TRUST FACTORS IN HEALTHCARE TECHNOLOGY: A HEALTHCARE PROFESSIONAL PERSPECTIVE

Raja Manzar Abbas[1], Noel Carroll[3], Ita Richardson[1,2], Sarah Beecham[1]
[1]*Lero - the Irish Software Research Centre, University of Limerick, Limerick, Ireland*
[2]*HRI- Health Research Institute, University of Limerick, Limerick, Ireland*
[3]*Lero - the Irish Software Research Centre, National University of Ireland Galway, Galway, Ireland*
{raja.abbas, noel.carroll, ita.richardson, sarah.beecham}@lero.ie

Keywords: Trust, Healthcare Technology, Technology Adoption, Healthcare Professionals, Mapping Study

Abstract: Being able to trust technology is of vital importance to its potential users. This is particularly true within the healthcare sector where lives increasingly depend on the correct application of technology to support clinical decision-making. Despite the risk posed by improper use of technology in the healthcare domain, there is a lack of research that examines why healthcare professionals trust healthcare technology. Therefore, there is little evidence regarding the key trust facilitators and barriers. In this paper, we investigate the concept of trust within a healthcare technology context. We conducted a systematic mapping study to identify relevant trust facilitators and barriers in published work in well-known bibliographic databases. Our results present a synthesis of 47 studies that describe trust factors that healthcare professionals associate with healthcare technology. Facilitators include compatibility and perceived systems usefulness, while barriers include privacy concerns and lack of knowledge. We conclude that HCT trust is complex, multi-dimensional, and influenced by a variety of factors at individual and organizational levels.

1 INTRODUCTION

Healthcare technology (HCT) is defined by the World Health Organization as the "application of organized knowledge and skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem and improve quality of lives" (WHO, 2017). This includes the pharmaceuticals, devices, procedures and organizational systems used in healthcare. HCT has the potential to address many of the challenges that healthcare is currently confronting. For example, HCT improves information management, access to health services, quality and safety of care, continuity of services, and costs containment (Miles and Asbridge, 2014).

Due to the growth in population and shift in demographics, there is considerable pressure on global healthcare systems to provide an effective and efficient service. Shojania et al. (2016) attribute deaths of 251,454 people in US hospitals per year to medical errors, the third-leading cause of death in the USA. The Institute of Medicine study estimated the cost of nonfatal medical errors is between $17 billion and $19 billion each year, and that between 2.9% and 3.7% of all patients admitted suffer some type of injury as a result of medical mismanagement. As a result, there is a growing focus on HCT support for healthcare services which has given rise to a comprehensive sociotechnical model for managing healthcare through technology (Carroll, 2016). Technological advances have encouraged the development of new technologies that drive connectivity across the healthcare sector, for example, systems that manage care using just-in-time information (Leroy et al., 2014).

Research suggests that patients also want clinicians to use HCT (Car and Sheikh, 2004). With increasing global computerisation, HCT is expected to become part of healthcare professional practice. Nevertheless, it appears that several HCT applications remain underused by healthcare professionals (Berner et al., 2005, Brooks and Menachemi, 2006). Healthcare organizations, particularly physician practices, are often used as examples for lagging behind in trusting and adopting these technologies (Yarbrough and Smith, 2007).

Human and organizational factors have frequently been identified as the main causes of HCT implementation and usage failure (Pagliari, 2005, Carroll et al., 2016).

1.1 Problem Statement

Although barriers and facilitators of trust in HCT settings are described to a certain extent in the literature, only a few studies have systematically reviewed factors influencing trust in different types of HCT (Yarbrough and Smith, 2007, Anderson, 2007, Kukafka et al., 2003, Yusof et al., 2007, Gagnon et al., 2012). Furthermore, there is no consensus on the categorisation of barriers and facilitators related to trust in HCT since most of these reviews have not been from a healthcare professional prospective.

The study in this paper systematically maps the key trust factors that are positively (facilitators) or negatively (barriers) associated with HCT used in clinical settings by healthcare professionals. Furthermore, this mapping allows us to highlight the differences and similarities of trust factors between different HCT types. This study serves as an initial basis for developing a fine-grained understanding of what comprises 'trust' in HCT from a healthcare professional's view-point. Such information can be crucial to design and implementation strategies that take end-users' concerns about trust into account and thus, have a higher chance of being accepted or implemented.

The remainder of the paper is organized as follows: Section 2 provides a brief overview of trust and different trust definitions in the healthcare and computer science literature. Section 3 describes our methodology adopted for this study. Section 4 describes our findings and results from the literature. Section 5 presents the discussion from the findings and results. Finally, Section 6 presents the conclusion, limitations and future research opportunities.

