Arab American University

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Knowledge, Attitude, and Factors Influencing the Intention to Adopt Clinical Decision Support Systems among Palestinian Physicians in Governmental Hospitals: A Cross-Sectional Study

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Thesis Approval

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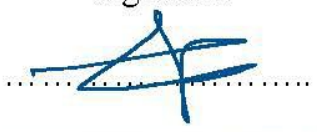
1. Dr. Shahenaz Najjar / Supervisor	
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Abstract

Introduction: One of the most popular emerging technologies in the healthcare sector is the clinical decision support system (CDSS), a feature provided by electronic health records. CDSS is any application used to aid decision making and provide knowledge regarding treatment, diagnosis, and laboratory testing. Despite the associated benefits, underutilization of CDSS is causing a global challenge. In Palestine no CDSS has been implemented yet, which necessitates exploring the acceptance and attitude level along with the possible factors influencing the intention to adopt CDSS.

Objective: To assess the general knowledge and attitude level about CDSS and its distribution by demographic characteristics. Also to determine the effect of performance expectancy (PE), effort expectancy (EE), computer self-efficacy level, level of involvement in decision making, perceived threat to professional autonomy, and social influence on the intention to adopt CDSS.

Methods: A validated questionnaire-based survey consisting of seven constructs with 41 items was used as a data collection tool. The constructs were derived from the modified unified theory of acceptance and use of technology (UTAUT). A total of 363 resident doctors and general practitioners (GPs) from three governmental hospitals served as a target population for this study. No eligibility criteria related to individual resident's characteristics was required. A total of 124 questionnaires were used to conduct the study.

Results: Majority of participants were males; accounting for 75% (n= 93), with mean years of experience = 2.9 years. The participants showed a moderate general knowledge level with a high intention to adopt CDSS, both of which weren't affected by demography, except for clinical experience which positively affected CDSS knowledge.

Our results showed significant effect of performance expectancy (p=0.000, r= 0.469), effort expectancy (p=0.001, r= 0.294), computer self-efficacy level (p=0.015, r= 0.218), perceived threat to professional autonomy (p=0.001, r = - 0.302), and social influence (p=0.047, r= 0.179) on the intention to adopt CDSS. On the other hand, level of involvement in decision making regarding CDSS didn't affect users' acceptance (p=0.123, r= 0.140).

Conclusion: This thesis provides the basis for successful implementation of CDSS in Palestinian settings. Despite the readiness of Palestinian physicians to adopt CDSS, careful and comprehensive implementation planning is needed. In this regard, several factors were identified as mediators of CDSS adoption, of which performance expectancy and perceived threat to professional autonomy have the strongest effect. Therefore, optimization of the CDSS performance and ensuring physicians' autonomy are needed to satisfy users' expectations and needs.

Key words: Clinical decision support system, Intention to adopt, Performance expectancy, Effort expectancy, Palestine, Attitude, Knowledge

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List of Abbreviations

AAU	Arab American University
ADE	Adverse drug event
CDSS	Clinical decision support system
CFA	Confirmatory factor analysis
CICU	Cardiac intensive care unit
CVD	Cardiovascular diseases
DDI	Drug- drug interaction
EE	Effort expectancy
E-health	Electronic health
EHR	Electronic health record
FPC	Finite population correction factor
GP	General practitioner
HRs	Health records
HIS	Health information system
HIT	Health information technology
IDT	Innovation diffusion theory
IT	Information technology
MM	Motivational method
MPCU	Model of personal computer utilization
NGOs	Nongovernmental organizations
PE	Performance expectancy
PMC	Palestine medical complex
PMOH	Palestinian Ministry of health
PSFHI	Patient Safety Friendly Hospital Initiative
SCT	Social cognitive theory
SD	Standard deviation
SPSS	Statistical Package for the Social Sciences
TAM	Technology adoption model
TPB	Theory of planned behavior
TRA	Theory of reasoned action
UAE	United Arab Emirates
UK	United Kingdom
UNRWA	United Nations Relief and Works Agency for Palestine Refugees
US	United states
USAID	U.S. Agency for International Development
UTAUT	Unified theory of acceptance and use of technology
VTE	Venous thromboembolism

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Statement of Original Authorship

I certify that this thesis was not submitted in order to get any other academic degree from any academic institution, but rather as partial fulfillment of the requirements for the Master's in Health Informatics at Arab American University.

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Signature: 

Chapter 1: Introduction

1.1 Background

Information technology (IT) has become one of the most powerful tools to help in providing quality health services (Esmaeilzadeh et al., 2015). The Medical field is becoming a very complex and dynamic field; medical data is expanding which necessitates appropriate manipulation, interpretation and analysis (Wasylewicz & Scheepers-Hoeks, 2018). Tremendous efforts have been made in recent years to improve the quality and quantity of the provided medical services in terms of efficiency and effectiveness. Advanced technologies played a crucial role in the healthcare sector as it helped introduce electronic health records (EHR) in the early 1990s; paved by the establishment of wireless connections and web-based software (*EMR: The Progress to 100% Electronic Medical Records*, n.d.). One of the most popular emerging technologies provided by the EHR is the clinical decision support system (CDSS) (Wasylewicz & Scheepers-Hoeks, 2018).

CDSS is any application that helps clinicians in implementing clinical guidelines at the point of care and aids decision-making in addition to providing knowledge regarding treatment, diagnosis, and laboratory testing (*New Release: Clinical Decision Support System Industry to Exhibit a CAGR of 21.5% in near Future - WhaTech*, n.d.). CDSS is not a new concept in the healthcare domain; the first CDSS, known as MYCIN, was developed in the early 1970s. This tool was created to help with infectious disease interventions. It contained over 600 rules for selecting appropriate antibiotics as well as treatment recommendations.

In terms of functionality, CDSS can be categorized into two groups; knowledge based and non-knowledge based CDSS. Knowledge based systems advice interventions using a predefined if-

then rule that integrates clinical information from patients' records, yielding individualized interventions regarding diagnosis, therapy, and medications. Whereas non-knowledge based employs machine learning modules to discover patterns from the entered data and provide medical advice accordingly (*Clinical Decision Support Systems (CDSS): Types and Benefits | AltexSoft*, n.d.). CDSS is usually incorporated into the health information system (HIS), where it provides guidance and person-specific information (*Clinical Decision Support | Agency for Healthcare Research and Quality*, n.d.).

CDSS plays a major role in decreasing medical errors and choosing the optimal treatment/diagnostic plans for patients, thus reinforcing patients' safety measures and improving the overall quality. As the Medical field is expanding, healthcare providers are required to have a great deal of knowledge about diagnosis and treatment. Even highly trained/skilled physicians require assistance at the point of care, particularly when the encountered cases are complicated; given the large number of patients and clinicians who might get exhausted.

CDSS interventions can be represented to the user in different forms, including: alerts and reminders, clinical guidelines, order sets, or patient data/reports (Campbell & James, 2013). There are two types of CDSS in terms of the provided interventions: passive and stand alone. The passive CDSS displays the intervention for users automatically, whereas the stand-alone CDSS (less preferred) offers clinical advice only if the user requests it (Sutton et al., 2020). The previously mentioned interventions can tackle various clinical areas, including: drug dosing, drug-drug interactions, calculators (body surface area, fluids, kidney function etc.), drug allergy alerts, medication ordering support, differential diagnosis, therapeutics, and laboratory/ radiology CDSS (Frisse, 1995, p.41).

1.2 Perceptions of CDSS and factors influencing possible adoption

Technology acceptance has been a true concern when implementing a new technology, especially in the healthcare sector. Successful implementation of any technology means user's acceptance and practical usage of the technology, which extends beyond the theoretical installation of these systems (Alqudah et al., 2021). Despite the associated benefits, underutilization of CDSS is causing a global challenge, even for facilities that have already installed a CDSS (Esmaeilzadeh et al., 2015; Jing et al., 2019; Laka et al., 2021; Porter et al., 2018; Sambasivan et al., 2012). Healthcare providers are the key players in adopting CDSS. Therefore, understanding factors' influencing their intention to adopt CDSS is essential for successful implementation. In an attempt to facilitate IT adoption and understand the determinants of adoption, several models were created to construct a framework for understanding users' acceptance. All of these models, share similar constructs, and users' adoption of healthcare technology is best explained using these models (Laka et al., 2021).One of the most popular models is "The unified theory of acceptance and use of technology" (UTAUT), developed in 2003 by Venkatesh and colleagues (Chao, 2019), shown in figure 1. The intention to embrace any technology is mostly influenced by four key components, according to this theoretical model, which was derived from eight earlier models. These previous models that make up the UTAUT are the theory of reasoned action [TRA](Ajzen & Fishbein, 1975), the theory of planned behavior [TPB] (Ajzen, 1985), innovation diffusion theory [IDT] (*(PDF) Diffusion of Innovations, by Everett Rogers (1995) | Bakani Ncube - Academia.Edu*, n.d.), the technology adoption model [TAM](*The Original Technology Acceptance Model TAM (Davis, 1989) | Download Scientific Diagram*, n.d.) , the combined TAM-TPB (Taylor & Todd, 1995), the model of personal computer utilization [MPCU] (Thompson et al., 1991), the motivational

method [MM] (Vallerand, 1997) and social cognitive theory [SCT])(Bandura, 1989; Compeau & Higgins, 1995). Integrating these eight theories yielded the UTAUT model that has these four key elements: effort and performance expectancy, social influence, and facilitating conditions (Chen & Zhou, 2016). A definition of each of the four elements will be provided in the second chapter and will be addressed again in section 2.7 (conceptual framework). Currently, UTAUT is the most frequently used model for explaining the adoption of CDSS by healthcare providers (Esmaeilzadeh et al., 2015; Jansen-Kosterink et al., 2021).When compared to other well-known models, UTAUT remains a better choice and the most reliable model to be implicated in the healthcare sector, and it is believed to be a strong predictor of users' IT adoption tendency (Alqudah et al., 2021; Esmaeilzadeh et al., 2015; Laka et al., 2021; Phichitchaisopa & Naenna, 2013; Sambasivan et al., 2012). The importance of the UTUAT model also stems from the fact that it was able to predict 70% of the intention to use IT, while the other models were able to explain only 40% of users' acceptance (Kijsanayotin et al., 2009; Magdi, 2013). Recent research highlighted the need to upgrade the existing model to make it more relevant for the healthcare industry, especially in developing countries. However, available research is still unable to completely identify the elements influencing health IT adoption, despite their relevance (Aljarboa & Miah, 2021; Ammenwerth, 2019; Bawack & Kala Kamdjoug, 2018).

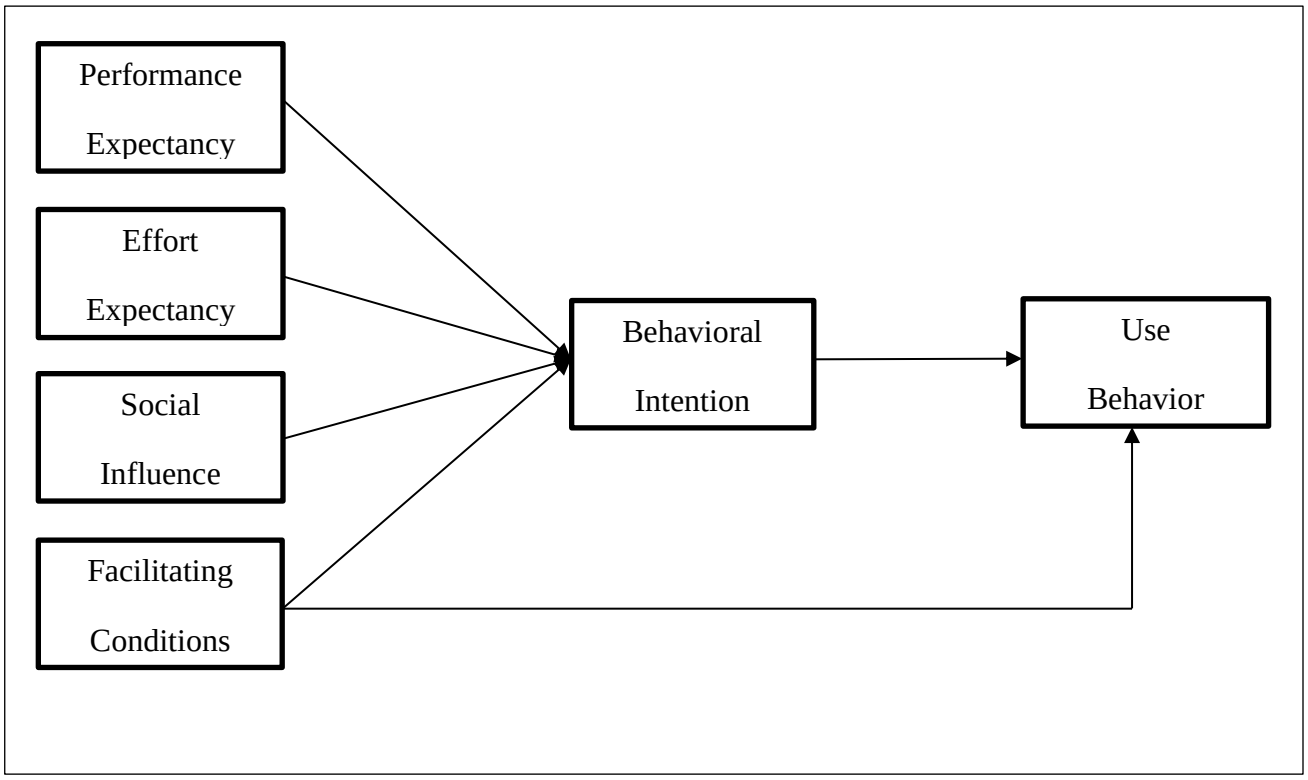

Figure 1 Unified Theory of Acceptance and Use of Technology (UTAUT), (Venkatesh et al., 2003)

1.3 Problem statement

In Palestine, no hospital (private or public) has yet adopted a CDSS. Realizing this fact necessitates understanding the roots of this problem. Understanding factors modulating the intention to adopt (users' acceptance) this type of health information technology (HIT) is a prerequisite for establishing CDSS. The importance of this research stems from the fact that physicians' resistance is one of the determinants of adopting HIT according to the available literature (Khairat et al., 2018; Porter et al., 2018), and without understanding their perceptions and points of view; no CDSS can be implemented successfully in Palestine.

Furthermore, medical errors inevitably occur even among the most skilled professionals in Palestinian healthcare settings because of the high patient volume and limited resources. This can be caused by the provider's heavy workload or by the provider's not having all the necessary

information at the point of care, both of which are preventable. As long as there is no CDSS in Palestine, preventable medical errors will continue to occur in diagnosis and treatment. Our research will be the first study to tackle this issue in Palestine. Hopefully, this proposed study will be able to fill the existing gap and contribute to a better comprehensive understanding of the current perceptions regarding CDSS adoption by Palestinian healthcare providers, which can be used later as a framework for proposing a suitable CDSS and pave the way for the true and practical implementation of CDSS across Palestinian hospitals.

1.4 Significance of the study

CDSS is a crucial tool needed for ensuring patients' safety, which has now become a global health concern. Annual hospital admissions are reported to reach 421 million, with 42 million of those resulting in adverse events, costing trillions of dollars annually to correct these errors. According to the World Health Organization (WHO), 83% of these events can be avoidable. It is reported that 40% of adverse events are related to therapeutics and medications (WHO EMRO, n.d.).

In Palestine, medical errors and patients' safety are a major challenge as well. According to a study involving 394 Palestinian healthcare professionals, including doctors, nurses, and pharmacists, missing the relevant clinical information and pharmacological knowledge was the primary cause of 84.3% and 53.8% of medical errors, respectively (Damin Abukhalil et al., 2022).This is expected given that there are more than 52,484 guidelines for healthcare professionals and healthcare facilities, which would be hard to access without having aiding tools like CDSS (*View of Towards an Improvement of Patient Safety: A Framework for Clinical Decision Support Systems | Journal of the International Society for Telemedicine and EHealth*, n.d.-a).

Any stage of the delivery of medical services, including diagnosis, drug selection, drug preparation/dispensing, and drug administration, is susceptible to medical errors. More than half a million patients suffer injuries or fatalities as a result of medical errors and adverse drug events (ADE), which yearly cost about $6 million per hospital in the United States (US). The available literature supports using CDSS for decreasing medical errors and improving patients' outcomes, as studies proved the efficacy of CDSS in improving the process of care (Jia et al., 2016).

In the Palestinian context, a well-known CDSS (Micromedex ®) was utilized to identify potential drug-drug interactions for patients admitted to the surgical wards in a recent study including three governmental hospitals in the West Bank. This CDSS showed that 56% of these patients experienced at least one potential ADE , with 52.7% of these events classified as major in terms of severity, 40.5% were considered to be moderate and only 6.4% were minor ADE (Rabba et al., 2020). Another cross sectional study in two major referral hospitals in the West Bank revealed that 94% of patients who suffered from cardiovascular diseases (CVDs) were discharged home on medications with potential ADE. This frightening finding highlights the necessity of implementing CDSS in Palestinian settings because the number of ADE is extremely high and can be reduced if a CDSS is used (Al-Jabi et al., 2021).

