more bureaucratically (Southon, Sauer, & Dampney, 1999; Walter & Lopez, 2008). For that reason, physicians and nurses might believe that a HIT would threaten their professional autonomy; as a result, they might be more likely to resist (Walter & Lopez, 2008). In public hospitals, physicians and nurses receive their salary from the government and not the hospital. Therefore, some physicians and nurses might feel less allegiance to the hospital and its HIT initiatives and be more likely to resist (Bhattacharjee et al., 2013). This may also be the reason why people working in a public environment tend to resist change (Agasisti, Catalano, & Erbacchi, 2018). When selecting a HIT, public organisations prefer the most economically suitable option, even though it might not always be the best. Hence, a HIT might not be a good fit for the hospital and is likely to face resistance (Boonstra, Versluis, & Vos, 2014). For these reasons, a public hospital was selected for this research since it will be more likely to face resistance to HIT, thus serving the purpose of this study.

## Case description

The case study was conducted at Multipublic Hospital (a pseudonym) in the Middle East. The hospital has a capacity of 800+ beds and provides primary to tertiary care to all patients of the region. In 2012, the hospital decided to implement a new HIT to reduce medical errors, lower healthcare delivery costs, and improve management of service. The hospital formed a multidisciplinary committee of department managers, physicians, nurses, and IT professionals to evaluate HITs on the market and identify the most suitable HIT for the hospital. After an exhaustive search, the committee selected an Electronic Health Records (EHR) system called Birtex (a pseudonym). The system was unknown to most of the staff in the hospital, but the committee considered the system to be affordable and a good fit for the hospital.

Birtex was first introduced to the hospital in 2014; it allowed physicians to enter, track, and retrieve laboratory results, X-rays, and pharmaceutical orders. However, Birtex contained four separate systems. The main system was Birtex, which could only be accessed by physicians, and it allowed them to request labs, X-rays, and pharmaceutical orders. The second system, BirtexTrack, could only be accessed by nurses, and it allowed them to view patients' information and to see the labs, X-rays, and medications ordered by physicians but not to see the results of these orders. The third system, BirtexView, could only be accessed by certain physicians, and it allowed them to view patients' X-rays. The fourth system, BirtexLab, could only be accessed by certain physicians, and it allowed them to view the lab results of the patients. But the hospital was not fully paperless, and physicians and

nurses had to rely on paper for important information, such as their exam, interview, and ER sheets. Physicians and nurses therefore had to use paper along with Birtex.

Early in 2018, the hospital introduced BirtexNG (New Generation), which allowed the hospital to become completely paperless. The four separate components were also integrated to become a single system. Also, it allowed physicians and nurses to enter and retrieve their notes through the system. These notes contained patients' information, such as their tests, anaesthesia, information about what they were eating and drinking, and their medications. This was considered a significant update to the existing HIT and managers were sure that this update would improve the quality of the hospital.

However, BirtexNG had numerous technical problems and was not received positively among physicians and nurses; it generated strong reactions. Many physicians and nurses complained and criticised the system publicly and in official meetings. A few months after BirtexNG was introduced, the hospital decided to temporarily suspend the system and revert to the older version of Birtex. The hospital's plan was to fix the problems experienced by BirtexNG users and address physicians' and nurses' complaints, gradually moving from Birtex to BirtexNG. However, in late 2018, the hospital announced that it was going to completely abandon Birtex and look for a new system. Early in 2019, the hospital announced that it had signed a contract with a different reputable HIT vendor that is known worldwide and popular among physicians and nurses.

### **Data collection**

Data were collected between May and June of 2018. Data sources were semistructured interviews with physicians and nurses in a public hospital. The interview guide for the semistructured interviews was formulated using the factors presented in the conceptual model (the interview guide appears in Appendix A). Semistructured interviews were chosen because they provide a platform for instant feedback and follow-up of questions during the interaction between the researchers and the respondents (Myers & Newman, 2007).

Furthermore, semistructured interviews provide valuable insights into the participants' perception of HIT and allowed the researchers to comprehend the perception of physicians and nurses and the conditions that led them to view the HIT negatively. As this research examines user resistance from a post-implementation perspective, data was collected six to twelve months after the deployment of HIT. This will allow users to reevaluate their initial perception of the system based on their direct interaction and actual experience with the system (Orlikowski & Gash, 1994; Saeed, Abdinnour, Lengnick-Hall, & Lengnick-Hall, 2010). They will thus provide researchers with an opportunity to study the actual causes of user resistance. A snowball sampling strategy was used to identify subsequent respondents, where each initial respondent was asked to suggest other physicians and nurses working in the hospital. The respondents were physicians and nurses who are familiar with the hospitals' HIT and represented a subset of the hospital population. In total, 15 physicians and 15 nurses across four different departments were interviewed. The name and location of the hospital are kept private to protect the privacy of the hospital and the participants.