2 OVERVIEW OF TRUST

The ultimate goal of technology is to support end-users in accomplishing their tasks in a convenient and efficient manner. However, the literature suggests a loss of productivity while using HCT and this leads to a lack of trust in the HCT (Van Velsen et al., 2016).

Trust is generally seen as an important antecedent of the acceptance, use of, and loyalty towards technology (Wu and Chen, 2005, Bélanger and Carter, 2008, van Velsen et al., 2015). This is also the case for HCT, where trust has been found to be an important antecedent of patient acceptance (Park et al., 2011), patients' and healthy persons' thoughts on the usefulness of a personal health record (Cocosila and Archer, 2014), and physicians' intention to use HCT for rehabilitation care (Wu et al., 2008).

Trust is investigated in many research fields, such as computer science, economics, politics, sociology and philosophy (Grandison and Sloman, 2000, Jøsang et al., 2007, Misztal, 2013). However, there is no agreement regarding the definition and properties of trust (Gollmann, 2006, Massa, 2007, Raya et al., 2008). According to the literature, trust is difficult to define, convey, measure or specify. Michael et al. (2002) explain that 'trust is a term with many meanings,' and this is supported by a large number of definitions proposed in the literature. Almenárez et al. (2004) define trust as the belief that an entity has about another entity, from past experiences, knowledge about the entity's nature and/or recommendations from trusted entities. Similarly, Robinson (1996) indicates that trust is one's expectations, assumptions or beliefs about the likelihood that another's future actions will be beneficial, favourable or at least not detrimental to one's interests. A more 'common sense' form of trust is derived from Alford (2004) who explains that to trust someone is to be confident that in a situation where you are vulnerable, one will be disposed to act benignly towards you.

Trust is also defined in different ways in the same research field, such as in computer science (Jøsang et al., 2007, Raya et al., 2008). For instance, Massa (2007) defines trust as the judgment expressed by one user about another user, often directly and explicitly, sometimes indirectly through an evaluation of artefacts produced by that user or their activity on the system. Reliability trust is defined as the subjective probability by which an individual expects that another individual perform a given action on which its welfare depends (Jøsang et al., 2007).

Trust is a key factor in the delivery of healthcare, high levels of provider/patient trust is conducive to more effective healthcare (Hall et al., 2002). Trust in healthcare can be seen as a three-part relationship between patient (truster), provider or organization (trustee), and the specific context of delivering healthcare (technology).

There are various definitions of trust in computer science and healthcare that may lead to a confusion about trust in the context of technology (Gollmann, 2006). Since, our focus is on HCT, we follow the trust definition in McKnight et al. (2002) where trust in the technology is defined as an individual's belief

that using a specific technology is safe and secure. In the same way, Krishna and Maarof (2002) explain that trust is the firm belief in the competence of an entity to act dependably, securely and reliably within a specified context.

3 METHOD

In the research literature, we examined the concept of trust in HCT, how the technology is accepted, and what is the criteria for its use. We have employed mapping study guidelines presented by Petersen et al. (2015). Our motivation to undertake a mapping study is to synthesize evidence, and bring about some structure to this research area - *HCT trust factors demonstrated by healthcare professionals*. Considering the broad nature of technological use in healthcare, we argue that stakeholders need to have a set of criteria by which they can assess the level of trustworthiness of a given technology. We present evidence related to trust facilitators and barriers based on the frequency of them occurring in the literature. In this study, we acknowledge that trust is often considered an elusive term. Therefore, in order to ensure that we captured various nuances related to trust in HCT, we have included terms related to the adoption, usage and acceptance of HCT. This builds on our knowledge that the literature uses these terms interchangeably when alluding to the concept of trust.

3.1 Eligibility Criteria

To account for the different types of studies on trust factors for HCT by healthcare professionals, a mixed study review was conducted. This can be conceptualized as a mixed methods research study where data consists of the text of papers reporting primary qualitative and quantitative studies in addition to mixed methods studies (Pluye et al., 2009).

3.2 Search Strategy

We searched seven well-established digital databases (*CINAHL, Embase, IEEE Xplore, Science Direct, Scopus, Springer Link and Web of Science*) for relevant publications. For expediency, we ran one search using the following search string (or variants of the search string to fit the various databases):
("Health care" OR *Healthcare*) AND (*Trust** OR *Accept** OR *Adopt** OR *Usage*) AND (*Software* OR "*Information Technology*" OR "*Information System")*.

The search process and result is in Figure 1.