Additional findings from the Gaza strip emphasize the need to take actual steps into CDSS introduction in Palestinian contexts. After retrospectively reviewing elderly patients' files in three medical departments at a major referral hospital in Gaza , it was found that around 44.2% received at least one inappropriate dose while third of these cases had drug-drug interactions (*Evaluation Of Inappropriate Prescribing To the Hospitalized Elderly Patients in Al Shifa Hospital Gaza-Palestine,* n.d.).

When this topic was researched in six governmental hospitals in Palestine, Al-Sarawan (2014) found that calculation errors of doses and low knowledge of medications caused 38% and 36% of total medication errors, respectively (Al-Sarawan, 2014).

These alarming figures highlight the need for implementing CDSS in Palestinian settings so as to warn healthcare providers about these ADE and hence prevent them.

Additionally it is known that only 20% of EMR is being used (if implemented) in Palestine and the overall adoption of Palestine to HIT is very poor (Ibrahim, 2013). Applying HIT to enhance healthcare services in Palestine has several hurdles; studying healthcare practitioners' perceptions will help highlight the reasons why they are hesitant to employ CDSS in healthcare settings. CDSS implementation will not be successful until the obstacles that impede healthcare providers' readiness are overcome. Due to the occupation, restricted resources, and restrictions on healthcare practitioners' movement, Palestine has unique obstacles delaying the application of HIT in the healthcare industry. Since Palestinian hospitals joined the WHO-led Patient Safety Friendly Hospital Initiative (PSFHI) in 2012 to improve patient safety standards, the need for CDSS has become even more urgent; as the primary goal of CDSS is patients' safety (Olakotan & Yusof, 2021). All these factors exacerbate the need for CDSS to facilitate decision making at the point of care. Therefore, this research will be unique and interesting as limited research is available regarding CDSS in Palestinian hospitals and will help identify fears related to adopting CDSS and facilitate overcoming these concerns. Moreover, identifying factors affecting users' acceptance, will help in highlighting strength points and reveals weaknesses which needs to be corrected.

This research will help in establishing a clear vision of the intention to adopt CDSS and will definitely facilitate putting CDSS into action in Palestinian hospitals.

1.5 Study objectives

The main objective of our study is to determine the prevalence of knowledge, attitude, and potential acceptance to adopt CDSS among Palestinian healthcare providers in three governmental hospitals.

In addition to the main objective, our study has other sub-objectives:

1. To explore the effects of performance expectancy (PE), effort expectancy (EE), level of involvement in decision making, perceived threat to professional autonomy, computer self-efficacy, and social influence on the intention to adopt CDSS.
2. To assess the general knowledge level about CDSS and its distribution by demographic characteristics.
3. To assess the attitude level and its distribution by demographic characteristics.

1.6 Research hypothesis

Based on the above-mentioned models regarding technology adoption in health sector and the literature review in the second chapter, the following hypotheses are proposed:

Hypothesis #1**:** There is a negative relationship between the intention to adopt CDSS and perceived threat to professional autonomy.

Hypothesis #2: Level of involvement in the decision making of selecting CDSS is positively linked to the intention to adopt CDSS.

Hypothesis#3: Performance expectancy has a positive relationship with the intention to adopt CDSS.

Hypothesis#4: Effort expectancy has a positive relationship with the intention to adopt CDSS.

Hypothesis #5: Social influence positively affects the intention to adopt CDSS.

Hypothesis #6: Computer self-efficacy level is linked to the intention to adopt CDSS in a positive way.

1.7 Description of thesis chapters

This thesis is structured as follows:

Chapter Two: Narrative review to explore the available research papers and highlight what investigation has been done so far in this area. This chapter will be divided into subsections. In order to assess the gaps in the literature and, hopefully, contribute to filling them in this paper, this chapter will first provide a thorough literature review to discuss studies addressing CDSS globally, second, a regional literature review to reflect the efforts made thus far on this issue in the Middle East (Arab countries), and third, a subsection to describe published articles about Palestinian settings and how frequently this topic is studied on a local level. This chapter will also include a description of the Palestinian healthcare system, in addition to a brief review of the available HIS in Palestine. Moreover, the conceptual framework of this study will be discussed in detail in a subsection of this chapter to illustrate the relationship of all the studied variables and how they are expected to affect one another. At the end of this chapter, operational definitions will be identified and a description of the dependent and independent variables will be provided as well, along with a summary of this chapter.

Chapter Three: This chapter outlines the research's methodology. We'll talk about the research approach, the study design, and why this particular research method was chosen. All features of study settings, target populations, and sample size computation are covered in this chapter.

The methods for gathering data and the statistical analysis that was done are also explained. The end of this chapter includes the ethical aspect of this research paper.

Chapter Four: In this section, the study's findings are reported. Tables of demographic characteristics of the participants are displayed in addition to the resultant relationship between independent variables and the intention to adopt CDSS (dependent variable).

Chapter Five: A comprehensive discussion of the findings is provided. This chapter analyzes and interprets the results of this paper and explains the significance of these findings in the context of Palestinian settings and other previous research. The answer to the research question and the validity of the hypothesis are provided as well. At the end of this chapter, the implications of these findings and their acknowledged limitations, in addition to future research and recommendations, are provided.

Chapter 2: Literature review

2.1 Introduction

This chapter will provide an overview of the current knowledge regarding CDSS. The aim of this section is to summarize research activities in this domain and to identify relevant theories and gaps in the existing literature. Numerous aspects of CDSS use, effectiveness, and efficiency in contexts where it was used have been investigated. In contexts where CDSS is not yet implemented, further studies focused on the variables influencing the intention to adopt the technology. In order to have a thorough review, all of these studies published globally, regionally, and locally in Palestine will be discussed in this chapter.

2.2 Global researches on CDSS

CDSS has become an interesting area for research during the past years as several studies were carried out in this regard. The largest portion evaluated CDSS in terms of efficiency and efficacy (Eudaley et al., 2019; Heard et al., 2019; Rawson et al., 2017; Venkateswaran et al., 2022; Watson et al., 2020; Wolfe et al., 2019), using the pre vs. post intervention (CDSS) approach.

Rawson and colleagues conducted a systematic review to summarize the use of CDSS in antimicrobial management in adults. There were 58 papers eligible for review in this study, which covered qualitative and quantitative investigations published between 1980 and 2015. However, this study proved a minor effect of CDSS on antibiotic selection. In this research paper, CDSS was discussed on a comprehensive level; highlighting the possible gaps in implementing CDSS, of which the users' acceptance was the key issue (Rawson et al., 2017).

Contrarily, other studies have demonstrated a promising role for CDSS in the infectious field and antibiotic selection. When a trial CDSS was introduced (2018–2019) in the US, in a multicenter study to advise doctors when a urinalysis and a culture are warranted, it was able to eliminate unindicated urine cultures for adult patients (inpatients and outpatients) in all of the 5 studied hospitals. Compared to the pre-intervention period (2017-2018), urine cultures were decreased by 38.5% after using this CDSS. Thus greatly lowering the expense associated with the incorrect prescription of antibiotics ($2,000 yearly) (Watson et al., 2020).

CDSS was studied in an outpatient setting as well. Eudelay et al. (2019), demonstrated that CDSS decreased inappropriate antibiotic use by 27% in treating urinary tract infections and eliminated empirical prescribing of broad-spectrum antibiotics in the studied setting. Guideline-directed duration of therapy increased by 32% as well (Eudaley et al., 2019).

Moreover, a study utilizing a CDSS embedded in the EHR of a pediatric unit in a children's hospital in California concluded that this intervention was able to save $717,538 per year in laboratory expenditures, where it reduced orders for complete blood count, chemistry, and coagulation panels for patients with congenital and acquired heart disease (Algaze et al., 2016).

One research question was the potential issues with using CDSS; Akhloufi et al., (2019) conducted the first usability study and reported potential issues with using CDSS, the most common of which was alert fatigue (Akhloufi et al., 2019).

Additionally, a Canadian study in 2021 compared the CDSS interventions for the severity of drug-drug interactions (DDIs) and the recommended intervention to actual pharmacists' rankings and actions in clinical practice. This study involved 73 pharmacists/pharmacy residents working at one of four health organizations in Canada and compared actual pharmacists' knowledge regarding DDIs to those provided by a CDSS. The study highlighted the need to better prepare

for CDSS, as pharmacists included in this study thought that the databases in this system weren't up-to-date, making them ignore most of the provided interventions. Lessons learned from this study include the fact that users are the main part of successful CDSS implementation, and obtaining their perceptions is a key step to guaranteeing actual usage of these systems (Lau et al., 2021).

On the other hand, when used in a cardiac and pulmonary department in Sweden, CDSS usage resulted in a 16–35% increase in adherence to clinical guidelines and had a major impact on clinical decision making. The 5 year-study (2004-2008) consisted of a control group and an intervention group (cardiac intensive care unit- CICU). In the intervention group, a clinical IT system called heart records (HRs), which took 16 months to be developed, was launched to notify physicians when a clinical guideline is not being followed in the treatment of cardiac patients. It also informed them when a specific medicine was required for prescription (e.g: angiotensin converting enzyme inhibitors). The collaboration between doctors and the IT company as they worked together to decide the features of HRs, in the author's opinion, is the most significant component that contributed to the success of this intervention. Moreover, having the choice to deviate from the suggested intervention facilitated the adoption of HRs because they didn't perceive any threat from the system or loss of autonomy. It is noteworthy that trying the system was voluntary, which facilitated using it as well, in addition to being led by an insider physician who made it easier for colleagues to follow his steps in using this CDSS. Overall, this study served as a catalyst for future researchers to study and analyze physicians' perceptions pre and post- implementation (dos Santos et al., 2014).

In a European Survey comprising 11 European nations and 581 clinicians, the use of CDSS for geriatric patients for fall risk management was investigated to uncover possible barriers and

facilitators. According to this study, the main barriers to adoption of CDSS were technical issues (66% of participants expressed this concern) and the needed effort expected to be made during the use of these systems. Moreover, 58% of the enrolled physicians stated that the need to justify the reason for overriding an intervention was a major barrier for adoption. The biggest facilitators for actual use, according to 64% of respondents, were ease of use and a CDSS that is clinically beneficial for patient care (Ploegmakers et al., 2022).

Another retrospective cohort study conducted at Missouri teaching hospital in the US discussed the effectiveness of CDSS using pre and post-alert interventions. The primary outcome of the study was de-escalating empirical antibiotic therapy within the first 72-hours of initiation. De-escalation of antibiotics was 55% vs. 35.1% in the post and pre-alert groups, respectively (Wolfe et al., 2019).

However, the above-mentioned studies assessed CDSS in a quantitative manner using a comparison of outcomes between pre and post implementation periods. The outcome of these studies was limited to certain predefined end points regarding treatment guidelines without involving practitioners in choosing the implemented CDSS. Despite the importance of these studies and their contribution to enriching knowledge regarding CDSS utilization, users are the cornerstone of any system, which must be taken into consideration, especially that healthcare providers' resistance has been identified as the primary issue for applying CDSS (Liang & Xue, 2016, 2021; *Physician Resistance as a Barrier to Implement Clinical Information Systems - Clinfowiki*, n.d.).

Therefore, efforts were made to study CDSS from another angle to address physicians' acceptance and the usability of CDSS from their point of view. Two qualitative research studies

using interviews with health professionals were conducted to assess reflections of users' experiences regarding CDSS use (Chung et al., 2017; Porter et al., 2018).

Chung and colleagues interviewed 22 medical staff in a pediatric emergency department in Colorado-US. The team included physicians, residents, nurses, and pharmacists. The intervwied staff was asked to assess an already implemented CDSS that is concerned with antibiotic describing. Several comments were received on the trial CDSS, where the most commonly reported complaint was constraining the autonomy of decision making and fear of not maintaining workflow efficiency (Chung et al., 2017).

In the second qualitative study, which was also carried out at an emergency room in the United Kingdom (UK), a CDSS was provided to 20 paramedics. This CDSS assisted the paramedics in determining if geriatric patients who had fallen needed to be referred to a hospital or could stay at home. The majority of participants voiced their concern over the length of time required to obtain CDSS support, believing it was time-consuming and demanding high technological abilities, which not all of them had (Porter et al., 2018).

The previously mentioned studies discuss a post-implementation situation, without taking into consideration factors that influence true users' acceptance that guarantees actual usage. Most CDSS research focused on adopting it for a set length of time and receiving feedback on it, ignoring the fundamental issues related to the individualized characteristics of users, including the organizational position of these users, level of knowledge of CDSS, their technological skills, the extent they are involved in decision making, their perception whether it is useful or not, and the effort and time required to use the system.

According to a qualitative study conducted in France and Switzerland, physicians have negative perceptions of CDSS; with the primary barriers to adoption being a loss of professional autonomy and an increase in medicolegal liability, as well as a fear of lacking technical capabilities (Catho et al., 2020).The same barriers were identified by a study from Australia (Laka et al., 2021).

Only two studies provided a clear description of the perceptions of healthcare providers and their intention to adopt CDSS. Both studies from Malaysia discussed CDSS in settings that haven't implemented a CDSS yet and assessed physicians' perceptions and feelings toward this emerging technology (Esmaeilzadeh et al., 2015; Sambasivan et al., 2012). A total of 335 questionnaires were collected from physicians working at 12 hospitals in Malaysia. In these studies, a modified UTAUT was used as a tool in both studies. Performance expectancy, effort expectancy, perceived threat to professional autonomy, involvement in decision making, social influence, and computer self-efficacy of physicians were found to be the main mediators affecting the intention to adopt a new CDSS. These studies encourage more research to be done in developing countries as very limited research has been conducted so far to address the intention of adopting CDSS in these nations.

According to the available aforementioned literature and the previously described UTAUT model, performance expectancy (PE), effort expectancy (EE), perceived threat to professional autonomy, and level of involvement in decision making, social influence, and computer skills are important parameters mediating the readiness and intention to adopt CDSS by healthcare providers, therefore a brief definition of each concept is provided in the next subsections, as they will be included in our conceptual framework, illustrated in the last subsection of this chapter. It is noteworthy that the first 4 concepts in the upcoming subsections are the main components of

the original UTAUT model, while the other 3 determinants are extracted from the previous literature review and were added to the UTAUT to shape our conceptual framework.

2.2.1 Performance expectancy

Performance expectancy (PE), which is based on the perceived usefulness in the TAM, is a determinant for acquiring new technology. PE can be defined as the extent to which the users expect the new technology will help them in enhancing their job tasks and upgrade their performance (Vermaut, 2017). It is worth mentioning, that this factor has been found to have the strongest influence on the intention to adopt a technology in the healthcare sector (Magdi, 2013). Therefore, the likelihood of adopting CDSS increases when healthcare providers believe it will be helpful in their daily work (Eapen, 2021; Esmaeilzadeh et al., 2015; Sambasivan et al., 2012).

2.2.2 Effort expectancy

The second parameter to be addressed is the effort expectancy, which is called perceived ease of use in the TAM, which refers to the extent the user believes the system will be easy to use and effort free (Aljarboa & Miah, 2021). It is known that users' perception is affected by the effort they expect to be required when using the new system. As the expected ease of use increases, so does the intention to adopt CDSS (Holden & Karsh, 2010; Magdi, 2013; Sambasivan et al., 2012).

2.2.3 Social influence

The concept of social influence refers to how influential people affect the actions and behaviors of their associates. In other words, some people might engage in a new behavior because a role model they respect and look up to has engaged in it (Magdi, 2013). It also refers to the degree someone perceives other important people would like him/her to adopt a certain behavior. Given

that social networks, shared objectives, and social trust are all seen as components of this construct, a researcher can choose one of these to investigate or combine them all (Esmaeilzadeh et al., 2015). It has been proposed that coworkers who are socially trusted and have strong professional ties are more likely to take similar pathways when it comes to a new technology or behavior since they will feel more engaged. The supportive atmosphere within a single organization, whether it is brought about through interpersonal trust, effective communication, or a common set of objectives, can also be thought of as social influence (Esmaeilzadeh et al., 2015).

2.2.4 Facilitating conditions

Facilitating conditions refer to the extent there is organizational or technical support that facilitates the use of a new technology. It was reported that this determinant affects actual use behavior more than behavioral intention compared to the previously mentioned determinants (PE, EE, and social influence), which were more strongly related to the intention to adopt a new technology in the healthcare sector (Zha et al., 2022).

2.2.5 Perceived threat to professional autonomy

Also known as perceived workflow disturbance; has been identified as one of the main concerns affecting the intention to adopt CDSS (Liberati et al., 2017). Some physicians believe that adopting a new technology might affect their control over their professional workflow and patients' cases, which negatively affects professional autonomy. Therefore, as the perceived threat increases, the desire to adopt a technology decreases (Esmaeilzadeh et al., 2015; Khalifa, 2014; Sambasivan et al., 2012)

2.2.6 Level of involvement decision making

Another important parameter to be considered is the level of physicians' involvement in choosing CDSS and how much they are allowed to be engaged in the process of deciding the features of the acquired system by the managers of their facility. It is hypothesized that engaging healthcare providers in the process of decision making when selecting and implementing CDSS, encourages users to acquire and adopt this technology as they feel they are part of the process and are more ready to actually use the system (Sambasivan et al., 2012).