## Data analysis

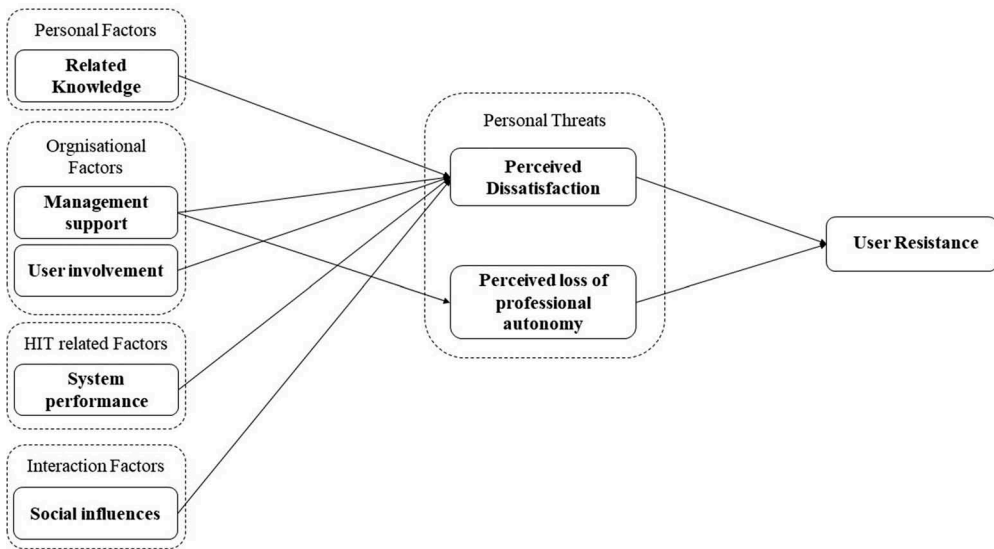
Data were analysed qualitatively based on the recommendations of Strauss and Corbin (1997): three coding procedures were used in the process of analysing qualitative data, which are open coding, axial coding, and selective coding. This approach allows for flexibility and rigour, which is required for research study engaged in theory building and provides a structured approach for analysing the phenomenon of interest (Day, Junglas, & Silva, 2009); thus, it was considered appropriate for this research.

After the transcription of the audio files, the data analysis was initiated by using open coding with NVivo 9.0, which assisted in the analysis of the data and identifying themes for analysis. Each interview was analysed on a line-by-line basis and composed into codes that surmised our understanding and interpretation of the data. Afterwards, codes were grouped based on abstract categories through an analysis of similarities and differences across all interviews.

Axial coding was then applied simultaneously with open coding (Bhattacharjee, 2012b; Strauss & Corbin, 1997). At this stage, categories were refined and linked with subcategories using the coding paradigm model suggested by Strauss and Corbin (1997). During this phase, emerging themes were noted. The coding paradigm model allows researchers to think systematically about their data so that they can relate pieces of the data to other pieces (Strauss & Corbin, 1997). In the last stage of the analysis, selective coding was used. At this stage, the potential core categories were identified; then, the core categories were related to categories that accrued in the axial coding. A coherent picture of the phenomena emerged after cross-validating the core category against the raw data.

## Findings

The analysis of the data revealed that physicians and nurses at Multipublic Hospital exhibited signs of resistance towards HIT. Several forms of resistant behaviour emerged during interviews, such as scepticism that HIT can or has improved the delivery of healthcare or reduced physicians' and nurses' stress and workload. The scepticism and stress are considered an attitudinal and emotional response, which is a manifestation of resistance behaviour. As discussed previously, resistance can be covert, passive, active, or aggressive. In this case, physicians and nurses showed a passive and active form of resistance, as some users forcefully and publicly complained about the system and many physicians and nurses were uncooperative – not attending HIT training sessions, which eventually led to system abandonment. Identifying perceived threats was not easy because physicians and nurses were often hesitant to express their true and honest feelings towards HIT during interviews and often communicated indirectly, through humour or referencing others to describe their dissatisfaction with the system. This is to be expected when studying complex phenomena such as user resistance, where the staff would not want to appear obstructive to the organisation. The analysis of the data indicate that dissatisfaction and perceived loss of professional autonomy are the main perceived threats to HIT, and five core categories emerged as antecedents to the perceived dissatisfaction and perceived loss of professional autonomy: (1) related knowledge, (2) management support, (3) user involvement, (4) system performance, and (5) social influences. The findings are subsequently presented in more detail (see [Figure 2](#)).



**Figure 2.** The antecedents of perceived threats and user resistance.

### **Personal factors: related knowledge**

The analysis of the data shows that the related knowledge of physicians and nurses influenced their perceived dissatisfaction, where physicians and nurses who do not have related knowledge of HIT are more likely to perceive HIT negatively (a sample of the chain of evidence linking related knowledge with perceived dissatisfaction appears in Appendix B). In the context of this study, related knowledge is referred to as the previous experience of users with HIT and their understanding of HIT concepts. On the one hand, the data shows that physicians and nurses who have used HIT previously are more likely to accept it. For example, during interviews, a nurse explained that she was happy with the hospital's HIT because she had used a similar one before joining the hospital.