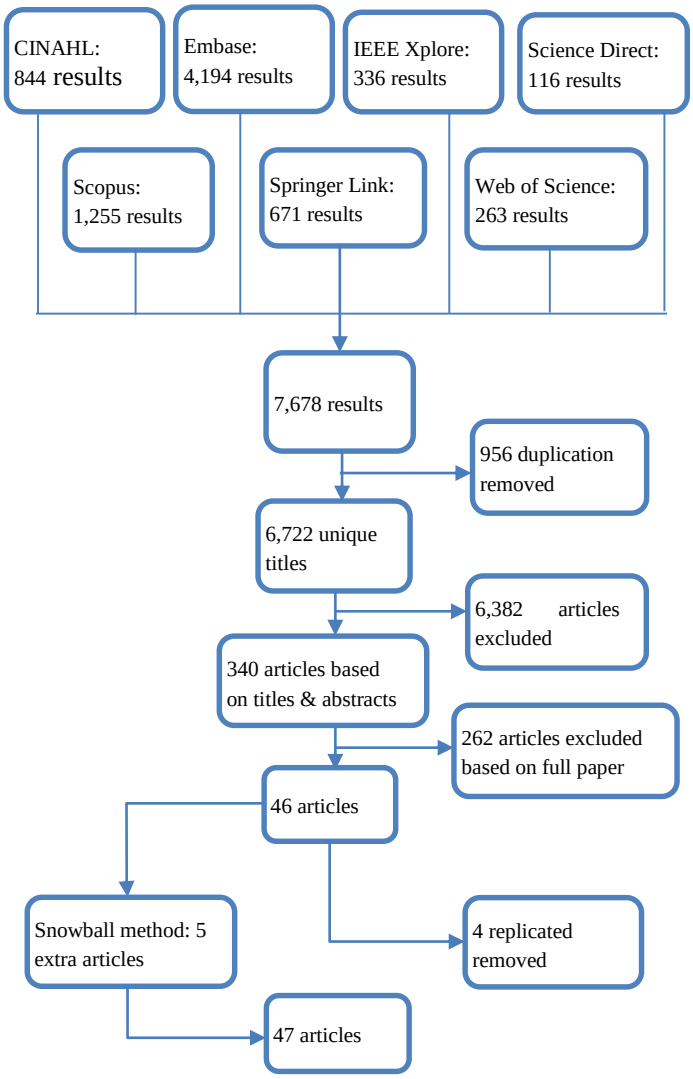

Figure 1: Study selection flow diagram

3.3 Article Selection

Titles and abstracts were screened by one of the authors [R1]. Out of the total 7,678 studies, 956 studies were removed by *EndNote* software as they were duplicated. From 6,722 studies, 340 full articles were selected by R1 through applying the inclusion exclusion criteria shown in Table 1. For validation purpose, a random 44 studies out of 6722 were selected and sent to two authors [R2] [R3]. Where there were conflicts with inclusion, this discrepancy was resolved by arbitration and mutual consent. In next step, inclusion exclusion criteria were applied by R1 on the remaining 340 articles. This resulted in 294 articles being excluded. For validation of the excluded articles, a randomly

chosen 40 studies from these 294 articles were reviewed by R2, and agreement was observed. Out of 46 included articles, four were found to be replicated and were removed.

In addition, using the snowball method, references from included articles were checked to ensure inclusion of relevant studies which may have been overlooked. Five articles were added resulting in a total of 47 articles presented in this study.

Table 1: Inclusion (I) and Exclusion (E) criteria

I: Original and peer-reviewed research written in English;
I: Qualitative, quantitative or mixed methods research;
I: Study on healthcare technology;
I: Study containing healthcare professional prospective;
I: Suggests/ recommends or contains/defines at least one trust attribute for healthcare technology;
I: Describes factors that influence trust or the intention to use technology in healthcare practice.
E: White or grey literature
E: Presents research noted in a prior/subsequent paper

3.4 Synthesis

A narrative synthesis, the process of synthesising primary studies to explore heterogeneity descriptively rather than statistically (Mays et al., 2005), was performed to summarize the evidence. We abstracted the trust factors into three categories: *HCT factors or characteristics of the HCT, Individual factors or healthcare professional characteristics* and *Organizational factors*.