2.2.7 Computer self-efficacy

As mentioned in section 2.2 (global literature review), technological skills and the ability of users to perform tasks successfully have been identified as one of the important predictors of technology adoption. Therefore, this construct will be added to our conceptual framework, illustrated in section 2.7. This concept was first introduced by Albert Bandura in 1977, which later became known as SCT in 1986 (*Social Foundations of Thought and Action: A Social Cognitive Theory. - PsycNET*, n.d.). It also refers to how confident people are in the abilities that allow them to do a task. It might also be interpreted as the person's assessment of their degree of performance (Esmaeilzadeh et al., 2015; Khalifa, 2014)

2.3 Regional researches on CDSS

Even though there hasn't been much regional research on CDSS, a few studies have looked at the subject from various aspects. In an attempt to prove the vital role that CDSS has in detecting medical errors; one study from the United Arab Emirates (UAE) investigated the costs that a CDSS would save for insurance companies. To do so, 2800 prescriptions from eight healthcare facilities were randomly selected and analyzed for medication errors. A CDSS was used to detect

duplication of medications, which was found to cause an average loss of 15.51$ per prescription and a total of 6.68% patient disability/fatality of all prescriptions (Konovalov, 2010).

Additional efforts were undertaken in the Middle East to identify the main factors for the success of CDSS in healthcare settings as well as the major barriers hindering the adoption of this technology. A 6-month study employing the Delphi technique was undertaken by the health informatics department of King Faisal Specialist Hospital and Research Center in Saudi Arabia, revealed that the most significant strategies for successful implementation were providing simple and timely interventions, up-to-date scientific information, and integrating CDSS into users' workflow within HIS without interruption. On the other hand, lack of computer skills and the loss of physicians' autonomy were main barriers for adopting CDSS according to this study (Khalifa, 2014).

The response of healthcare professionals to the suggested CDSS interventions in outpatient and inpatient settings was examined in another observational, retrospective, cross-sectional study from Saudi Arabia involving two hospitals. Approximately five million prescriptions for medications were made over the study period (2015–2017), and 4 million alerts were generated. However, 95.2% of these alerts were overridden. Drug duplication alerts accounted for 80% of the total alerts, followed by inappropriate doses and drug interaction alerts. Alsaidan and colleagues urged additional studies to delve more deeply into healthcare providers' perceptions of CDSS and to be involved in the selection of these systems in order for the suggested interventions to be successful (Alsaidan et al., 2022).

In a third study from Saudi Arabia, 54 general practitioners (GPs) working at different governmental hospitals were surveyed to assess their perception of CDSS knowing that none of their facilities had implemented one. Results from this study confirmed previous research in

which PE, EE had a significant impact on users' acceptance. However, no effect of social influence on the intention to adopt CDSS was found according to this research paper (Aljarboa & Miah, 2021).

The effectiveness of CDSS in the management of diseases was also the subject of interest. A quasi-experimental study from Saudi Arabia used the VTE-CDSS, a tailored version of the CDSS, to identify individuals who are most likely to experience venous thromboembolism (VTE) and provide evidence-based prophylaxis recommendations for those who require them. The pre-implementation phase of this study involved 871 patients, while the post-implementation phase involved 938 patients at a 900-bed tertiary hospital. The percentage of patients who received the proper VTE prophylaxis increased from 50.9 % to 81.4%, and the detection of VTE on admission increased dramatically from 77.4% to 93.3% as a result of the application of the VTE-CDSS (Titi et al., 2021).

2.4 CDSS in Palestine

In Palestine, an online survey (2017) revealed that Palestinian healthcare providers aren't familiar with the term CDSS. On the other hand, 63% believed that CDSS would be useful and improve the quality of their services. This survey was not limited to Palestine but also to Portugal (*View of Towards an Improvement of Patient Safety: A Framework for Clinical Decision Support Systems | Journal of the International Society for Telemedicine and EHealth*, n.d.-b).

A recent study from Palestine, conducted at Al-Najah University- Nablus, discussed the possible features users would like to have in an implemented CDSS . In this study, a Delphi technique was used to answer the research question, and included 19 (specialist phycisians , resident doctors, nurses, pharmacists, and IT programming specialists). The interveiwees expressed their

optimism towards CDSS, as 93.4% of them agreed that having a CDSS embedded in the EHR can reduce medication errors, while 77.6% stated that having a CDSS can reduce ADEs (Shawahna, 2019).

Another recent quantitative , questionnaire-based study conducted in the Gaza strip at United Nations Relief and Works Agency for Palestine Refugees (UNRWA) health centers evaluated the impact of electronic health systems (e-health systems) on outcomes (quality of care, patients' safety, clinical decision making, and costs of services). Data was collected from 241 medical staff working at 19 different centers in Gaza .Although CDSS wasn't included in these e-health systems, as the studied HIS contained only the basic features of EHR, it was concluded that the quality of information in HIS enhances clinicians' performance (Dahleez et al., 2020).

Additional recent study from the West Bank showed CDSS interventions to increase adherence to clinical guidelines when applied in antenatal care. The eRegistry's CDS, an electronic/digital record, was employed as the intervention in this cluster-randomized, controlled trial, while the paper-based record was designated as the control. Anemia management and screening rates were greater in the intervention clinics (44.3% vs 28.9 %), and the intervention group's diagnosis rate of gestational diabetes was higher (50.7%) compared to the control group (39.7%) (Venkateswaran et al., 2022).

Research regarding the intention to adopt CDSS and factors influencing users' perceptions is lacking in Palestine, as no study has discussed the topic from this angle yet. Therefore, more in-depth, focused research is required to understand what Palestinian healthcare providers think regarding the adoption of CDSS.

2.5 Palestinian healthcare system

In order to successfully prepare for any intervention involved in the healthcare sector, a review of the current infrastructure is highly needed. According to recent reports, there are 2.05 million people living in the Gaza Strip and 3.05 million people living in the West Bank and east Jerusalem. The Palestinian health system is mainly regulated by four sectors: the government health sector, UNRWA, nongovernmental organizations (NGOs), and the private sector. In the West Bank, the Palestinian Ministry of Health (PMOH) controls more than 70% of all clinics, making it the dominant provider of primary care. However, as the PMOH clinics constitute almost a third of all clinics in the Gaza Strip, NGOs and UNRWA play a significant role in primary care. There are 87 hospitals in Palestine, with 35 in Gaza and 52 in the West Bank. The bed capacity for both Gaza and the West Bank is 1.3 beds per 1000 population. (Central & Bureau of Statistics - PCBS, 2021; Ministry of Health, 2021). Table 1 provides an insight to some of the important health indicators for the Palestinian population (Central & Bureau of Statistics - PCBS, 2021; *Doctors per 1,000 People by Country, around the World | TheGlobalEconomy.Com*, n.d.)

Table 1 Palestinian Health Indicators

Indicator	Count
Males	WB 1,491,645 GS 925,164
Females	WB 1,443,723 GS 925,164
Male/ Female ratio in general Pop. (per 100)	103.3
Life Expectancy among pop. (year)	73.3
Life Expectancy among females (year)	75.2
Median age (years)	WB 18.4 GS 21.2
Physicians per 1,000 pop.	WB 2.3 GS 2.2
Beds per 1,000 pop.	WB 1.3 GS 1.3

WB-West Bank, pop.-population, GS- Gaza Strip

With a capacity of 3590 beds, or 54.8% of all hospital beds in Palestine, Palestinian governmental hospitals are also very important to the country's healthcare system. These 28 hospitals are located in Gaza and the West Bank. In the West Bank, 15 governmental hospitals with a total capacity of 1760 beds serve a large number of patients each year, with bed occupancy rates as high as 95%.

The same thing applies to the Gaza Strip as there are 13 governmental hospitals with a total 1830 beds (Ministry of Health, 2021). Palestinian healthcare providers generally face additional pressures, especially those working at governmental hospitals, considering the scarcity of resources they have, restrictions on movement, which decrease their opportunities to have overseas training, and the associated difficulties in recruiting additional specialized staff.

From the previous table, we can see the high workload on Palestinian physicians and hospitals, as these indicators are much higher in developed countries. For example, in Austria, there are 5.32 physicians per 1,000 population, while Australia has 3.9 beds per 1,000 population. Furthermore, the WHO has recommended a minimum of 3 beds per 1000 population (*Doctors per 1,000 People by Country, around the World | TheGlobalEconomy.Com*, n.d.) (*Hospital Resources 2017–18: Australian Hospital Statistics, Hospitals and Average Available Beds - Australian Institute of Health and Welfare*, n.d.)(*Hospital Bed Industry: The New Healthcare Policy Mandates a Minimum of 3 Beds per 1000: Sumeet Aggarwal, Health News, ET HealthWorld*, n.d.). According to these figures, CDSS can be highly beneficial in Palestinian contexts, as healthcare providers deal with numerous numbers of cases, where any aiding clinical tool can play a major role in enhancing patients' outcomes.

2.6 HIS in Palestine

In order to create a Palestinian HIS for all governmental facilities, including clinics, hospitals, and offices, the U.S. Agency for International Development (USAID) worked with the PMOH and sponsored Palestinian Health Sector Reform and Development (the "Flagship" project) between 2008 and 2014. The established HIS, called Avicenna, includes all electronic elements for patients' care, including clinical information, registration information, and financial. Avicenna's implementation phase was handled by Dimensions Company, a local Palestinian IT firm. Currently, the Avicenna HIS main servers are kept at the PMOH IT unit in Ramallah, under the supervision of Dr. Ali Al Helo; Director General of Engineering and Information Technology (IT). The central level management of the activities at this unit is handled by about 31 IT personnel (*Health Information System (His) Assessment Report*, 2015).

Unfortunately, Avicenna doesn't provide a CDSS, not even the basic features such as notifications or alerts to draw the attention of the user in case something needs to be modified.

2.7 Conceptual framework of the study

The theoretical/ conceptual framework of this study is a modified UTAUT model. The reason for modifying UTAUT is that previous research has encouraged researchers to design and create their own customized frameworks using different dimensions; as they vary depending on the country of study and the investigated situation; in other words, "one size does not fit all (Aljarboa & Miah, 2020; Sambasivan et al., 2012).

As previously discussed, the original UTAUT model suggests that any intention to a use technology by healthcare providers will be mediated by the following factors: performance expectancy, effort expectancy, social influence, and facilitating conditions. In this study, UTAUT was used as a base model and modified to better explain the perception of healthcare providers in Palestinian hospitals. Since UTAUT is a general model, we modified it to better address physicians' individualized characteristics. These modifications were made following an extensive review of the current literature. Current evidence suggests that performance expectancy and effort expectancy are more strongly correlated with the intention to accept CDSS compared to the other two parameters, which might have a low or insignificant effect. The facilitating conditions construct was specifically found to have the least impact on the intention to adopt (Aljarboa & Miah, 2021; Catho et al., 2019, 2020; Kim et al., 2016; Laka et al., 2021; Owolbi et al., 2016). Therefore, the facilitating conditions construct was removed and replaced by another more influential variable, which is the computer self-efficacy variable. Based on these facts; seven variables were used to shape the study's conceptual framework. The first one is the intention to adopt variable, which is the main study question, and the remaining six variables are

the determinants that will be investigated in this study. As shown in table 2; three out of the six variables were extracted from the original UTAUT model, which was then modified to include additional three variables that were identified by several studies after extensive review of the available literature.

Table 2 Source of Study's Constructs

Construct	Source
Intention to adopt	UTAUT model, (Venkatesh et al., 2003)
Performance expectancy	UTAUT model, (Venkatesh et al., 2003)
Effort Expectancy	UTAUT model, (Venkatesh et al., 2003)
Social influence	UTAUT model, (Venkatesh et al., 2003)
Computer self-efficacy	(Khalifa, 2014),(*Social Foundations of Thought and Action: A Social Cognitive Theory*. - *PsycNET*, n.d.), (Esmaeilzadeh et al., 2015)
Perceived threat to professional autonomy	(Sambasivan et al., 2012),(Esmaeilzadeh et al., 2015)(Catho et al., 2019)((Ploegmakers et al., 2022)
Level of involvement in decision making	(Sambasivan et al., 2012),(Esmaeilzadeh et al., 2015), (Liberati et al., 2017a)

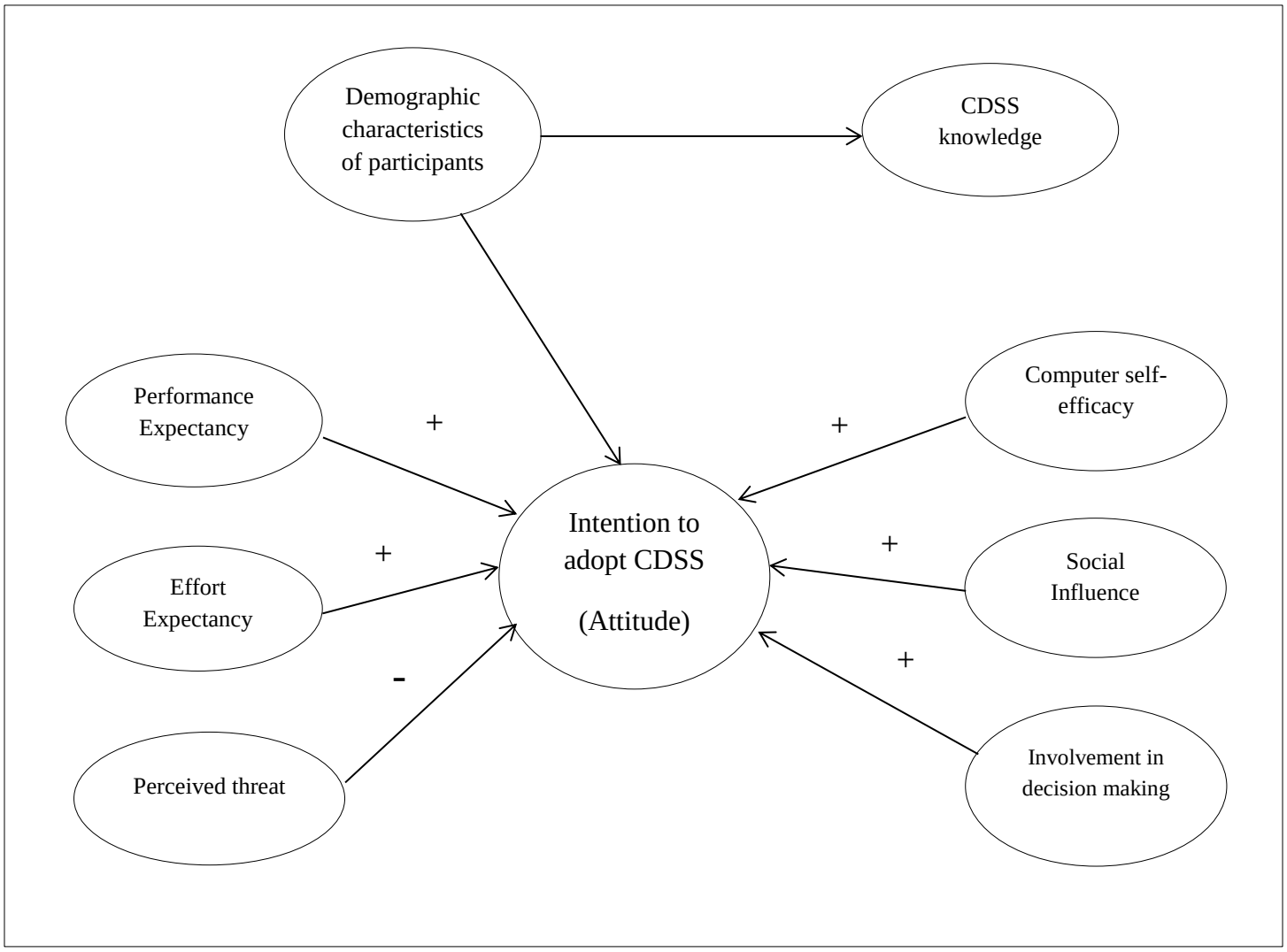

Figure 2 Conceptual Framework of the Study

2.8 Study variables and operational definitions

2.8.1 Variables:

Dependent variables: The dependent variables in this study were CDSS knowledge level and the intention to adopt CDSS by Palestinian residents at three governmental hospitals.

Independent variables: Demographics and background variables (age, gender, specialty, facility, previous CDSS use, and years of experience), in addition to performance expectancy (PE), effort expectancy (EE), perceived threat to professional autonomy, level of involvement in decision making, computer self-efficacy, and social influence.

2.8.2 Operational definitions:

- Age: age of the participant (resident/GP). Entered as ordinal data where the age category 20-29 was coded 1, 30-39 coded 2, 40-49 coded 3, 50-59 coded 4, 60-69 coded 5 and over 70 coded 6.
- Gender: the two options male and female were coded 2 and 1 respectively.
- Specialty: the resident's current medical specialty. The options were internal, pediatrics, radiology, gynecology, surgery, oncology, and other. These were coded as nominal data (1, 2, 3 ,4 ,5 ,6 ,7 respectively).
- Other specialty: to allow the resident to write the specialty as text if it was not covered by the previous options (e.g: emergency), entered as string variable.
- Years of experience: number of years the resident practiced medicine. It was entered as quantitative data allowing the participant to write the years of experience as a number.
- Level of CDSS knowledge: to determine the CDSS prior knowledge and familiarity. Given as 5 options (very high, high, moderate, low and very low) coded from 1 to 5, where 5 is very high and 1 is very low.
- CDSS use: to state if the resident has used a CDSS before. Answers were coded as 1 and 2 to resemble yes and no respectively.
- Hospital's name: to determine the place of work for the residents. The participant was allowed to enter the name of facility as text. For data entry it was coded as nominal data

where 1 for Beit Jala governmental hospital (Al-Hussein), 2 for Palestine medical complex (PMC) and 3 for Hebron government hospital.