*'I used a similar system to the one we have here, so I quickly learned how to use this system. So for me, this is better; the system is good.'* (Nurse 6)

Furthermore, the analysis shows that physicians and nurses who are confident with their IT skills and use technology on a regular basis like HIT and felt more confident using it.

*'You know now, as of this time, a lot of people are very good with technology. They can get it [learn how to use HIT] in a second – smart people with good computers skills.'* (Nurse 13)

On the other hand, physicians and nurses who did not have good IT skills and had no prior experience with HIT were dissatisfied with the system. One of the physicians explained that physicians with low IT skills were not happy with HIT.

*'We have another doctor that has been in the department for a long time, maybe 60 years. She can't type; she's not used to it. She's so slow, so she did not like the system and complained a lot.'* (Physician 6)

Therefore, related knowledge influences users' perception; physicians and nurses who have low IT skills and have no prior experience with HIT felt dissatisfied with the system.

### **Organisational factors: management support**

Management support refers in the context of this study to the degree to which managers are willing to provide the necessary resources, authority, and power that are important for a successful HIT implementation, such as motivation and training. The analysis of the data indicates that management support is negatively linked with perceived dissatisfaction and perceived loss of professional autonomy, where the less management support is provided to physicians and nurses, the more likely they are to have perceived dissatisfaction and perceived loss of professional autonomy (a sample of the chain of evidence linking management support with perceived dissatisfaction and perceived loss of professional autonomy appears in Appendix B). Some physicians and nurses felt that they did not receive strong management support to help them adapt and accommodate to the changes brought on by the new HIT. One physician said:

*'We are already under a lot of stress and we are overworked; we need extra time to adjust to the system. So they should introduce the change gradually and in a friendly environment considering our situation.'* (Physician 5)

Further, many felt that they did not have enough training for the new HIT.

*'I think they need to bring specialists to sit with us and give full instructions about the system.'* (Nurse 14)

Additionally, the system restrictions that management placed caused some physicians and nurses to feel that they were not trusted by management because they no longer had the privilege to access certain parts of the HIT.

*'Some people might feel that they are not trusted because of these restrictions [to HIT].'* (Physician 12)

The lack of support shown by management caused physicians and nurses to be dissatisfied with the system and caused some to feel that they no longer had the professional autonomy they needed to perform their job quickly and effectively.

### **Organisational factors: user involvement**

User involvement refers in this study to the participation of the users or their representatives in the development and implementation process of HIT. The results show that there is a negative link between user involvement and physicians' and nurses' perceived dissatisfaction, where the lower the user involvement is, the more likely the perceived dissatisfaction (a sample of the chain of evidence linking user involvement with perceived dissatisfaction appears in Appendix B). In a large IT project such as HIT, user involvement gives the user a feeling of control over the development and implementation of the system and helps the user develop realistic expectations for the system. However, in this case study, physicians and nurses felt that they were left out of the decision making. One physician expressed his dissatisfaction with not being involved in the development process of HIT by saying:

*'I think that before they make any changes, they have to discuss it with us and take our requirements. They have to ask people on the front line, the people who use the system on a daily basis.'* (Physician 2)

Furthermore, a lack of user involvement caused some physicians and nurses to feel that they were not appreciated because they were not involved in making big decisions that will affect their work, such as HIT implementation.

*'I think if they ask, we can give some good suggestions. It will make us feel better, feel like you are worth something (laugh).'* (Nurse 2)

The lack of user involvement caused physicians and nurses to feel dissatisfied with the system, as they felt they did not have a chance to give suggestions and explain what they need in a HIT. All these causes led physicians and nurses to be dissatisfied and to have a feeling of irritation and frustration with the HIT.

### **HIT-related factors: system performance**

System performance refers in the context of this study to the ability of HIT to accomplish the task required quickly, accurately, and efficiently. The data analysis indicates that system performance is strongly linked with perceived dissatisfaction, where bad system performance leads to a higher likelihood that physicians and nurses will be dissatisfied with HIT (a sample of the chain of evidence linking system performance with perceived dissatisfaction appears in Appendix B). In this case, physicians and nurses felt that HIT was not performing the tasks they needed quickly, accurately, and efficiently.

*'The system is slow, so our progress is very slow. Sometimes there are many patients waiting to see the doctor, and the patients don't know what's happening; we are the ones who suffer. But, them too, they can suffer from delayed doctor appointments, for example.'* (Physician 7)

In large hospitals, such as the hospital in this case study, HIT must have the capacity to handle a large number of transactions. Furthermore, it must be able to handle important transactions, such as retrieving patients' information, quickly. Slow HIT or HIT that crashes a lot could slow the progress of physicians and nurses, and in critical situations, it can put patients' lives at risk.

*'I encounter some difficulties in the system; like, for example, sometimes there is system downtime, sometimes it's a very long wait before the software opens. So sometimes the patients have to wait until we fix the system.'* (Nurse 13)

Furthermore, some physicians and nurses felt that HIT affected their relationship with patients because it increased waiting times for patients.

*'The system can break down sometimes; then we're waiting for the system to be fixed in order to receive the patient. So they get upset, then we get upset.'* (Physician 6)

These problems caused physicians and nurses to be dissatisfied with the system because it negatively impacted their work. Furthermore, it caused frustration and irritation with HIT, and it had a negative impact on their relationship with their patients.

### **Interaction factors: social influences**

Social influences refer in the context of this study to the extent to which users' attitudes and behaviours are impacted or influenced by other people's opinions regarding HIT. Social influences are considered an interaction factor because they are related to personal and HIT factors. The findings of this case study revealed that social influences led to physicians' and nurses' perceived dissatisfaction (a sample of the chain of evidence linking social influences with perceived dissatisfaction appears in Appendix B). The findings suggest that physicians and nurses can be influenced by their co-workers, colleagues working at other hospitals, and by the reputation of HIT itself. When these groups have

a negative perception of HIT, then it is more likely that physicians and nurses will be dissatisfied with HIT. Mostly, physicians and nurses consider HIT an important part of their work and life. Therefore, they are regularly talking about it.

*'we discuss the system among ourselves; it is something that we care about.'* (physician 6)

These talks lead to system comparison. If physicians and nurses believe that the HIT in their hospital is inferior to the HIT that is being used by their colleagues at other hospitals, then they are likely to be dissatisfied with the system.

*'I know that other hospitals have this feature in their system: they can access patient files and request what they need from anywhere they like. I have one of my friends working in another hospital, and he can access the system and check on his patients even when he travels outside the country. Our system should have something like this; it makes things easier.'* (Physician 4)

The physician thought the HIT in their hospital lacked the essential and useful features that other hospitals had, which led them to be dissatisfied with their HIT.

Also, the reputation of HIT will influence physicians and nurses. HITs with a bad reputation or unknown HITs are likely to have a bad influence on physicians and nurses.

*'I think that's true [user resistance to HIT] with systems that aren't well-known. That's not the case when the doctor is told that [a famous system] will be brought. Maybe, that was the case in [Hospital X]. The system they brought was a Korean system that nobody knew or heard anything about. So there was maybe apprehension about it. This time, the [new] system has a good reputation. So we are excited to use it.'* (Physician 2)

The unfavourable opinion of colleagues towards a HIT, system comparison, and a HIT with a bad reputation will lead physicians and nurses to be dissatisfied with HIT.

### **Perceived threat: perceived dissatisfaction**

Perceived dissatisfaction refers in this study to frustration and irritation caused by HIT. The analysis of the data shows that physicians' and nurses' perceived dissatisfaction of HIT directly impacts user resistance, where the more physicians and nurses were dissatisfied, the more likely they were to resist (a sample of the chain of evidence linking perceived dissatisfaction with user resistance appears in Appendix B). Some physicians and nurses were not happy with HIT and felt that it increased their stress level. This is exemplified in the following comments:

*'I want a decent thing that is able to progress my work; I don't want a system that I can't log in to because of constant lagging. It might have some slight lagging or delay, but it's not working at all! That's a little hard.'* (Physician 1)

Others felt that the system was increasing their workload rather than decreasing it. This was frustrating for some as they believed that HIT would decrease their workload and make them more productive.

*'Technology should make things easier not harder. What bothers me is that if a thing reaches a certain price, a very high price, and has an advanced technology and all of this and in the end, it lags! And we have to wait for it to be fixed!'* (Nurse 9)

The last HIT the hospital implemented was not received positively among physicians and nurses. It generated strong reactions as they expected that the HIT upgrades were going to improve their work. When it did not, many physicians and nurses complained



and criticised the system publicly and in official meetings, which eventually led hospital managers to completely abandon their HIT and search for a new one.

### **Perceived threat: perceived loss of professional autonomy**

A perceived loss of professional autonomy refers in this study to physicians' and nurses' fear that HIT implementation will reduce their authority and freedom to make decisions. The analysis of the data shows that physicians' and nurses' perceived loss of professional autonomy of HIT directly impacts user resistance, where the more physicians and nurses perceived loss of professional autonomy, the more likely they were to resist (a sample of the chain of evidence linking perceived loss of professional autonomy with user resistance is in Appendix B). Some physicians and nurses felt that they lost some authority and freedom to make decisions after HIT implementation. This is exemplified in the following comments:

*'We do not have access to the progress note, which is something we need. So sometimes when we are in the treatment room doing dressings and other things and we meet something we don't know, we want to go back and see what the doctor has written.'* (Nurse 15)

Many felt that HIT denied them access to patients' information when there was a need to make clinical decisions. Moreover, some felt that HIT slowed down their work because they had to wait for physicians or nurses with a higher authority to approve their clinical decisions or provide them with access to the required patient's information.

*'I think we know when the patients need new dressing, so we should be able to order it without going back to the doctor. It will make things go faster.'* (Nurse 10)

Furthermore, some physicians and nurses felt that system restrictions and lack of professional autonomy increased the workload and mental stress of physicians and nurses with more authority, such as consultants and registered nurses, because they not only had to do their own job but also had to approve others' orders as well.