- Intention to adopt CDSS: to explore the readiness to actually utilize a CDSS once it becomes available at the facility. This section contains 6 items and can be answered using a 5 point Likert scale from 1-5 , where 5 indicates strongly agree and 1 indicates strongly disagree. One example from this construct is “I intend to use the CDSS in my patient care and clinical decision-making when it becomes available in my hospital’s department”.
- Level of involvement in decision making: this section is intended to assess the extent of involvement of residents in deciding the appropriateness of CDSS in their organization/facility. One example from this section is “I believe the managers will let me participate in the planning of the CDSS for the hospital”. A 5 point Likert scale was used to answer 4 questions in this part, where 5 indicates strongly agree and 1 indicates strongly disagree.
- Perceived threat to professional autonomy: this section’s five items analyze the user’s perceptions of the CDSS’s potential negative effects on his /her autonomy and to what degree this system will make them loose control over their workflow. “Using the CDSS can decrease my control over each step of the patient care process” is one item from this section which can be answered using the same 5 points Likert scale, where 5 indicates strongly agree and 1 indicates strongly disagree.
- Healthcare professionals’ computer self-efficacy: this construct’s 8 items look into how the individual perceives their overall computer skills. Five of these questions specifically ask about Avicenna. This construct tries to investigate how open individuals are to

learning about new systems like CDSS. Same coding method was used for this section (5 points Likert scale), where 5 indicates strongly agree and 1 indicates strongly disagree.

"I could complete the job using the CDSS if I had seen someone else using it before trying it myself" is one example from this section.

- Performance expectancy: this section targets the perceived usefulness of CDSS and how much the user believes this system will increase his/her productivity and be beneficial on a daily basis. 6 items coded as 5 points Likert scale were used to assess this dimension. 5 indicates strongly agree and 1 indicates strongly disagree. One of these items is "Using the CDSS would enable me to accomplish tasks more quickly ".
- Effort expectancy: how much the user believes this system will be easy to use is the scope of this part. Same 5 points Likert scale was used for all of the 6 items in this construct, where 5 indicates strongly agree and 1 indicates strongly disagree. "It would be easy for me to become skillful at using the CDSS" is a sample item of this construct.
- Social influence: the social relationship of the participants with their colleagues is assessed in this part. Shared goals and social trust are being investigated as well among the 6 items of this construct. Example: "I can always trust my subordinate group (such as para-professionals, physician assistants and junior professionals) to lend me a hand if I need it". 5 points Likert scale was used for all of the 6 items in this construct, where 5 indicates strongly agree and 1 indicates strongly disagree.

2.9 Summary

In summary, several attempts have been made globally to study CDSS and assess the efficacy of these systems in various contexts. Although early evidence of CDSS's effectiveness is highly encouraging, the utilization rate is still much lower than anticipated. Regional and local studies

in Palestine are limited and still aren't sufficient to draw conclusions regarding CDSS efficacy and factors influencing successful implementation and adoption by healthcare providers. Therefore, additional research is needed to fill the gaps regarding the preparation phases prior to implementation, where users' perceptions are the key issue.

The following chapter describes the study's methodology, data collection tool, which is the questionnaire instrument, and all related validity tests and constructs, in addition to data management, statistical analysis, and ethical considerations.

Chapter 3: Methodology

3.1 Introduction

The study methodology will be described in detail in this chapter. Additionally, study settings and the reasons for choosing this methodology will be explained. Information about the studied settings and study participants, along with the inclusion criteria, are provided as well. A description of the research tool and data collection method is found in this chapter. Nonetheless, statistical tests and analysis that were used to interpret the collected data are discussed, along with the ethical considerations and processes that were needed to conduct this research.

3.2 Rational of study design

A cross-sectional study design was used to conduct this research using a deductive approach. A well-designed, validated questionnaire-based survey was used to answer the research question and collect the needed information. The well-structured questionnaire allows users to express their perceptions regarding the CDSS adoption, and thereby understand the users' point of view. Although the cross-sectional approach cannot prove causality, it can assist in identifying associations and prevalence. Other advantages of this type of study design include requiring limited time and budget. Using a questionnaire analyzed quantitatively allows for reporting results using statistical analysis and ensures asking the intended questions (Sedgwick, 2014). Obtaining a representative sample is a critical measure to be ensured in cross-sectional designs. To do so, three governmental hospitals were used as the target population, with the residents and general practitioners (GPs) of these hospitals serving as the population source. This is because governmental hospitals share the same regulations and, to a large extent same administration, in addition to providing medical care for a huge number of patients. Furthermore, because all of these institutions utilize the same electronic medical record (Avicenna), selecting a sample from

these settings should, presumably, produce a conclusion regarding governmental settings. The reason for choosing residents and GPs to be the subjects of this study is that they are the future physicians and their perceptions and attitudes will highly influence the future of HIT in Palestine. Second, residents are in the preparation and studying phase to become specialists. Sometimes they are reluctant to ask clinical questions to their seniors and highly need a clinical guide at the point of care.

3.3 Study settings

Residents and GPs from three governmental hospitals in Palestine were chosen to be the study participants. Rationality of that selection has been discussed above in section "Rational of study design". The three governmental hospitals are:

1. Palestine Medical Complex (PMC) is a major hospital in Ramallah. It has five hospitals with a total of 214 beds. The total number of employees is 860. Nurses account for the majority and make 42% of the staff. Specialist doctors are 9% of the cadre while 19% are resident doctors. Administrative staff and paramedics contribute to 19% and 11% respectively (*State of Palestine Ministry of Health Palestine Medical Complex*, n.d.).
2. Hebron government hospital in Hebron with 237 beds, located in the south of the West Bank. This hospital employs 508 people, including 86 administrative personnel, 71 medical assistants, 241 nurses, and 51 specialist doctors. In addition to eight pharmacists and 30 mid-wives (*Princess Alia Governmental Hospital, Hebron*, n.d.).
3. Beit Jala governmental hospital (Al-Hussein) which has 131 beds, which is located in Bethlehem. The health workforce at Beit Jala hospital are divided as follows: 36 specialist doctors, 11 pharmacists, 48 medical assistants, 153 nurses including registered nurses and mid-wives and 79 administrative staff (Ministry of Health, 2021).

3.4 Study participants and sample size

The medical directors of the three chosen hospitals were contacted to determine the size of the target population. Beit Jala hospital has 100 GPs as there is no residency program at this hospital. PMC has a total of 160 resident doctors; of which 124 are completing a residency program and the remaining 36 are GPs. Hebron governmental hospital has 81 residents on a residency program and 22 general practitioners. Raosoft online calculator was used to estimate the needed sample size. With a confidence interval of 95% and a margin of error of 10% for a target population of 363 residents/GPs, a minimum of 77 residents was the recommended sample size of this study. Any resident doctor working in any department of these governmental hospitals (GP or in a residency program) was eligible to participate, with no eligibility criteria related to individual resident's characteristics. Convenient sampling was used to collect the needed data for conducting this research.

3.5 Questionnaire instrument

3.5.1 Constructs of the questionnaire

The questionnaire for this study was adapted from a study conducted in Malaysia that looked at a comparable research question (Sambasivan et al., 2012).The original survey was slightly modified; one construct regarding interactivity level with CDSS was removed as it was a very theoretical construct that probably required a previous CDSS use to be able to answer it. Table 3 describes the survey's main constructs and the number of items in each section that were used in the current research (total of 41 items), which correspond to our conceptual/theoretical framework. A Five-point Likert- scale was used to answer these measures, where "Strongly Disagree"= 1 and "Strongly Agree"=5. It is noteworthy that two items in the "intention to adopt CDSS" construct were reverse coded (third and fourth items in this section). The questionnaire

was translated into Arabic as it is the mother tongue of the participants and back translation to English was used to assure the original meaning was maintained.

Table 3 Main Constructs' of the Research Questionnaire

Construct	Items (n)
Intention to use CDSS	6
Level of physician's involvement in decision-making	4
Perceived threat to professional autonomy	5
Healthcare professionals' computer self-efficacy	8
Performance expectancy	6
Effort expectancy	6
Social influence	6

*n is the number of items in the defined category

3.5.2 Validity and reliability

Content validity was double checked by seven known experts (Appendix A). Moreover, Cronbach's alpha was used to check the instrument's reliability and internal consistency. As shown in table 4, for all constructs it was above the recommended value (0.7), except the intention to adopt construct which was slightly lower than 0.7, however, still considered to be acceptable. This indicates measurement errors were minor (Tavakol & Dennick, 2011).

Table 4 Constructs' Reliability

Construct	Items (n)	Cronbach's alpha value
Intention to use CDSS	6	0.696
Level of physician's involvement in decision-making	4	0.850
Perceived threat to professional autonomy	5	0.774
Healthcare professionals' computer self-efficacy	8	0.831
Performance expectancy	6	0.869
Effort expectancy	6	0.879
Social influence	6	0.788

*n is the number of items in the defined category

3.5.3 Piloting

Although the used collection tool is considered a valid one and was previously used, this questionnaire was pilot tested by six well-known resident doctors before it was widely disseminated; so as to find any opportunities for improvement. According to the pilot results, the questions were clear and easily understood by the participants; so no modifications were made.

3.6 Data collection

Questionnaires were distributed to the intended participants in person and all needed data was collected by the author of this research solely. In addition to the brief introduction about CDSS provided with the questionnaire (Appendix B), each participant received a verbal explanation of CDSS and the scope of the study. The data collection phase took one month, starting from the 1st of June until end of June. In order to obtain a variety of respondents the researcher visited each hospital several times at different working shifts and distributed the questionnaires in person. Most of the surveys were instantly filled out and immediately returned to the researcher. However, some of the respondents had a busy shift and needed 15 minutes to an hour to fill the questionnaires. The response rate was very high (96%); as only four questionnaires from Beit Jala government hospital and one survey from Hebron governmental hospital weren't returned back.

3.7 Statistical analysis

Statistical analysis for this study was carried out using the Statistical Package for the Social Sciences (SPSS) version 25. Surveys were included in the analysis if at least 75% of the items (at least 30 items) were answered. However, all surveys were deemed usable. Before analyzing the collected data, it was entered into the SPSS file, and each questionnaire was given a unique ID to help prevent data entry errors and facilitate detecting them in case they happen. The third and

fourth items from the intention to adopt construct were reverse coded into the same variables, as they had a negative direction. Using the transform option in SPSS, the mean Likert scale of the following constructs was computed for each questionnaire: a) intention to adopt CDSS b) PE c) EE d) computer self-efficacy e) perceived threat to professional autonomy f) level of involvement in decision making g) social influence. Thereby, all of these constructs were converted into quantitative variables for further analysis.

3.7.1 Univariate analysis

The profile of the respondents was obtained through the analysis of the background variables (age, gender, years of experience, hospital, specialty, and previous CDSS use). It is noteworthy that years of experience were entered as string variable, but was converted into three categories (1-4, 5-10, 11-15) for more convenient representation in the results section. Furthermore, to report the level of CDSS knowledge, proper univariate analysis techniques were used.

3.7.2 Bivariate analysis

Bivariate analysis was conducted to assess the correlation of the level of CDSS knowledge (dependent variable) with the background variables (age, gender, years of experience, hospital, and specialty). Also the intention to adopt (dependent variable) was analyzed using bivariate analysis with the same background variables to assess any correlations. In order to explore the factors affecting the intention to adopt CDSS, it was analyzed with the following constructs: PE, EE, perceived threat to professional autonomy, level of involvement in decision making, computer's self-efficacy, and social influence. Correlations were said to be significant at $p < 0.05$. Table 5 illustrates the generally used tests for bivariate analysis depending on the variables' types.

Table 5 Bivariate Analysis Techniques

Dependent variable	Independent variable	Test used
Qualitative	Qualitative	Cross tabulation, Chi-square
	Quantitative	ANOVA/Independent T-test
Quantitative	Qualitative	ANOVA/Independent T-test
	Quantitative	Pearson's correlation coefficient

Table 6 provides an insight to the study's variables. It is noteworthy that the years of experience variable was considered a continuous quantitative variable for the bivariate analysis with the intention to adopt construct. And it was converted to categorical variable when analyzed with CDSS knowledge using bivariate techniques.

Table 6 The Study's Variables Types

Type	Variable
Qualitative-ordinal	Age
	Level of CDSS knowledge
Qualitative- nominal	Gender
	Hospital
	Specialty
	Previous CDSS use
Quantitative	Intention to adopt
	Years of experience
	PE
	EE
	Perceived threat to professional autonomy
	Computer's self-efficacy
	Level of involvement in decision making
	Social influence

PE-Performance Expectancy, EE-Effort Expectancy

In our study, the Finite population correction factor (FPC) was used to overcome the infinite population estimation in the ANOVA test. The following formula was used $\sqrt{\frac{N-n}{N-1}}$, where N is the size of population (N=363) and n is the sample size taken from the population (n=124). Therefore, our FPC is 0.81 which was used to compute the new upper and lower limits of ANOVA confidence intervals to obtain more reflective results.

3.8 Ethical considerations

An approval letter to conduct the study was obtained from the Arab American University (AAU) which was sent to the PMOH and the medical directors of the enrolled hospitals so as to get the needed permission to contact residents/GPs and conduct the study (Appendix C). Privacy of the participants was ensured throughout the study period and during results reporting. The names of the participants and their organizations were protected during all phases of this research. Data will be kept according to known standards for a period of 3 years after research completion. The participants were issued a consent form (see Appendix B) with the questionnaire to ensure all processes were carried out ethically and harmonized with national standards of research.

3.9 Summary

A quantitative, survey –based, cross-sectional method was used to carry out this study and answer the research question. Three governmental hospitals were used as a population source and any resident doctor working at these hospitals, whether a GP or in a residency program was the unit of analysis. A total sample of 124 questionnaires was used to obtain the desired margin of error and confidence intervals of 10% and 95%, respectively. Ethical approvals from the AAU, PMOH and the medical directors of the hospitals were obtained before conducting the research.

In the up-coming chapter, the results of this study will be discussed in detail along with the resulting relationships of the studied variables and the tested hypothesis.

Chapter 4: Results

4.1 Introduction

The study's key findings will be presented in this section along with an overview of the participants' demographics using relevant figure and tables. The results are displayed in three sections. First, a summary of demographics characteristics of participants is provided ,in addition to the distribution of CDSS knowledge according to demography and the potential associations Second, the distribution of CDSS intention to adopt among demography; highlighting any associations that may exist. And third, answering one of the main important research questions; what factors influence the acceptance and attitude level towards CDSS and a description of these relationships.

4.1.1 Descriptive statistics - Sociodemographic characteristics and CDSS knowledge distribution

A total of 124 resident doctors and general practitioners working at three different governmental hospitals were included in this study. Regarding the sociodemographic characteristics of the participants, which are provided in table 7; the majority were males, accounting for 75% (n=93) of the study sample. Mean years of working experience was 2.9 years, with one year being the minimum experience and 15 years being the highest. As shown in table 7, similar contribution from each hospital was obtained. Doctors from diverse specialties were enrolled and around 41% of participants had other specialties including emergency department (n=9), orthopedic (n=1), cardiology (n=1), urology (n=1), and family medicine (n=2), while 39 respondents didn’t specify their other specialty and 2 didn’t answer this part. Regarding CDSS usage and familiarity, the majority of participants expressed moderate previous knowledge of CDSS while 89.5% of them haven’t used a CDSS before.

Table 7 Demographic Characteristics of Study Participants

Characteristic	Description	Count (n)	Percent (%)
Gender	Female	31	75%
	Male	93	25%
Age	20-29	98	79%
	30-39	21	16.9%
	40-49	5	4%
Years of experience	1-4	87	70.2%
	5-10	15	12%
	11-15	6	4.8%
	Missing	16	13%
Hospital	Beit Jala	36	29%
	PMC	39	31.5%
	Hebron	49	39.5%
Specialty	Internal	18	14.5%
	Pediatrics	23	18.5%
	Radiology	1	0.80%
	Gynecology	14	11.3%
	Surgery	12	9.7%
	Oncology	3	2.4%
	Other	51	41.1%
	Missing	2	1.7%
Previous CDSS knowledge	Very high	5	4%
	High	15	12.1%
	Moderate	47	37.9%
	Low	33	26.6%
	Very low	24	19.4%
Previous CDSS use	Yes	11	8.9%
	No	111	89.5%
	Missing	2	1.6%

*n is the number of participants occurrence in the defined category, % is the percentage of cases in defined category
PMC- Palestine medical complex

Among the different age groups, the majority of doctors aged 20-29 had a very low to moderate knowledge of CDSS while only 15.3% of them had a high to very high knowledge of CDSS. Similarly, 90.6 % of the physicians in the age category of 30-39 had a very low to moderate

knowledge of these systems. On the other hand, older physicians had a higher knowledge level and familiarity of CDSS; where two thirds of the participants aging 40-49 had a high to very high knowledge of CDSS as shown in figure 3.