*'If I see that the patient needs a sick leave, I still have to talk to the consultant. I'm not the one who's in trouble, but rather the consultant. For example, he would have patients, and I would call him every now and then to tell him that someone needs a referral.'* (Physician 5)

The physicians and nurses believed that this loss of professional autonomy slowed their progress, and it frustrated some physicians and nurses. Moreover, it increased the workload for consultants and registered nurses. These factors eventually led to user resistance.

## **Discussion and implications**

This paper investigates the circumstances that cause physicians and nurses to perceive HIT as a threat and to answer the research question: What are the organisational, personal, HIT-related, and interactional factors that lead physicians and nurses to perceive HIT as a threat? In doing so, a case study of a public hospital that uses HIT is presented. In this case study, physicians and nurses expressed both covert and overt resistance behaviour. The study developed a model to better understand the antecedent of the perceived threats to HIT and user resistance among physicians and nurses. Moreover, the study identifies two factors of perceived threat: perceived dissatisfaction and perceived loss of professional autonomy. The Bhattacharjee and Hikmet (2007) model was extended by deconstructing perceived threats and identifying the antecedents of perceived threats. In addition, the study investigates the role of the organisation, HIT, and the interaction between people, HIT, and the organisation

on physicians' and nurses' perception of HIT. While previous research showed the effects of user perception on user resistance to HIT (e.g. Bhattacharjee & Hikmet, 2007; Hsieh, 2015; Laumer et al., 2016b; Walter & Lopez, 2008), this study went further and investigated the antecedents of the perceived threat.

The main findings of the study explain that perceived dissatisfaction and perceived loss of professional autonomy are the primary perceived threats of HIT for physicians and nurses. These findings are in line with IS literature, which indicates that, in general, physicians have high professional autonomy, where they have the freedom to practice their work based on their individual judgement and without evaluation or oversight from others (Boonstra & Broekhuis, 2010; Boonstra et al., 2014; Lapointe & Rivard, 2005; Walter & Lopez, 2008). Several characteristics related to the culture of public organisation may explain why some physicians and nurses felt that HIT would lead to perceived loss of professional autonomy. In general, rigidity of hierarchies and the centralisation of power is common in public organisation (Bannister, 2001), these characteristics may have led physicians and nurses to believe that the hospitals' hierarchies are aiming to more centralisation of power by implementing HIT. Studies have shown that physicians are more likely to support elements that increase their professional autonomy and fight and resist elements that threaten their autonomy (Borkowski & Allen, 2003; Walter & Lopez, 2008). Furthermore, physicians are sensitive to any change that threatens their professional autonomy because it is considered to be a privilege that is associated with their social and economic status (Doolin, 2004; Esmaeilzadeh et al., 2015). This study shows that physicians and nurses are more likely to support elements that increase their professional autonomy and fight and resist elements that threaten their autonomy. While the restricted access to HIT was put forward by hospital management to protect patient's privacy and reduce medical errors, it is vital to consider how these restrictions could influence physicians' and nurses' perceptions of HIT. In this case study, the restricted access to HIT – which denied physicians and nurses access to certain information and prevented them from ordering certain medications without the approval of their superior – clearly frustrated them, reduced their professional autonomy, and led to user resistance. Organisation managers should regularly review these restriction to ensure that they are achieving the goal of these restriction and to limit their impact on physicians and nurses performance and professional autonomy.

Although various studies examine factors that affect user perception and user resistance (e.g. Bhattacharjee & Hikmet, 2007; Laumer et al., 2016a; Lin et al., 2012), we know little about the antecedents that affect perceived threats to HIT. Therefore, our results targeted this research gap and revealed that related knowledge, management support, user involvement, system performance, and social influences have a great impact on user perception and perceived threats – particularly, perceived dissatisfaction and perceived loss of professional autonomy.

The findings of this study indicate that management support is a vital way to help physicians and nurses to adapt to HIT while reducing user resistance. Managers should provide training, as well as provide the time for physicians and nurses to familiarise themselves with the functionality of the new system (Ali et al., 2016; Venkatesh et al., 2011). Management support does not only include user support, but it also includes

championing HIT itself. This means that managers should believe that HIT will improve their organisation and should push for the total use of technology with all types of users (Boonstra & Broekhuis, 2010). Some researchers have found that employee satisfaction, well being, motivation, and training is not valued in public organisation compared to other organisations such as private organisations (Alshmemri, Shahwan-Akl, & Maude, 2016; De Simone, Cicotto, Pinna, & Giustiniano, 2016; Haider, Bao, Larsen, & Draz, 2019), which in turn could explain why many physicians and nurses believed that they did not receive enough management support and were dissatisfied with HIT. Management support is one of the most important factors in a successful IS implementation, as it creates an environment that is ready for change (Adam Mahmood, Burn, Gemoets, & Jacquez, 2000). Managers should provide the resources, guidance, and motivation that is required for HIT implementation (Kim & Kankanhalli, 2009); all of these roles of managers are important in creating and influencing user perception regarding HIT.

Moreover, organisations can help reduce the effect of perceived threats of HIT on physicians and nurses by involving physicians and nurses in the decision-making process. The bureaucratic culture of public organisations may have influenced this factor, as the decision making is centralised and controlled by top management (Leidner & Kayworth, 2006; Nurdin, Stockdale, & Scheepers, 2010), hence explaining why some physicians and nurses felt that they were not involved in the decision and implementation process of HIT. A number of research studies indicate that user involvement gives users a feeling of control over the development and implementation of the system, helps the user to develop realistic expectations for the system, and commits the user to the system from the early stages of development (Baronas & Louis, 1988; Markus, 1983). User involvement has been credited with influencing users' perception of control and user satisfaction (Baronas & Louis, 1988; Turan, Tunç, & Zehir, 2015). Hence, this research indicated that in HIT implementation, an increase in user involvement would lead to a decrease in users perceiving HIT as a threat.

The results of this research align with previous literature which indicates that social influences, such as colleagues' opinions are one of the most important references for people when it comes to work-related issues, such as their opinion about HIT (Kim & Kankanhalli, 2009). Social influence has an impact on individuals' behaviours and motivation to use technology (Grublješič & Jaklič, 2015). Furthermore, social influence suggests that users will behave according to their beliefs of how other users might view them (Venkatesh et al., 2003). This suggests that social influence, especially colleagues' opinions, can influence user perception of technology (Kim & Kankanhalli, 2009). Additionally, external influences from outside the organisation (such as the reputation of the HIT) can influence physicians' and nurses' perceptions. In this case study, physicians and nurses were very disappointed that the hospital implemented an unknown HIT because they expected the hospital to implement a popular and well-known HIT. Organisation managers should consider the reputation of HIT they plan to implement and how it will affect physicians and nurses' perception of the technology. Further, they should seek to recruited active and influential physicians and nurses to champion HIT implementation and serve as a support their colleagues such champions could help reduce negative social influences. In brief, a favourable colleague opinion towards a new IS-related change can change their original negative perception of the change and reduce their uncertainty (Martins, Oliveira, & Popovič, 2014; Pichitchaisopa & Naenna, 2013) and unfavourable opinion of HIT.

### ***Theoretical implications***

This research offers several implications and contributions to theory. First, this research identifies the antecedents of the perceived threats and user resistance to HIT (Figure 2) and explains how these factors may influence user perception and resistance. The study is derived from Bhattacharjee and Hikmet (2007) model and examines in more detail the perceived threats of HIT among physicians and nurses. This research uncovers two main sources of perceived threats among physicians and nurses: perceived dissatisfaction and perceived loss of professional autonomy.

The study extends the body of literature by showing how organisational factors, the personal traits of the user, HIT-related factors, and the factors related to the interaction between physicians, nurses, and the organisation can influence how physicians and nurses can perceive HIT. Previous studies on user resistance have often neglected to explore the antecedents of user perception. This research fills this gap by taking a post-implementation perspective to examine how perceived threats are formed and extend our understanding of user resistance. The results of the study indicate that management support, user involvement, system performance, and social influences impact how physicians and nurses may perceive HIT.

### ***Practical implications***

The study has practical implications for managers and IT developers, especially in the healthcare sector. First, in a broad sense, knowing and understanding the factors that lead to perceived threats and user resistance will help managers to design resistance mitigation plans. Managers should develop appropriate strategies that reduce user resistance and dissatisfaction and maximise HIT adoption. Based on the findings in this research, it is recommended that managers should understand the source of user resistance and how users perceive the system. As indicated in this study, the five root causes of perceived threats and user resistance are related knowledge, lack of management support, lack of user involvement, bad system performance, and unfavourable social influences.

Managers should provide the required support to physicians and nurses so as to help them adapt to HIT, such as providing training and quickly resolving any HIT problem. Moreover, management support includes moral support, such as motivating users to use the system, communicating openly and honestly with users, and leading by example. Furthermore, the study shows the importance of user involvement on physicians' and nurses' perception of HIT. Hospital managers should seek to involve users as much as possible. This can be done through surveys that ask physicians and nurses about their opinion and by discussing future hospital plans with physicians and nurses during hospital and department meetings. Physicians' and nurses' involvement with the decision-making process and implementation of HIT will ensure several important factors that are critical for successful IT implementation and user satisfaction: giving the user a feeling of control over the development and implementation of the system, helping the user develop realistic expectations for the system, and committing the user to the system from the early stages of development. Finally, the study shows that managers should pay attention to problems with HIT and seek to develop and implement HIT that is able to

carry out the required tasks and transactions quickly and accurately. It is envisioned that if explicit attention is paid to the factors presented in this study, HIT resistance will be reduced among physicians and nurses.

### **Limitations and further research**

As is the case with every study, this study is not without its limitations. First, this is a single case study of user resistance to one specific HIT within a specific hospital. As a result, there might be differences in user resistance within different settings. Thus, the focus on one specific case limits the generalisability of our results to other contexts or domains. Second, this study only focuses on physicians and nurses as its focal group. In hospitals, physicians and nurses hold positions of hierarchical power; thus, they have more freedom than other employees and users to choose whether they adopt a given system. As a result, caution is required in generalising the findings to other domains or contexts. Finally, the research is of a qualitative nature, so the results are subject to interpretation.