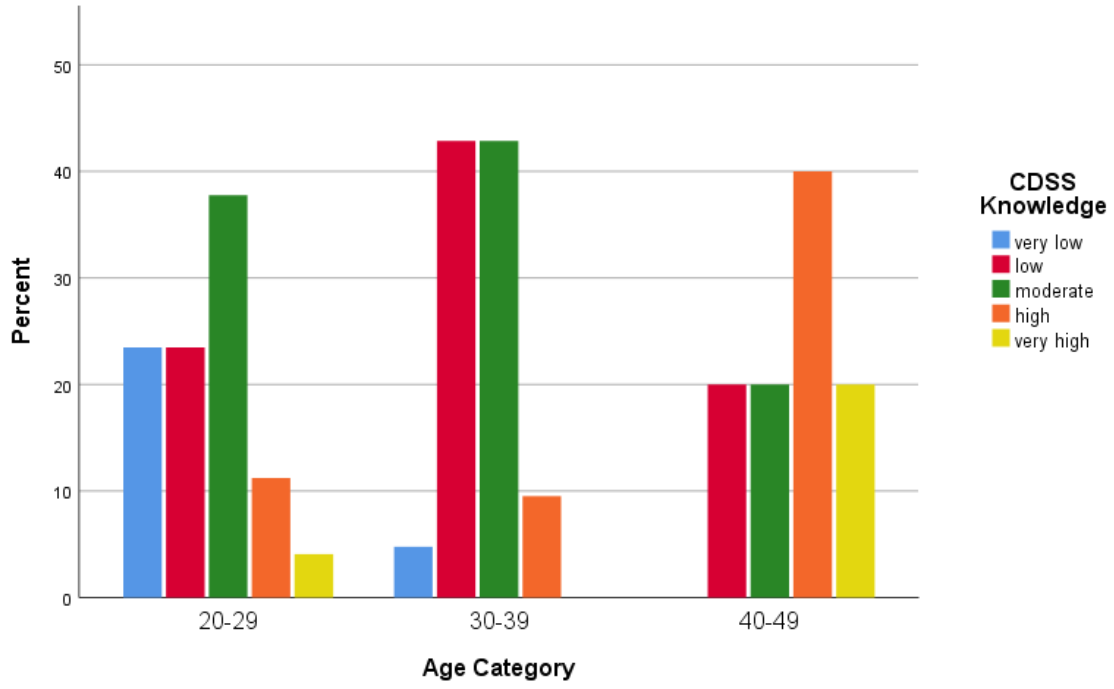

Figure 3 CDSS Knowledge Distribution according to Age

In terms of gender, our results showed that the majority of females and males had a very low to moderate knowledge of CDSS as described in table 8.

Table 8 Distribution of CDSS Knowledge According to Gender

			Gender		
			Female	Male	Total
CDSS knowledge	very low	Count (n)	7	17	24
		% within Gender	22.6%	18.3%	19.4%
	low	Count (n)	9	24	33
		% within Gender	29.0%	25.8%	26.6%
	moderate	Count(n)	11	36	47
		% within Gender	35.5%	38.7%	37.9%
	high	Count(n)	3	12	15
		% within Gender	9.7%	12.9%	12.1%
	very high	Count(n)	1	4	5
		% within Gender	3.2%	4.3%	4.0%
Total		Count(n)	31	93	124
		% within Gender	100.0%	100.0%	100.0%

*n is the number of participants occurrence in the defined category, % is the percentage of cases in defined category

Nevertheless, regarding working facility and the level of CDSS knowledge, a moderate knowledge of CDSS was the main finding from all three hospitals, as shown in figure 4.

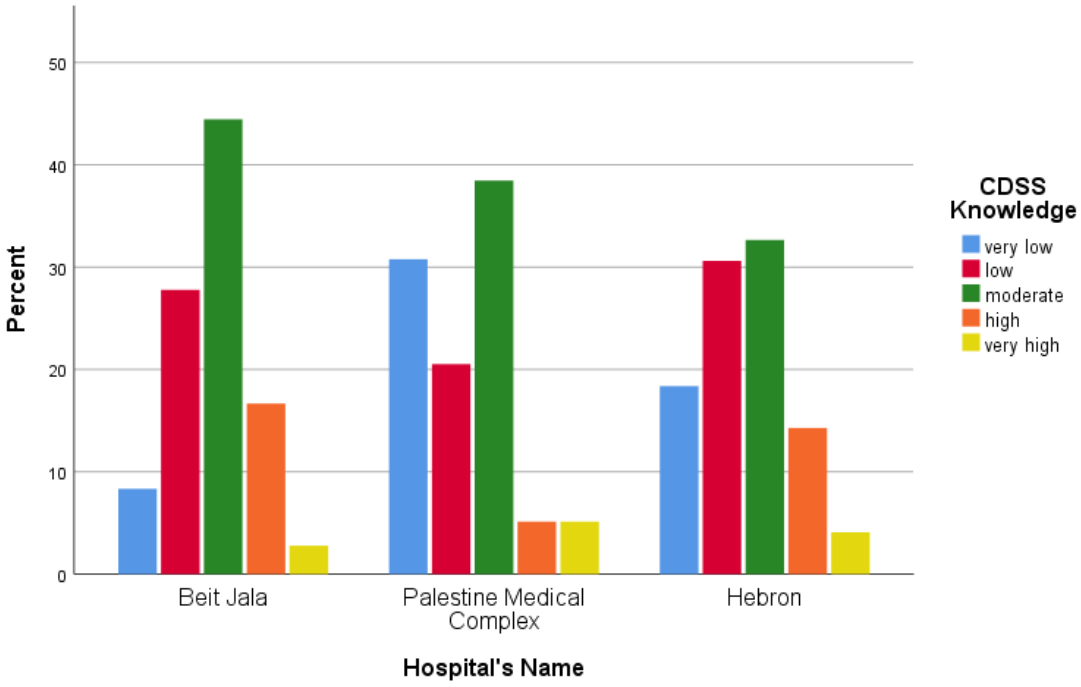

Figure 4 CDSS Knowledge across the Three Studied Settings

Additionally, half of the internal residents had a moderate CDSS knowledge while 16.7% and 22.2% had a low and very low knowledge, respectively. As we can see from table 9, which provides the distribution of CDSS knowledge among different specialties, third of the pediatric residents had a low knowledge level about CDSS while more than 60% of all other specialties had very low to moderate knowledge about CDSS.

Table 9 Distribution of CDSS Knowledge According to Specialty

			Specialty							Total
			Internal	Pediatrics	Radiology	Gynecology	Surgery	Oncology	Other	
CDSS knowledge	very low	Count (n)	4	5	1	3	2	0	8	23
		% within Specialty	22.2%	21.7%	100.0%	21.4%	16.7%	0.0%	15.7%	18.9%
	low	Count (n)	3	7	0	5	4	1	12	32
		% within Specialty	16.7%	30.4%	0.0%	35.7%	33.3%	33.3%	23.5%	26.2%
	moderate	Count (n)	9	5	0	5	4	1	23	47
		% within Specialty	50.0%	21.7%	0.0%	35.7%	33.3%	33.3%	45.1%	38.5%
	high	Count (n)	1	5	0	0	2	1	6	15
		% within Specialty	5.6%	21.7%	0.0%	0.0%	16.7%	33.3%	11.8%	12.3%
	very high	Count (n)	1	1	0	1	0	0	2	5
		% within Specialty	5.6%	4.3%	0.0%	7.1%	0.0%	0.0%	3.9%	4.1%
Total		Count (n)	18	23	1	14	12	3	51	122
		% within Specialty	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

*n is the number of participants occurrence in the defined category, % is the percentage of cases in defined category

Another sociodemographic parameter “years of experience” was also analyzed in our study. Apparently respondents with higher years of experience were more familiar with the term CDSS, as given by figure 5.

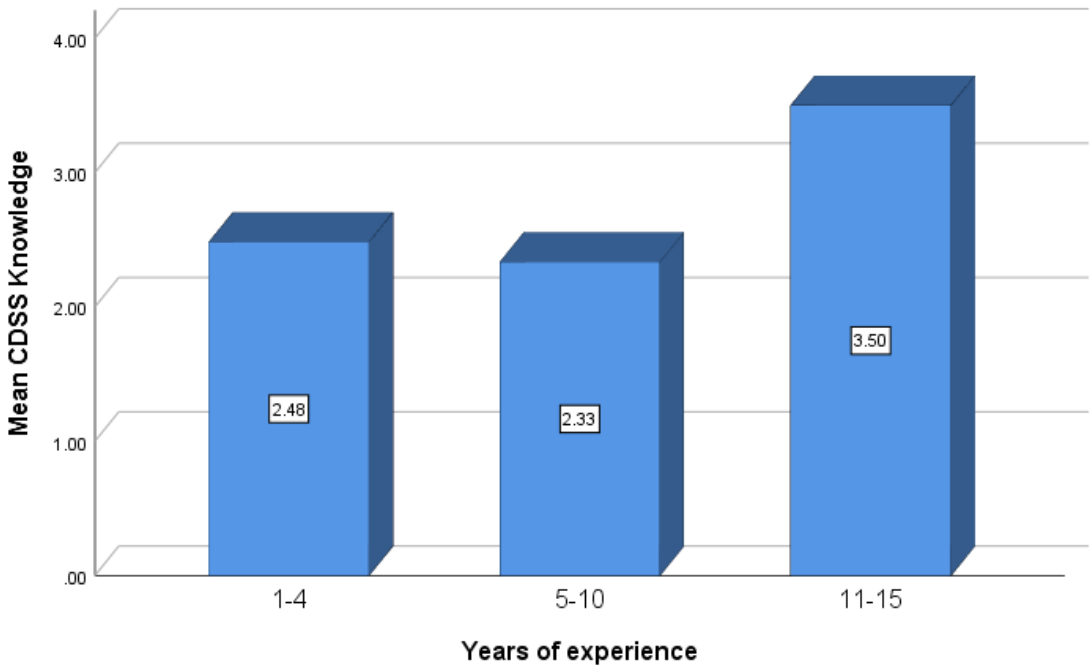

Figure 5 Mean CDSS Knowledge According to Years of Experience

4.1.2 Bivariate analysis: Association between CDSS knowledge and sociodemographic characteristics

Our bivariate analysis, given in table 10, showed that no association exists between CDSS knowledge and the studied demographic characteristics (age, gender, specialty, and working place) since the corrected confidence intervals for each category are intersected. However, a statistically significant relationship was found between years of experience and CDSS knowledge according to the provided confidence intervals.

Table 10 Bivariate Analysis between CDSS Knowledge and Demographic Factors

Variable		N	Mean	SD	SE	95% CI for mean	
						LL	UL
Age	20-29	98	2.4898	1.09587	0.11070	2.3140	2.6655
	30-39	21	2.5714	0.74642	0.16288	2.3128	2.8300
	40-49	5	3.6000	1.14018	0.50990	2.7905	4.4095
	Total	124	2.5484	1.06194	0.09537	2.3970	2.6998
Gender	Female	31	2.4194	1.05749	0.18993	2.1178	2.7209
	Male	93	2.5914	1.06563	0.11050	2.4160	2.7668
	Total	124	2.5484	1.06194	0.09537	2.3970	2.6998
Hospital	Beit Jala	36	2.7778	0.92924	0.15487	2.5319	3.0237
	PMC	39	2.3333	1.13168	0.18121	2.0456	2.6210
	Hebron	49	2.5510	1.08130	0.15447	2.3058	2.7963
	Total	124	2.5484	1.06194	0.09537	2.3596	2.7372
Specialty	Internal	18	2.5556	1.09664	0.25848	2.1452	2.9659
	Pediatrics	23	2.5652	1.19947	0.25011	2.1681	2.9623
	Radiology	1	1.0000	NA	NA	NA	NA
	Gynecology	14	2.3571	1.08182	0.28913	1.8981	2.8162
	Surgery	12	2.5000	1.00000	0.28868	2.0417	2.9583
	Oncology	3	3.0000	1.00000	0.57735	2.0834	3.9166
	Other	51	2.6471	1.01634	0.14232	2.4211	2.8730
	Total	122	2.5656	1.06008	0.09597	2.4132	2.7179
Experience Years	1-4	87	2.4828	1.12954	0.12110	2.2905	2.6750
	5-10	15	2.3333	0.61721	0.15936	2.0803	2.5863
	11-15	6	3.5000	1.04881	0.42817	2.8202	4.1798
	Total	108	2.5185	1.08930	0.10482	2.3521	2.6849

N-number of cases, SD- standard deviation, SE-standard error, CI- confidence interval
LL-lower limit, UL-upper limit, PMC – Palestine medical complex, NA-not applicable

Additionally, the p-values in table 11 can be considered to be reflective because, after taking FPC into account, no correlation was established between demographic factors (age, gender, specialty, and place of employment) and CDSS knowledge.

Table 11 P-values for Bivariate Analysis

Dependent Variable	Independent Variable	p-value	Test Used
CDSS knowledge	Age	0.073	ANOVA
CDSS knowledge	Gender	0.437	Independent T-test
CDSS knowledge	Specialty	0.743	ANOVA
CDSS knowledge	Hospital	0.195	ANOVA

4.1.3 Intention to adopt CDSS according to sociodemographic factors

Corresponding to the second objective of this study, descriptive statistics, and bivariate analysis were used to demonstrate the distribution of the intention to adopt CDSS based on different sociodemographic characteristics and assess any correlations that might exist. The mean of the six items in the intention to adopt construct was computed for each questionnaire then analyzed with each sociodemographic variable.

As shown in table 12, which provides a comprehensive summary of the intention to adopt CDSS across demography, similar attitudes were found between the different age groups. The same applies to gender as males and females showed comparable trends as well. Moreover, physicians from the three studied settings expressed similar willingness to adopt this technology. Among the different specialties, pediatric and surgery residents showed a slightly higher mean to adopt CDSS. It is noteworthy that the confidence intervals were corrected using FPC for each variable for more reflective results. Therefore, we can conclude that the aforementioned demographic factors didn’t have a statistically significant effect on the intention to adopt CDSS, as all confidence intervals across each variable were intersected.

Table 12 Bivariate Analysis between Intention to Adopt CDSS and Demographic Factors

Variable		N	Mean	SD	SE	95% CI for Mean	
						LL	UL
Age	20-29	98	3.9150	0.68374	0.06907	3.8053	4.0246
	30-39	21	3.9206	0.58599	0.12787	3.7176	4.1236
	40-49	5	3.9000	0.49441	0.22111	3.5490	4.2510
	Total	124	3.9153	0.65763	0.05906	3.8216	4.0091
Gender	Female	31	4.0323	0.57320	0.10295	3.8688	4.1957
	Male	93	3.8763	0.68185	0.07070	3.7641	3.9886
	Total	124	3.9153	0.65763	0.05906	3.8216	4.0091
Hospital	Beit Jala	36	3.9815	0.63092	0.10515	3.8145	4.1484
	PMC	39	3.9744	0.67380	0.10789	3.8031	4.1457
	Herbon	49	3.8197	0.66566	0.09509	3.6688	3.9707
	Total	124	3.9153	0.65763	0.05906	3.8216	4.0091
Specialty	Internal	18	3.7500	0.55792	0.13150	3.5412	3.9588
	Pediatrics	23	4.0435	0.52995	0.11050	3.8680	4.2189
	Radiology	1	2.8333	NA	NA	NA	NA
	Gynecology	14	3.9881	0.65524	0.17512	3.7101	4.2661
	Surgery	12	4.0556	0.53811	0.15534	3.8089	4.3022
	Oncology	3	3.8889	0.96225	0.55556	3.0069	4.7709
	Other	51	3.9150	0.73664	0.10315	3.7513	4.0788
	Total	122	3.9276	0.65274	0.05910	3.8338	4.0214

N-number of cases, SD- standard deviation, SE-standard error, CI- confidence interval
LL-lower limit, UL-upper limit, PMC – Palestine medical complex, NA-not applicable

The relationship between the intention to adopt CDSS and the number of experience years was investigated as well. Figure 6 shows the resulting scatter plot for these two variables. Given that the calculated Pearson's correlation coefficient (r= -0.014) was almost zero, there is a weak correlation. The negative value indicates that a negative relationship exists. In other words, the intention to adopt CDSS decreases as experience increases. However, p= 0.889, indicating that there was no statistically significant relationship.

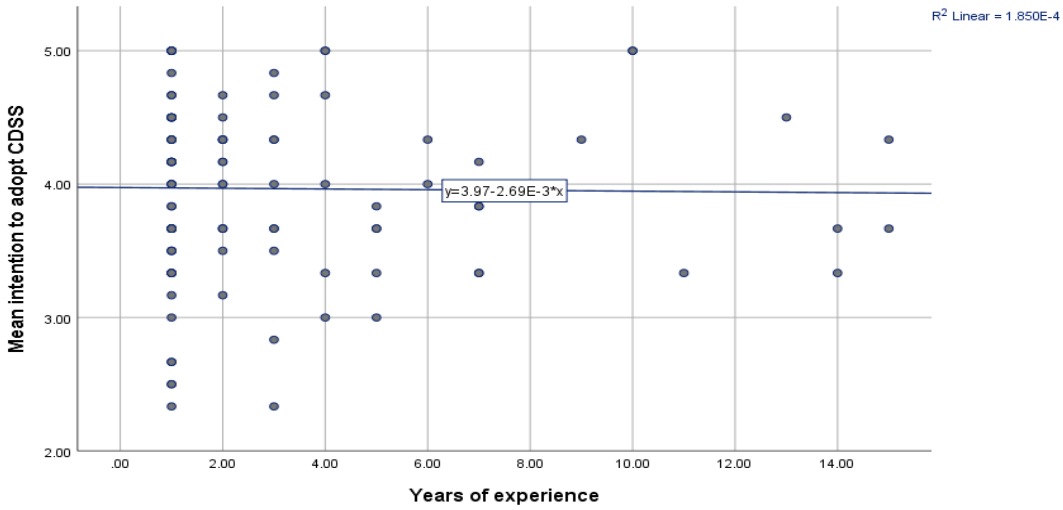

Figure 6 Relationship between Mean Intention to Adopt CDSS and Years of Working Experience

Additionally, the p-values shown in table 13 can be considered to be reflective because, after taking FPC into account, no correlation was established between demographic factors (age, gender, specialty, and place of employment) and the intention to adopt CDSS.

Table 13 Bivariate analysis of Intention to adopt CDSS and Demographic Factors

Dependent Variable	Independent Variable	p-value	Test Used
Intention to adopt	Age	0.998	ANOVA
Intention to adopt	Gender	0.255	Independent T-test
Intention to adopt	Specialty	0.428	ANOVA
Intention to adopt	Hospital	0.491	ANOVA
Intention to adopt	Years of experience*	0.889	Pearson's correlation coefficient

* Years of experience expressed as continuous quantitative variable

4.1.4 The Influence of PE, EE, perceived threat to professional autonomy, computer self-efficacy, involvement in decision making, and social influence on the intention to adopt CDSS

In this section our findings will reflect the association between the variables gleaned from the literature review and either support or refute our hypotheses regarding the elements that might have an impact on users' intentions to implement CDSS in their daily workflow. The mean scores and standard deviation for each construct, provided in table 14, indicate the following: a) residents have a high intention to adopt CDSS b) residents believe a CDSS will enhance their performance c) residents agree a CDSS will be easy to use d) residents perceive moderate threat from CDSS e) residents highly believe they have good computer skills f) healthcare providers are moderately involved in choosing CDSS g) residents highly agree on having good influence on their colleagues. Additionally, the mean and standard deviation for each item in these constructs is given in Appendix D for more details on the descriptive statistics of each item.

Table 14 Descriptive Statistics for Constructs

Construct	Mean	SD	95% CI	
			LL	UL
Intention to adopt CDSS	3.9153	0.65763	3.821541	4.009059
PE	3.8261	0.67317	3.730126	3.922074
EE	3.8632	0.66130	3.768918	3.957482
Perceived threat	3.1980	0.67020	3.102449	3.293551
Computer self-efficacy	3.8808	0.61255	3.793468	3.968132
Involvement in decision making	3.2270	0.90556	3.097894	3.356106
Social influence	3.9632	0.57999	3.88051	4.04589

PE-performance expectancy, EE-effort expectancy, SD- standard deviation, CI- confidence interval
LL- lower limit, UL-upper limit

To start with, our results showed that the intention to adopt CDSS is significantly and positively associated with the following variables: PE, EE, healthcare professionals' computer self-efficacy, social influence. While there is a statistically significant negative relationship with

perceived threat to professional autonomy, and no association was found with the level of involvement in decision making. The aforementioned relationships are shown in figures 7 -12.

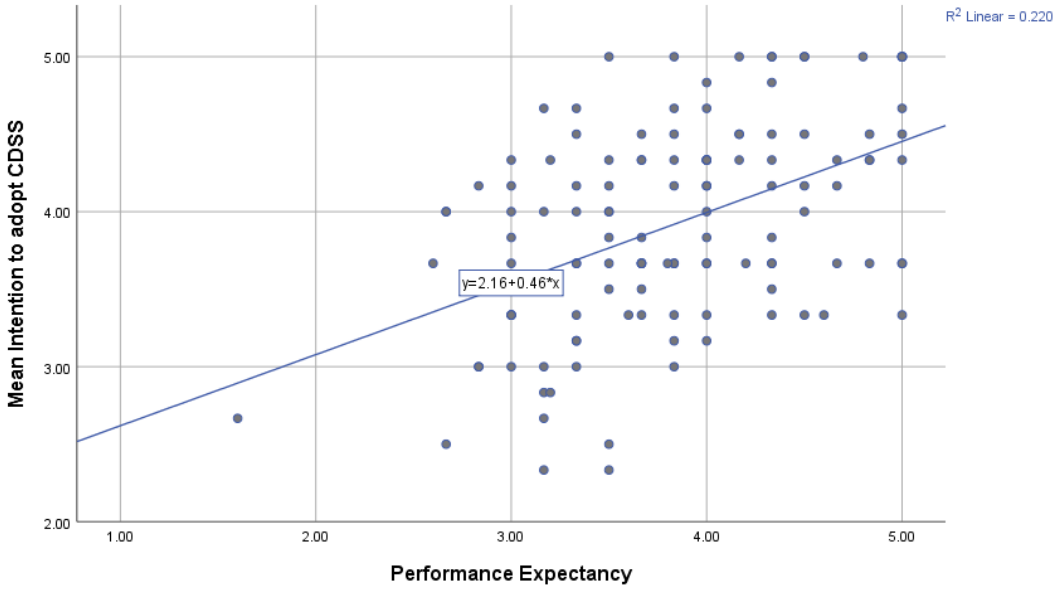

Figure 7 Relationship between Intention to Adopt CDSS and Performance Expectancy

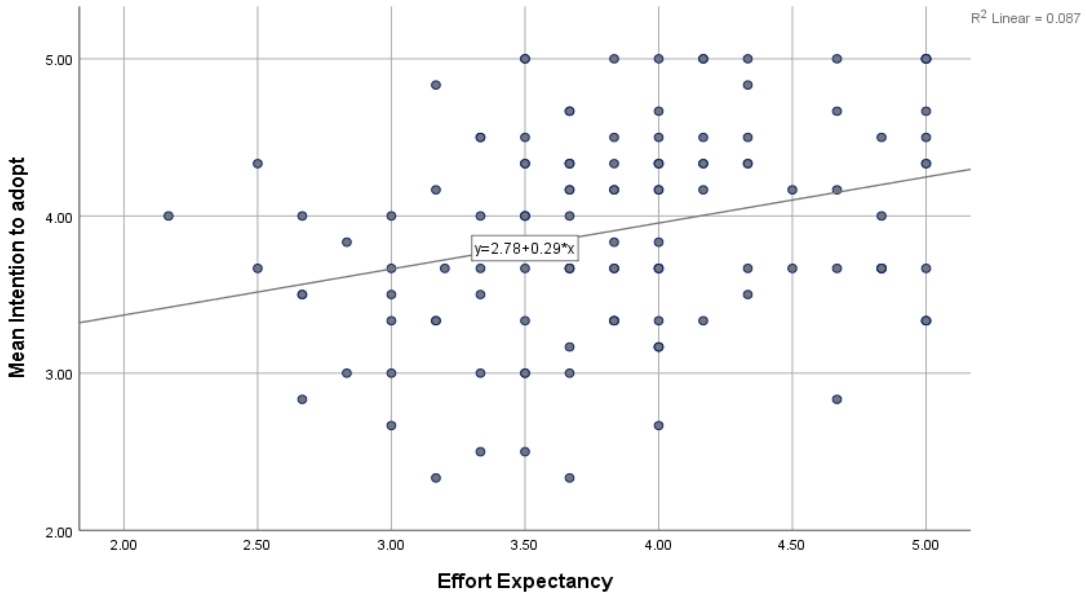

Figure 8 Relationship between Intention to Adopt CDSS and Effort Expectancy

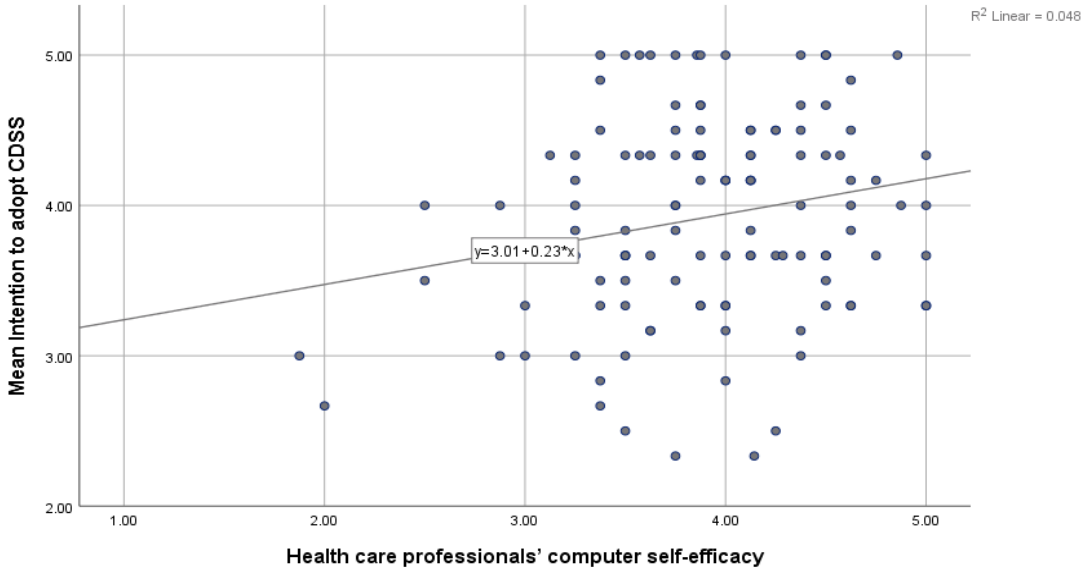

Figure 9 Relationship between Intention to Adopt CDSS and Computer Self –Efficacy

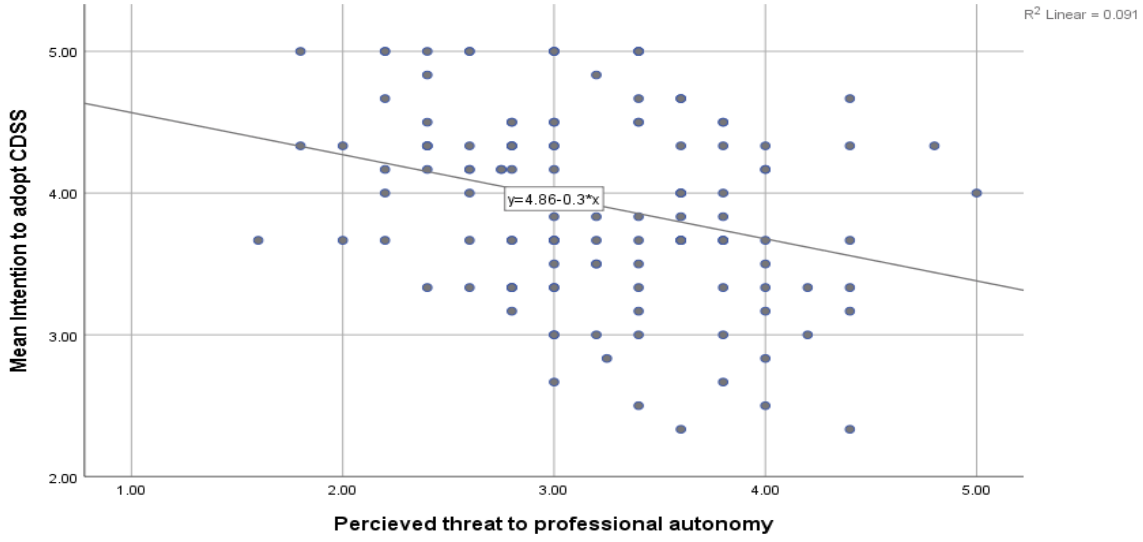

Figure 10 Relationship between Intention to Adopt CDSS and Perceived Threat to Professional Autonomy

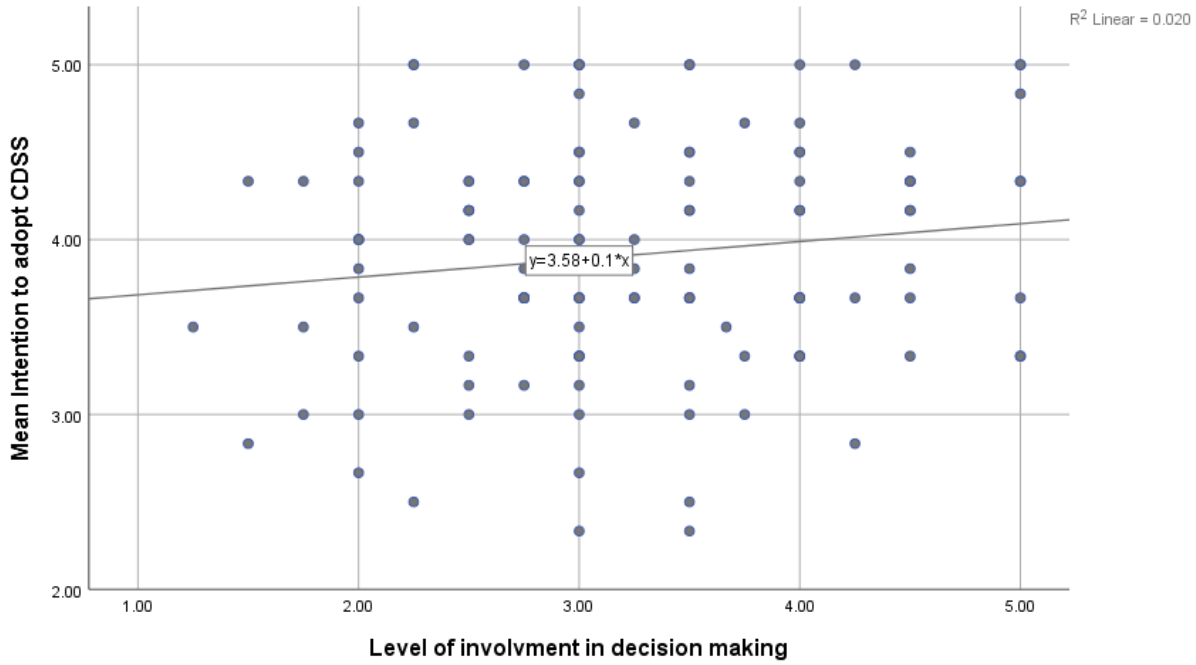

Figure 11 Relationship between Intention to Adopt CDSS and Level of Involvement in Decision Making

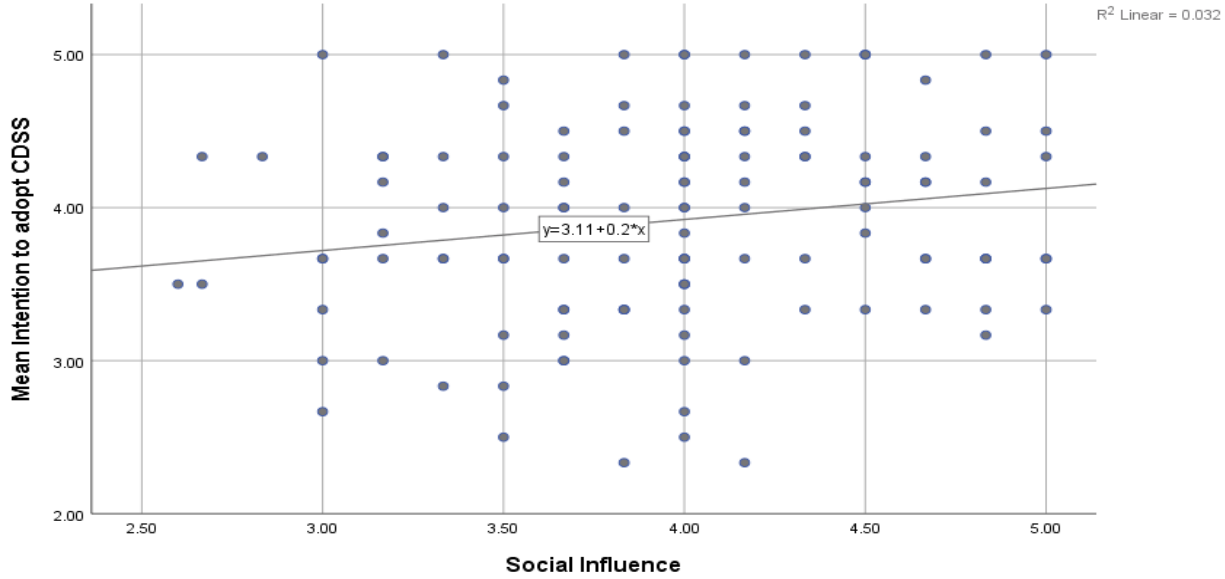

Figure 12 Relationship between Intention to Adopt CDSS and Social Influence

Additionally, table 15 summarizes the correlations between the independent variables and the intention to use CDSS. Moreover, PE and perceived threat to professional autonomy had the strongest impact on users' acceptance compared to the other variables.