To address this limitation, it is recommended that in future research, another study should expand the model. User resistance and user perception is a complex subject; this case study only covered part of the picture. A cross-case analysis of different hospital types such as private, military, and educational hospital will greatly improve our understanding of the phenomena. Moreover, a case study of system implementation in different settings that focuses on the different types of users would improve the external validity of the model. It is also recommended that future researchers test the model using quantitative methods to allow for the generalisability of the study. Future research can examine the difference between physicians' resistance and nurses' resistance. Furthermore, future research should also examine how organisational culture can cause users to dislike change. Additionally, researchers should study the role of managers' actions in leading to user resistance. Also, future researchers should examine how previous system implementation failure may influence user perception and user resistance.

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No potential conflict of interest was reported by the authors.

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## Appendix A

### Interview Guide

#### A: Introduction and Welcome:

- (1) Thank the interviewee for agreeing to the interview.
- (2) Briefly outline the purpose and importance of the research.
- (3) Ask The interviewee to sign the participant consent form.
- (4) Restate your commitment to anonymity and confidentiality of the interviewee and provide verbal assurances that nothing would be attributed to the interviewee or the organisation.
- (5) provide the interviewee with the opportunity to state any concerns or request additional information where clarification is required.

#### B: Demographic Questions:

- (1) Speciality:
- (2) Years of Experience:
- (3) Years of working with the organisation:

#### C: Open-ended interview questions:

- (1) Could you provide some background information on your daily work practices? What IT tools/ applications do you use?
- (2) Have you used a HIT (Name of the System) in another organisation?
- (3) What features of (Name of the System) do you use on a daily basis? What features do you not use and why?
- (4) Have you ever been involved in a discussion with your colleges over HIT? If so, what are the main points of the discussion pertaining to HIT?
- (5) What degree of change has the HIT had on your job? (For example: Change in the work routine, communication, control over how you make decisions) How does it make you feel?
- (6) Are there any changes or updates that happen to the system? Do you participate in changing the system? Do you think there is a need to change the system or some of its features? If yes what changes does the system need?
- (7) What measures can the organisation take to help you get more benefit from the system? (For example: continues training and updates to the system, support with any problems that come up with the system)
- (8) Are there any other issues about the adoption of a system that you perceive as important, but we have not discussed yet? What are they?

**Appendix B. Chain of Evidence.****Related Knowledge**

Physician 5 'Well, I don't have any problem with the system because I am good with computer. So, the system suits me very well. Sometimes, I hear doctors that complain about the system because they are not familiar with computers.'

Nurse 11 'I prefer the system, Maybe because we're millennial nurses.'

Nurse 9 'Even if I am good at this, if 'm not familiar. So, I need training. That's very important. Then I will be able to adjust'

**Management Support**

Nurse 1 'they [management] have to raise some awareness that there is a new system and it's used to do these tasks, and they have to teach me the interface of the system and it's features.'

Physician 11 'I do not want them [management of the hospital] to come one day and shock us by telling us that from next week you have to use the new system. This will be a huge shock for us. Even if they gave us training on the new system because training is different than reality. We need time to adjust to the system'  
Physician 4 'the doctors and nurses should take a day to acquaint themselves with the system in order to avoid problems and to reduce the miscommunication that might occur.'

**Management Support**

Physician 14 'I have faced some difficulties I have to communicate with the responsible department and the IT, so they can grant me some competences that I wasn't allowed before, such as some medications'

Physician 8 'It has [the system] a few drawbacks. For example, If I request a sample or an ECG for a patient who has a tumour, I have to fill a written form. So, there are limitations'

Nurse 13 'the system itself didn't update; they [management] only remove some authorities from us [chuckle]'

**User involvement**

Physician 6 'they should do a survey because we are the users, we are the ones who are supposed to benefit from it [the system]. The more we benefit from it, the more we can benefit the people'

Nurse 5 'they [management] should ask what we need in the system. At least by department, by department they can ask by department.'

Nurse 10 'they [management] have to ask us and get our feedback, check with the nurses, with the doctors; how is it going? We will give the feedback; the system will be better this way'

**System performance****Perceived Dissatisfaction**

Nurse 9 'since the system started, of course there were some difficulties, because I was learning. So, it was a difficult time, I was not happy with the system'

Physician 6 'Honestly, I was a little concerned, I read a little about it [the system] and tried to learn the system. But it was not easy, and I wasted a lot of times learning how to use it.'

**Perceived Dissatisfaction**

Nurse 6 'they [managers] did tutorials for anyone who has any question. But there are things that I haven't understood, they need to send someone to teach me how to deal with the system'

Physician 10 'there are some problems with the system, I emailed the IT about it, but it seems they have no intention to fixing it. Right now, I am forced to deal with these problems'

**Perceived Loss of Professional Autonomy**

Physician 13 'there are unnecessary restriction as well, for example I cannot refer a patient to a different department I mean if I wanted to refer my patient to a dermatologists I cannot do it, I have to ask the consultants to do it for me but I think we [residents] needs to have the ability to refer.'

Physician 14 'Even Vitamin D is restricted for me. I am surprised since we [doctors in the department] prescribe vitamin D every day. there are also some other problems that I tried and am still trying to find a solution to'

Nurse 5 'Before [the system] it is our privilege, like we can enter any laboratory. But now we don't have an access to enter anything, like lab. For laboratory results, we should at least view the results, I think it's our right to view it'

**Perceived Dissatisfaction**

Nurse 1 'The most important thing is to involve us, they [management] must make me part of the big picture, the idea of them coming and telling me that's a new system, start working on it, no. Involve me first'

Physician 8 'For the last year, I've noticed some flaws in the listening procedure. They [managers and IT department] would, for example, come to our department and listen to the limitations that concern us; we tell them we would like some things to change. However, they tell us: "That has to do with the administration. We can't change that". I don't feel that there is a collaboration or true listening.'

Physician 10 'the problem was we felt frustrated to be honest they [management] always said, meetings, meetings, meetings at last nothing happened, so frustration always there, we don't know if what we say [about the system] will be used or not'

**Perceived Dissatisfaction***(Continued)*

**Appendix B. (Continued).**

Nurse 11 'it happens a lot, when I log in then try to open some file and it's lagging or sometimes it's too slow to open'

Physician 13 'but sometimes even if I entered the medication at [the system], it shows me that the medication is out of stock, sometimes it is wrong even if the medicine is available it gives me this message'

Nurse 1 'The system hang a lot and sometimes there is unlisted information'

**Social influences**

Nurse 11 'my friends told me that their hospital, in front of every room, there is a laptop that they use to make a nursing track. We do not have this here'

Nurse 1 'We talk about the system among ourselves, we try to teach each other, it is something important for us.'

Physician 11 'I have worked in other hospitals. Compare with the one we have here in this hospital, I think those systems are much better. In terms of orders, and the ease of use. the system is causing big trouble for us'

**Perceived Dissatisfaction**

Nurse 1 'So it [the system] disappoint me a little, as this system lagged in important times. so, what do you think this lagging did do to us [sarcasm]?'

Nurse 7 'once the system is okay, that's the time we have to re-enter again, so it's double job for us,so, this would be a hard time'

Physician 5 'The flow isn't fast. You feel that there's time ... A bit wasted, yes.'

**Perceived Loss of Professional Autonomy**

Physician 13 'there are unnecessary restriction as well, for example I cannot refer a patient to a different department I mean if I wanted to refer my patient to a dermatologists I cannot do it, I have to ask the consultants to do it for me but I think we [residents] needs to have the ability to refer.'

Physician 7 'It's not me who's in trouble, but rather the consultant. For example, he would have patients and I would call him every now and then to tell him that someone needs a referral. Of course, I need to give him details as he's the one who will submit the referral using his name.'

Nurse 2 'Previously, we were able to enter patient's information and request some stuff, but they have removed that power and only left viewing. it's not ideal'.

Physician 1: 'I want a decent thing that is able to progress my work, I don't want a system that I can't log in to because of constant lagging, it might have some slight lagging or delay but it's not working at all, that's a little hard to accept'

Nurse 5 'To check the files I want to check like the procedure, or the examination that I have done before. That's always difficult'

Physician 14 'So, these are the issues that face us sometimes. Additionally, we sometimes find a problem prescribing medication or writing analyses. Sometimes, I am forced to write analyses 4-5 times because of the system malfunctioning. That's hard for me and the patients'

**Perceived Dissatisfaction**

Nurse 2 'I talk about the system with my colleagues. We would like the system to improve. Honestly, the discussion is mostly negative'

Physician 10 'I discussed the system with doctors, we talk about how can we shorten the time it takes, as if it there was shortcuts [sarcasm], always there is negative impressions, always'

Physician 3 'The system here isn't really good compared to the systems used in other hospitals. Since we know about the other system, we only talk about the drawbacks because we don't find the good features that we need in this system.'

**User Resistance**

Nurse 1 'sometimes, when you log in, then you open some file and it's too slow to open. That's why some people complain, we have more important things to do than wait for the system to open.'

Physician 5 'some people didn't like it. For example, people judge the system to be a failure only because of minor defects or problems about it.'

Nurse 12 'They shouldn't install the system all of a sudden and ask us to immediately start working with it that is why some people are resisting'

**User Resistance**

Nurse 4 'it was really difficult for doctors, they could not do all they want, like they could not give patients some medicine. So, they constantly complain to the managers about it, they are doubts about the system'

Nurse 2 'sometimes patients need analyses at that very moment. So, I find myself forced to talk to someone else that I don't know or someone from the emergency to do the job [without going through the system]. And some of them accept and others refuse; I do not have enough time to call people to get analysis for my patients'

Physician 15 'Honestly, I don't use the new system often, everything is restricted and has to be authorised by a consultant'