Table 15 Bivariate Analysis of Constructs

Dependent Variable	Independent Variable	p-value	r	Test Used	Correlation
Intention to adopt CDSS	PE	0.000**	0.469	Pearson's coefficient	Moderate
Intention to adopt CDSS	EE	0.001**	0.294	Pearson's coefficient	Weak
Intention to adopt CDSS	Healthcare professionals' computer self-efficacy	0.015*	0.218	Pearson's coefficient	Weak
Intention to adopt CDSS	Perceived threat to professional autonomy	0.001**	-0.302	Pearson's coefficient	Moderate
Intention to adopt CDSS	Level of involvement in decision making	0.123	0.140	Pearson's coefficient	Weak
Intention to adopt CDSS	Social influence	0.047*	0.179	Pearson's coefficient	Weak

** Significant at 0.01 significance level
* Significant at 0.05 significance level

4.2 Summary

Our findings indicated that study participants had a high level of CDSS unfamiliarity and a propensity to embrace CDSS. Both the intention to implement CDSS and the level of understanding were unaffected by demographics. The attitude of users toward the adoption of CDSS was found to be influenced by a number of factors. Among these factors PE and perceived threat to professional autonomy were found to have the strongest correlations, exerting a positive

and a negative effect, respectively. Additionally, the desire to adopt CDSS was significantly impacted by EE, social influence, and the computer's self-efficacy, whereas the degree of decision-making engagement was not significantly correlated with attitude level. As a result, five of our suggested hypotheses were verified, while only one was disproved. The upcoming chapter provides a detailed discussion on these results in addition to the overall conclusion of this paper and final recommendations along with the study limitations.

Chapter 5: Discussion

5.1 Introduction

The outcomes of the study will be analyzed and interpreted in this section within the framework of earlier studies. Moreover, the relevance of our results will be highlighted in this section. The limitations of this study, along with the final recommendations for this thesis, will be covered as well.

5.2 Discussion

This study looked into knowledge, attitude, and the variables affecting the decision to utilize CDSS in Palestinian settings. In the following sub-sections the main findings will be discussed.

Level of CDSS knowledge

We found that the vast majority of participants haven't used a CDSS, which is consistent with the fact that CDSS hadn't been adopted in Palestinian contexts. However, a very low to moderate level of general understanding of CDSS was found, which is similar to other developing countries that are considered pre-adopters like Palestine. In Malaysia and Australia, around 80% of physicians from public and private hospitals had very low to moderate familiarity with the term CDSS with only 10% having experienced using it (Hor et al., 2010; Sambasivan et al., 2012).We found that only 16% of our participants had a high to very high knowledge of CDSS. This can be related to how social media affects education and knowledge sharing as well as the possibility that some of these doctors may have studied abroad (Chan et al., 2020).

The modest knowledge of CDSS highlights the need for introducing these technologies in the Palestinian settings. As previously mentioned healthcare providers working in governmental hospitals face additional challenges and pressures and highly need an aiding tool for their daily

work flow so as to keep up with the exerted demands. Unfortunately, a true gap seems to exist in terms of the familiarity of CDSS, which definitely hinders the development of the healthcare sector in Palestine.

Effect of demography on CDSS knowledge and users' acceptance

As reported in the results section, neither the level of knowledge nor the intention to adopt CDSS was found to have a direct relationship with sociodemographic factors. Our results are in line with other studies, which revealed that professional traits such as decision-making authority, technological proficiency, and confidence in one's own clinical judgment had a stronger influence on the intention to adopt CDSS than demographic factors like age, gender, and specialization (Aljarboa & Miah, 2021; Hor et al., 2010; Sambasivan et al., 2012; Toth-Pal et al., 2008).

Familiarity with CDSS was significantly higher among more experienced doctors, which is quite understandable given that they have been practicing medicine for a longer time and may be more knowledgeable about this technology. It is noteworthy that some of the participants had experience years up to 15 years because the study included GPs in addition to resident doctors.

The diminished effect of working facilities in our study is also expected given that all participants work in governmental hospitals with the same HIS and in environments that are similar, which would lessen the impact of the workplace on the intention to use CDSS. In other words, the technological needs of a physician at the point of care would probably be the same regardless of gender, age, specialization, and working facility.

A negative correlation was found between years of experience and attitude level, although not statistically significant, this negative correlation was identified by several studies (Bawack &

Kala Kamdjoug, 2018; Eapen, 2021; Esmaeilzadeh et al., 2015). It was found that more experienced doctors are more likely to resist the use of CDSS as it may interfere with their clinical judgment. Additionally, due to their longer experience in the medical field, the more confidence they have in their clinical judgment. A study from Australia reported that physicians with high years of experience (>10 years) where more likely to refuse adopting CDSS, as half of them reported distrust in the provided intervention, in addition to concerns related to medicolegal liability (Laka et al., 2021). Another explanation can be that the new generation is more familiar and comfortable with the use of IT which justifies their readiness to use CDSS and accept it in their day-to-day work. This finding gives an important indicator for policy makers, to develop strategies to attract experienced GPs and put extra efforts into introducing CDSS for this category specifically. Decision-makers should make sure experienced doctors are convinced of the possible advantages of CDSS because their actions may also influence the decisions of their juniors.

Factors affecting the intention to adopt CDSS- Performance expectancy and effort expectancy

Another important scope of this study was to investigate the attitude level, which can be thought of as the intention to adopt CDSS by Palestinian healthcare providers and the influencing factors. Our study identified important factors that were significantly related to the intention to adopt CDSS. Similar to our results, PE and EE were identified by other studies as important factors influencing the readiness to use CDSS. It is reasonable to think that when somebody perceives a system will be useful for their daily work and ensure easiness of use, they will be more open to using CDSS (Aljarboa & Miah, 2021; Catho et al., 2020; Esmaeilzadeh et al., 2015; Kim et al., 2016; Laka et al., 2021; Ploegmakers et al., 2022).

Since PE and EE play a vital role in the successful usage of CDSS, policy makers should highlight the added value of incorporating CDSS in Palestinian settings, and emphasize its positive contribution to patients' outcomes. Ensuring users that the system will be effort free is also one important variable to be taken into consideration. Stakeholders should implement CDSS only after proper and careful selection of its features. According to the available literature, alert fatigue and the associated troublesome use of the system have been identified as the primary concerns of physicians in some settings (Khalifa, 2014; Ploegmakers et al., 2022). Therefore, for successful implementation, cautious CDSS selection in collaboration with expert IT companies and physician involvement are essential.

Computer self-efficacy

Regarding computer self-efficacy, Esmaeilzadeh and colleagues demonstrated that computer self-efficacy significantly influenced the intention to use CDSS, which is consistent with our findings (Esmaeilzadeh et al., 2015). As noted earlier, we updated our model to include this variable; as a result, future studies are encouraged to address it as well, given the noteworthy impact we discovered on the intention to adopt CDSS.

Level of involvement in decision making

In other studies, it was found that the degree of healthcare professionals' involvement in the development, selection, and implementation of CDSS had a significant impact on their motivation to use the CDSS; however, our data did not support this finding (Esmaeilzadeh et al., 2015). The contradictory results could be due to the disparities between the organizational infrastructure and different hierarchies between the country of the previous study (Malaysia) and Palestinian settings. According to our findings, healthcare providers are willing to use a CDSS

even if they weren't part of the process of selection, as their need for these systems overrides their desire to be involved in the decision making of the managers. However, this encourages more studies to be conducted in this regard to obtain a better reflection of this correlation.

Furthermore, our findings highlighted a crucial problem with the inadequate participation of Palestinian doctors in decision-making. Other developing nations, besides Palestine, appear to be dealing with the same problem (Esmaeilzadeh et al., 2015). Additional attention should be attributed to physicians in hospitals, as they are the pillars of these organizations.

Perceived threat to professional autonomy

As can be observed in the results section, our hypothesis regarding perceived threats to professional autonomy was verified, revealing a strong inverse association. Even though it wasn't part of the original UTAUT model and was added to our conceptual framework, this variable, in addition to PE, had the most impact on users' acceptability. Meaning that as the fear of losing control over the profession increases, the intention to use the system decreases. This relationship was highly studied in the context of CDSS adoption. The same negative relationship was identified by several studies (Esmaeilzadeh et al., 2015; Jao & Hier, 2010; Liberati et al., 2017b; Walter & Lopez, 2008). A new technology may make doctors feel threatened for a number of reasons. First, some people think that the CDSS may eventually fill their positions and replace them. Second, some perceive it could disturb the workflow and decrease clinicians' time with their patients. Third, some physicians think their knowledge loses its flexibility and the interventions restrict their clinical judgements(Sambasivan et al., 2012). This finding necessitates careful planning and the need to involve healthcare providers in the selection process. Stakeholders should make sure clinicians understand that their professional roles are recognized

and would be strengthened by utilizing CDSS rather than the contrary in order to achieve successful adoption.

Social influence

The social influence was the final factor that was discovered to favorably influence Palestinian doctors' intentions to adopt CDSS. As healthcare professionals urge one another to take the same actions, our theory about how well social interactions boost the intention for adoption is proven to be true, which was confirmed by previous studies (Kijsanayotin et al., 2009), however another two studies found contradictory results regarding the social influence variable (Aljarboa & Miah, 2021; Esmaeilzadeh et al., 2015). Social influence could be related to cultural differences which justifies the contradictory results. However, since we identifed this variable, it is worth taking into consideration when applying CDSS in Palestinain contexts.

5.3 Practical implications to Palestinian healthcare sector

Our study has several implications to the Palestinian healthcare sector including but not limited to the following:

- This thesis helped identify potential determinants for CDSS adoption in Palestine, including the importance of PE, EE, computer self-efficacy, social influence, and perceived threat to professional autonomy on users' acceptance towards CDSS.
- Our thesis provided possible future implications for the health informatics sector in Palestine, as features of CDSS should be user-friendly as much as possible with up-to-date evidence-based interventions so as to be more accepted by users.
- Our findings provide an important basis for the PMOH and policy makers, to start the introduction of CDSS in Palestinian contexts. Despite the high unfamiliarity levels with

the term CDSS, Palestinian healthcare providers seem to be intending to adopt CDSS once it becomes available in their settings.

5.4 Conclusion and recommendations

Despite the high unfamiliarity with CDSS, a high intention to adopt CDSS was present among Palestinian physicians. Implementing CDSS in Palestine can be a challenging task. However, this study identified important factors that affect users' acceptance, that need to be considered in the planning phase of CDSS.

Managers and stakeholders are encouraged to inform medical staff about the potential benefits of CDSS in order to remove adoption barriers and ensure that a CDSS is an aiding tool rather than a threat to their autonomy because performance expectancy and perceived threat showed the highest effect on users' acceptance. One recommendation in this regard would be to send a number of physicians abroad to settings where CDSS was successfully implemented to reflect the positive impact of this tool. Moreover, proper training is needed to provide doctors with the abilities they need to get past their prejudices about technology. To do so, the PMOH may conduct a number of training sessions, in coordination with the administration of hospitals. This will also help in supporting older physicians who might not be comfortable with these systems.

And finally, establishing good social networks is a favorable thing in general for any organization, and will also help facilitate adopting CDSS. Our study highlighted the importance role that social interaction has; therefore, focusing on the social environments is a key step in the planning phase as well.

5.5 Future research

Despite the contribution of this research paper to the body of knowledge about Palestinian settings, a scarcity of information still exists about CDSS in Palestine. Comprehensive research involving private hospitals is still needed to have generalizable results on this topic. Also, this study provided preliminary data about the potential factors that might affect or hinder the use of CDSS in Palestinian settings. To expand our findings, additional national studies are required. Opportunities for further research include integrating a trial CDSS in healthcare facilities and obtaining a post-implementation feedback about the system. In doing so, the theoretical part covered by our study will be supported by actual usage, leading to the true implementation of CDSS in the near future, hopefully.

5.6 Strength of the study

This study was the first one to address CDSS in Palestine from this perspective. The studied parameters added to the existing-limited knowledge about Palestinian contexts. No previous studies reported the level of CDSS knowledge as our paper did. Also, no earlier information was available about any potential factors that influence the desire to adopt CDSS. Another strength point of our study is that a valid model for technology adoption was used and was also modified to better fit Palestinian settings. In addition, a validated questionnaire tool was used by the author of the study to collect data in person, thereby ensuring a high quality of data. Last but not least, the Palestinian resident/GP was the core of the study, which enhances the significance of this research further given that they are the key players in successful implementation.

5.7 Limitations

Our study had a number of limitations. First, it may be challenging to extend the study's findings to other private and governmental hospitals due to the study's inclusion of three governmental

hospitals from the middle and south of Palestine. Second, the cross-sectional design of the study, which seeks out prevalence and associations rather than demonstrating causal relationships, encourages additional research to be done in this regard to establish causal links. Third, in order to achieve the recommended sample size with a confidence interval of 95%, a 10% margin of error was adopted due to the constrained resources made available for this study. Fourth, even though the used technology adoption model is a well-known model, the participants were theoretically questioned about CDSS, which might have marginally influenced their answers.

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Appendices

Appendix A – Experts' information

Name	Position
Dr. Haytham Eriqat	Pediatrician
Dr. Ihab Abu Ammar	Resident doctor
Dr. Raneen Bakri	Resident doctor
Dr. Fadi Bannoura	General practitioner
Dr. Wissam Khair	Senior doctor
Dr. Shahenaz Najjar	Assistant Professor of Health Sciences - Arab American University
Dr. Faisal Awartani	Senior Researcher and Development Expert- Arab American University

Appendix B – Questionnaire

نموذج الموافقة

عزيزي/تي الطبيب/ة

أنت مدعو/ة للمشاركة في هذا الاستبيان لقياس و تقييم العوامل المؤثرة في نية تبني أنظمة دعم القرار السريري بين الأطباء الفلسطينيين في المستشفيات الحكومية

أنظمة دعم القرار السريري (CDSS)

هي أنظمة كمبيوتر تسمح للأطباء بالحصول على المشورة الطبية أثناء علاج المرضى. تستخدم هذه الأنظمة ، بيانات المريض كمدخلات وباستخدام بعض تقنيات التفكير المنطقي المبرمج مسبقا تولد خيارات تشخيصية و مقترحات عن الوصفة الطبية و الادوية المناسبة لحالة المريض. لذلك ، تتمثل الوظيفة الرئيسية لـ CDSS في تحسين اتخاذ القرارات السريرية للأطباء من خلال التوصية بالخطط العلاجية و تقديم اقتراحات علمية للحالات المرضية المختلفة.

الهدف من الدراسة

تحديد مدى انتشار المعرفة والمواقف والقبول المحتمل لاعتماد CDSS بين مقدمي الرعاية الصحية الفلسطينيين في المستشفيات الحكومية

طريقة إجراء الدراسة

سيتم إجراء هذه الدراسة من خلال إجابة مجموعة الأسئلة التالية في الاستبيان المرفق.

تجري هذا البحث الدكتورة الصيدلانية هيا سلطان، طالبة ماجستير في الجامعة العربية الأمريكية في فلسطين تخصص معلوماتية صحية تحت اشراف كل من الدكتورة شهيناز نجّار والدكتور فيصل عورتاني

يستغرق الاستبيان:5 دقائق على الأكثر

سيتم التعامل مع المعلومات بسرية تامة ولن يتم استخدامها خارج إطار البحث

إذا لديك اي استفسارات يمكنك التواصل معنا من خلال:

رقم جوال: 0597263360

ايميل:hsultan@birzeit.edu

الجزء الأول: معلومات عامة وديموغرافية

1.1 العمر:

☐ 29-20 ☐ 39-30 ☐ 49-40 ☐ 59-50 ☐ 69-60 ☐ أكثر من 70

1.2 الجنس:

☐ ذكر ☐ أنثى

1.3 التخصص:

☐ باطني ☐ أطفال ☐ أشعة ☐ نسائية و توليد ☐ جراحة ☐ أورام ☐ غير ذلك

(الرجاء تحديد التخصص اذا كانت الاجابة غير ذلك) : .....

1.4 سنوات الخبرة : .....

1.5 إلى أي مدى أنت على دراية عامة بأنظمة دعم القرارالسريري التي تهدف إلى مساعدة الأطباء في اتخاذ القرارات السريرية؟

☐ عالي جدا ☐ عالي ☐ متوسط ☐ قليل ☐ قليل جدا

1.6 هل استخدمت أنظمة دعم القرار السريري (CDSS) من قبل؟

☐ نعم ☐ لا

1.7 اسم المستشفى :

.....

ملاحظة: يتم قياس مستوى موافقتك بناءً على مقياس من خمس نقاط على النحو التالي:

أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
5	**4**	**3**	**2**	**1**

الجزء 2: نية استخدام CDSS :

يرجى وضع دائرة حول مستوى موافقتك على العبارات التالية:

	أوافق بشدة				لا أوافق بشدة
أ. أنوي استخدام CDSS في رعاية المرضى واتخاذ القرارات السريرية عندما يصبح متاحًا في قسم المستشفى الذي أعمل فيه	5	4	3	2	1
ب. أعتزم استخدام CDSS لتقديم خدمات الرعاية الصحية للمرضى كلما دعت الحاجة	5	4	3	2	1
ج.أنوي عدم استخدام CDSS في رعاية المريض وعلاجه و في اتخاذ القرارات السريرية بشكل روتيني	5	4	3	2	1
د. أنوي عدم استخدام CDSS في رعاية المريض و علاجه و في اتخاذ القرارات السريرية، اذا كان ذلك ممكنا	5	4	3	2	1
ه. إلى أقصى حد ممكن ، سأستخدم CDSS للقيام بأشياء مختلفة ، في الحالات الحرجة أو غيرالحرجة	5	4	3	2	1
و. إلى أقصى حد ممكن ، سأستخدم CDSS في رعاية المرضى واتخاذ القرارات السريرية بشكل متكرر	5	4	3	2	1

الجزء 3: مستوى مشاركة المتخصصين في الرعاية الصحية:

	أوافق بشدة				لا أوافق بشدة
أ.أعتقد أن المدراء سيسمحون لي بالمشاركة في تخطيط CDSS للمستشفى	5	4	3	2	1
ب.أعتقد أن المدراء سيسمحون لي بالمشاركة في تنفيذ CDSS في المستشفى	5	4	3	2	1
ج.أعتقد أنه يمكنني اتخاذ قرار بشأن تطوير CDSS في المستشفى	5	4	3	2	1
د.أعتقد أنه يمكنني المشاركة في صنع القرار العام لـ CDSS في المستشفى	5	4	3	2	1

الجزء 4: التهديد المتوقع للاستقلالية المهنية:

	أوافق بشدة				لا أوافق بشدة
أ. قد يؤدي استخدام CDSS إلى تقليل سيطرتي على القرارات السريرية	5	4	3	2	1
ب. قد يؤدي استخدام CDSS إلى تقليل استقلالي المهني بشأن قرار رعاية المرضى	5	4	3	2	1
ج. يمكن أن يؤدي استخدام CDSS إلى تقليل سيطرتي على كل خطوة من خطوات عملية رعاية المرضى	5	4	3	2	1
د. قد يؤدي استخدام CDSS إلى زيادة مراقبة قراراتي التشخيصية والعلاجية من قبل غير مقدمي الخدمة وغير المتخصصين (مثل المرضى والإدارة في المستشفى)	5	4	3	2	1
ه. اجد أن CDSS مفيدة لمهنة الطب ككل	5	4	3	2	1

الجزء 5: الكفاءة الذاتية لأجهزة الكمبيوتر لأخصائيي الرعاية الصحية :

	أوافق بشدة				لا أوافق بشدة
أ. أعتقد أن لدي مهارات جيدة من حيث التعامل مع أجهزة الكمبيوتر بشكل عام	5	4	3	2	1
ب.أعتقد أن لدي مهارات جيدة من حيث التعامل مع نظام Avicenna تحديدا	5	4	3	2	1
ج. لقد كان تعلم التعامل مع نظام Avicenna سهل بالنسبة لي	5	4	3	2	1
د.أعتقد بأنني على دراية كافية بكافة تفاصيل نظام Avicenna	5	4	3	2	1
ه.أعتقد أن لدي الكثير لأتعلمه عن نظام Avicenna لتحسين جودة عملي	5	4	3	2	1
و. أقوم باستخدام نظام Avicenna لأقصى حد ممكن خلال عملي	5	4	3	2	1
ز. أعتقد أنه يمكنني تعلم إكمال مهمة جديدة على الكمبيوتر إذا رأيت شخصًا آخر يستخدمها قبل تجربتها بنفسي	5	4	3	2	1
ح. سيكون من السهل تعلم اجراء مهمة جديدة على الكمبيوتر إذا كان بإمكاني الاتصال بشخص ما للحصول على المساعدة إذا تعثرت	5	4	3	2	1

الجزء 6: توقع الأداء ومتوقع الجهد:

6.1 توقع الأداء:

	أوافق بشدة				لا أوافق بشدة
أ. سأجد CDSS مفيدًا في عملي	5	4	3	2	1
ب. سيمكنني استخدام CDSS من إنجاز المهام بسرعة أكبر	5	4	3	2	1
ج. سيؤدي استخدام CDSS إلى زيادة إنتاجيتي	5	4	3	2	1
د. إذا استخدمت CDSS ، فسوف أزيد من فرصي في الحصول على علاوة	5	4	3	2	1
ه. إذا استخدمت CDSS ، فسيؤدي ذلك إلى تحسين أدائي في وظيفتي من حيث دقة و نجاح الخطة العلاجية	5	4	3	2	1
و. إذا استخدمت CDSS ، فسيعزز ذلك من فعاليتي في وظيفتي من حيث سرعة الأداء	5	4	3	2	1

6.2 توقع الجهد:

	أوافق بشدة				لا أوافق بشدة
أ. سيكون العمل مع CDSS واضحًا ومفهومًا	5	4	3	2	1
ب. سيكون من السهل بالنسبة لي أن أصبح ماهرًا في استخدام CDSS	5	4	3	2	1
ج. اعتقد أن استخدام ال CDSS سيكون سهل	5	4	3	2	1
د. سيكون تعلم تشغيل CDSS أمرًا سهلاً بالنسبة لي	5	4	3	2	1
ه. أعتقد أنه من السهل الحصول على ما تريد من CDSS	5	4	3	2	1
و. لن يتطلب تفاعلي مع CDSS الكثير من جهدي الذهني	5	4	3	2	1

الجزء 7: التأثير الاجتماعي:

	أوافق بشدة				لا أوافق بشدة
أ. بشكل عام ، لديّ علاقة جيدة جدًا مع زملائي (مثل المساعدين المتخصصين ومساعدي الأطباء و المهنيين المبتدئين)	5	4	3	2	1
ب. أجري دائمًا مناقشة مطولة مع زملائي (مثل المساعدين المتخصصين ومساعدي الأطباء والمهنيين المبتدئين)	5	4	3	2	1
ج. يمكنني دائمًا الوثوق بزملائي (مثل المساعدين المتخصصين ومساعدي الأطباء والمهنيين المبتدئين) لمساعدتي إذا كنت بحاجة لذلك	5	4	3	2	1
د.أعتقد أن زملائي (مثل المساعدين المتخصصين والأطباء والمهنيين المبتدئين) متحمسون دائمًا لتحقيق الأهداف والمهام الجماعية للمنظمة بأكملها	5	4	3	2	1
ه. أنا على استعداد لمساعدة الآخرين الذين لديهم مشاكل متعلقة بالعمل في المستشفى	5	4	3	2	1
و. إنني على دراية بكيفية تأثير سلوكي على وظائف زملائي الآخرين	5	4	3	2	1

Appendix C- PMOH and hospital approvals

State of Palestine
Ministry of Health
General Directorate of Education in
Health and Scientific Research

دولة فلسطين
وزارة الصحة
الإدارة العامة للتعليم الصحي
والبحث العلمي

Ref.: .....
Date:.....

الرقم: ٢٢/١٩٣/٦٦٣
التاريخ: ٢٠٢٢/٦/٢٠

عطوفة الوكيل المساعد المدير التنفيذي لمجمع فلسطين الطبي المحترم،،،
الأخ مدير عام الادارة العامة للمستشفيات المحترم،،،
تحية واحترام،،،

الموضـــوع: تسهيل مهمة بحث

يرجى تسهيل مهمة الطالبة: هيا سلطان، ماجستير معلوماتية صحية– الجامعة العربية الامريكية، لعمل بحث بعنوان:

" تقييم العوامل المؤثرة في نية تبني أنظمة دعم القرار السريري بين الأطباء الفلسطينيين في المستشفيات الحكومية: دراسة مقطعية "

حيث ستقوم الطالبة بجمع معلومات من خلال عمل تعبئة استبانة من قبل الاطباء (بعد اخذ موافقتهم)، مع العلم أن مشرف الدراسة: د. شهناز النجار ود. فيصل عورتاني.

وذلك في:

مستشفى عاليه/الخليل – مستشفى بيت جالا

مجمع فلسطين الطبي

على ان يتم الالتزام بالمحافظة على اخلاقيات البحث العلمي وسرية المعلومات.
على ان يتم الالتزام بجميع تعليمات واجراءات الوقاية والسلامة الصادرة عن وزارة الصحة بخصوص جائحة كورونا، وتحت طائلة المسؤولية. وابراز شهادة التطعيم قبل دخول مرافق وزارة الصحة.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر لحين الحصول على موافقة وزارة الصحة.

مع الاحترام،،،

د. عبد الله القواسمي
مدير التعليم الصحي والبحث العلمي

نسخة: عميد كلية الدراسات العليا المحترم/ الجامعة العربية الامريكية

Telfax.:09-2333901 scientificresearch.dep@gmail.com تلفاكس: 09-2333901

Arab American University
Faculty of Graduate Studies

الجامعة العربية الأمريكية
كلية الدراسات العليا

2022-5-10

الدكتور أحمد البيتاوي المحترم،،

مدير مستشفى مجمع فلسطين الطبي

تسهيل مهمة بحثية

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الأمريكية أطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالبة **هيا سلطان** والتي تحمل الرقم الجامعي **202012909** هي طالبة ماجستير في برنامج إدارة المعلوماتية الصحية، وتعمل على رسالة الماجستير الخاصة بها بعنوان:

" تقييم العوامل المؤثرة في نية تبني أنظمة دعم القرار السريري بين الأطباء الفلسطينيين في المستشفيات الحكومية: دراسة مقطعية". تحت إشراف الدكتور يوسف ميمي، حيث تستهدف الدراسة قياس العوامل المؤثرة في نية تبني أنظمة دعم القرار السريري بين الأطباء الفلسطينيين في ثلاث مستشفيات حكومية (مجمع فلسطين الطبي، مستشفى عالية الحكومي، مستشفى بيت جالا الحكومي). علماً ان أداة التقييم التي سيتم استخدامها هي عبارة عن استبيان، نأمل من حضرتكم الإيعاز لمن يلزم لمساعدتها للحصول على المعلومات اللازمة للدراسة، وذلك من خلال السماح لها بالتواصل مع الأطباء (المقيمين) المعنيين وجمع المعلومات المطلوبة لإتمام البحث.علماً أن المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بغاية السرية، وقد أعطيت هذه الرسالة بناءً على طلبها.

وتفضلوا بقبول فائق الاحترام

عميد كلية الدراسات العليا

د. نوار قطب

كلية الدراسات العليا
FACULTY OF GRADUATE STUDIES

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E-mail: FGS@aaup.edu ; PGS@aaup.edu Website: www.aaup.edu

Arab American University
Faculty of Graduate Studies

الجامعـــة العربيـــة الأمريكيـــة
كلية الدراسات العليا

2022-5-10

حضرة الدكتور محمود ابراهيم المحترم،

مدير مستشفى بيت جالا الحكومي

تسهيل مهمة بحثية

تحية طيبة وبعد،

تهديكم كلية الدراسات العليا في الجامعة العربية الأمريكية أطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالبة **هيا سلطان** والتي تحمل الرقم الجامعي **202012909** هي طالبة ماجستير في برنامج إدارة المعلوماتية الصحية، وتعمل على رسالة الماجستير الخاصة بها بعنوان:

" تقييم العوامل المؤثرة في نية تبني أنظمة دعم القرار السريري بين الأطباء الفلسطينيين في المستشفيات الحكومية: دراسة مقطعية".
تحت إشراف الدكتور يوسف ميمي، حيث تستهدف الدراسة قياس العوامل المؤثرة في نية تبني أنظمة دعم القرار السريري بين الأطباء الفلسطينيين في ثلاث مستشفيات حكومية (مجمع فلسطين الطبي، مستشفى عالية الحكومي، مستشفى بيت جالا الحكومي).
علماً ان أداة التقييم التي سيتم استخدامها هي عبارة عن استبيان، نأمل من حضرتكم الإيعاز لمن يلزم لمساعدتها للحصول على المعلومات اللازمة للدراسة، وذلك من خلال السماح لها بالتواصل مع الأطباء (المقيمين) المعنيين وجمع المعلومات المطلوبة لإتمام البحث.علماً أن المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بغاية السرية، وقد أعطيت هذه الرسالة بناءً على طلبها.

وتفضلوا بقبول فائق الاحترام

عميد كلية الدراسات العليا
د. نوال قطب

كلية الدراسات العليا
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Appendix D- Mean scores and standard deviation for each item of the questionnaires' constructs

Variable	Mean	SD	Variable	Mean	SD
Inten1*	4.3306	0.751387	SE7	3.9597	.79018
Inten2	4.2984	0.754174	SE8	4.0242	.80105
Inten3	3.5323	1.321710	PE1*	4.1545	.75783
Inten4	3.701613	1.306518	PE2	4.0163	.81967
Inten5	3.7581	.99895	PE3	3.9915	.78985
Inten6	3.8710	0.979196	PE4	3.0325	1.10835
Involv1*	3.3171	1.08882	PE5	3.8548	.85248
Involv2	3.3740	1.035425	PE6	3.9355	.77294
Involv3	3.1066	1.089449	EE1*	3.8548	.85248
Involv4	3.1057	1.16516	EE2	4.0403	.74789
PT1*	2.9516	1.08091	EE3	3.8943	.83777
PT2	2.795082	1.12035	EE4	3.9032	.87809
PT3	2.6967	1.02763	EE5	3.7581	.78988
PT4	3.4516	1.02295	EE6	3.7339	.91161
PT5	4.0887	.85551	SI1*	4.2339	.74473
SE1*	4.0726	.89419	SI2	3.8387	.94900
SE2	4.0000	.86839	SI3	3.8468	.85582
SE3	3.8770	.96704	SI4	3.6748	.90078
SE4	3.5610	.99298	SI5	4.1774	.72188
SE5	3.6917	.96837	SI6	4.0161	.74336
SE6	3.8667				

Inten-Intention to adopt, Involv-Involvment in decision making, PT-perceived threat, SE-computer self-efficacy, PE-performance expectancy, EE-effort expectancy, SI-social influence, SD-standard deviation
* 5-point Likert scale, 5= strongly agree, 4=agree, 3= neither agree nor disagree, 2 = disagree, 1= strongly disagree

ملخص الدراسة

مقدمة: إن أحد أكثر التقنيات الجديدة شيوعًا في قطاع الرعاية الصحية هو نظام دعم القرار السريري ، وهي ميزة توفرها السجلات الصحية الإلكترونية .علما أن نظام دعم القرار السريري هو أي تطبيق يستخدم لمساعدة الطبيب في اتخاذ القرار السريري وتوفير المعرفة فيما يتعلق بالعلاج والتشخيص. على الرغم من الفوائد المرتبطة بذلك ، فإن قلة استخدام هذه الأنظمة يسبب تحديًا عالميًا. في فلسطين ، لم يتم تبني هذا النظام حتى الآن ، مما يستلزم استكشاف مستوى القبول لدى مقدمي الرعاية الصحية بالإضافة للعوامل المحتملة التي تؤثر على نية التبني.

الأهداف: تقييم مستوى المعرفة العامة والموقف حول نظام دعم القرار السريري وتوزيعها حسب الخصائص الديموغرافية. أيضًا لتحديد تأثير توقع الأداء ، ومتوسط الجهد المتوقع ، ومستوى الكفاءة الذاتية للكمبيوتر ، ومستوى المشاركة في صنع القرار ، والتهديد المتصور للاستقلالية المهنية ، والتأثير الاجتماعي على نية تبني أنظمة دعم القرار السريري.

منهجية البحث: تم استخدام مسح قائم على الاستبيان مكون من سبعة أجزاء تحتوي 41 عنصرًا كأداة لجمع البيانات. تم اشتقاق أجزاء الاستبيان من النظرية الموحدة المعدلة لقبول واستخدام التكنولوجيا (UTAUT). العينة المستهدفة كانت الأطباء المقيمين بالإضافة للأطباء العامين في ثلاث مستشفيات حكومية و اللذين بلغ عددهم 363 طبيب. لقد تم جمع 124 استبيان علما أن الحد الأدنى الموصى به للدراسة كان 77 استبيان.

نتائج البحث: غالبية المشاركين كانوا من الذكور بنسبة 75٪ (عدد = 93) بمتوسط سنوات خبرة 2.9 سنة. أظهر المشاركون مستوى معرفيًا عامًا معتدلاً مع نية عالية لاعتماد أنظمة دعم القرار السريري ، وكلاهما لم يتأثر بالخصائص الديموغرافية للمشاركين.كما و أظهرت نتائجنا تأثير واضح للعناصر التالية على نية تبني و قبول نظام دعم القرار السريري: توقع الأداء حيث كانت القيمة الاحتمالية ($p = 0.000$ ، $r = 0.469$) ، توقع الجهد ($p = 0.001$، $r = 0.294$) ، مستوى الكفاءة الذاتية للكمبيوتر ($p = 0.015$، $r = 0.218$) ، التهديد المتوقع للاستقلالية المهنية ($p = 0.001$، $r = -0.302$) ، والتأثير الاجتماعي ($p = 0.047$، $r = 0.179$). من ناحية أخرى ، لم يؤثر مستوى المشاركة في اتخاذ القرار بشأن نظام دعم القرار السريري على قبول المستخدمين ($p = 0.123$، $r = 0.140$).

الخلاصة: يوفر هذا البحث الأساس للتطبيق الناجح لـــنظام دعم القرار السريري في فلسطين. على الرغم من استعداد الأطباء الفلسطينيين لاعتماد هذا النظام ، إلا أن هناك حاجة إلى تخطيط دقيق وشامل. لذلك تم تحديد العديد من العوامل التي قد تؤثر على نية تبني هذا النظام، مما يستلزم أخد هذه العوامل بعين الاعتبار لتلبية توقعات المستخدمين واحتياجاتهم.