4 MAPPING RESULTS

This systematic mixed mapping study presents an integrative and comprehensive structure of trust factors and barriers associated with HCT for healthcare professionals. Additionally, we present their relative importance for specific types of HCT used in healthcare. In this mapping study, 47 papers presented 57 trust facilitators and 48 trust barriers in HCT demonstrated by healthcare professionals. Table 2 shows different types of HCT throughout the literature and categorizes them into 8 specific types of HCT based on their characteristics. Most discussed HCT were **Information Systems** (including; online databases, electronic guidelines, information technology, electronic appointment system and computer systems), **Telemedicine** (including; smartphones, m-health, mobile health systems, tele-health and e-health), **Electronic Records** (including; medical/ health/ patient record, health information exchange, electronically mediated services and electronic logistics information system), **Wearable Devices**, **Evidence-based Medicine**, **Adverse Event Reporting System**, **Multi-agent System** and **Computerised Medical Diagnosis Systems**. Tables 3 and 4 present trust facilitators and trust barriers most frequently discussed in the literature. Studies are referenced in our associated technical report (Abbas et al., 2017).

There are differences and similarities between trust factors associated with each type of HCT. *Perceived system usefulness* is a consistent factor across all types of HCT, but its importance varied according to the technology. *Security issues* and *privacy concerns* are the most prominent trust barriers.

Table 2: Healthcare Technology within studies

Type of Healthcare	**Study reference number**
Information System (IS)	S2,S3, S8, S11, S20, S25, S33, S34, S35, S36, S37, S39, S46, S47
Telemedicine (TM)	S7, S10, S12, S17, S19, S26, S30, S31, S40, S43, S45
Electronic Record (ER)	S2, S4, S6, S9, S13, S14, S15, S18, S21, S22, S23, S32, S41, S44
Wearable Devices (WD)	S24, S28
Evidence-Based Medicine (EBM)	S1, S16, S29
Adverse Event Reporting System (AERS)	S5
Multi-Agent Systems (MAS)	S38
Computerised Medical Diagnosing System (CMDS)	S29

5 DISCUSSION

Various types of factors (technological, human, and organizational) influence the level of HCT trust by healthcare professionals. Factors facilitating HCT trust tend to be mostly related to the perception of the characteristics of the specific HCT and to organizational aspects. Barriers are also related to HCT characteristics, and are found in each of the individual, professional, and organizational levels. Some of the trust factors identified are ‘multilevel’ since they could affect more than one level (e.g. *ease of use* can be seen as a characteristic of the HCT but is also related to *familiarity with HCT* at the individual level). Interestingly, they are described as a facilitator in one level, but a barrier in another level indicating the importance of context.

Table 3: Trust facilitators

Types of Trust Factors	Trust Facilitators	IS	TM	ER	WD	EBM	AERS	MAS	CMDS
HCT factors or characteristics of the HCT	Compatibility	3	×	1	1	×	×	1	×
	Security	1	2	2	×	1	×	×	×
	Reliability	2	2	2	×	1	×	×	×
	Functionality	3	3	2	×	1	×	1	×
	Usability	1	3	1	×	×	×	×	×
Individual factors or healthcare professional characteristics	Knowledge	2	2	4	×	2	×	×	1
	Positive attitude towards usage	3	×	3	×	×	×	×	1
	Perceived system usefulness	17	4	14	3	1	3	×	1
Organizational factors	Training and technical support	3	×	4	×	1	3	×	×

Table 4: Trust barriers

Types of Trust Factors	Trust Barriers	IS	TM	ER	WD	EBM	AERS	MAS	CMDS
HCT factors or characteristics of the HCT	Privacy concerns	4	5	3	2	×	×	×	×
	Security issues	2	5	5	1	1	×	×	×
	Lack of efficiency	2	2	1	×	1	×	×	×
	Cost issues	3	1	7	×	×	×	×	×
	Poor quality	1	2	2	1	×	×	×	×
	Design & technical concerns	2	1	3	1	1	×	×	×
Individual factors or healthcare professional characteristics	Lack of knowledge	3	1	4	×	4	×	×	×
	Negative attitude towards usage	1	1	1	×	1	2	×	×
	Perceived risks of usage	3	2	3	1	1	×	1	×
	Task complexity	1	3	2	×	×	×	×	×
Organizational factors	Poor training and technical support	2	2	2	×	1	×	×	×
	Governance/regulatory compliance and policies	1	2	3	×	1	×	×	×

1. HCT Factors

Compatibility is a trust facilitator within the characteristics of HCT category which is discussed six times in the literature. S37: Hung et al. (2014) defined compatibility as the degree to which the system is consistent with [nurses'] work practices or preferences. Determining whether HCT is consistent is an important trust factor because its function has been specifically updated and modified to meet the current needs. When the user sees that a particular HCT is compatible with their work practice or style, then they start to trust the technology or see the relative advantage of using it.

Reliability is also discussed as a crucial trust facilitator. S45: Van Velsen et al. (2016) discussed trust in a rehabilitation portal technology, which was mainly determined by its reliability. They defined reliability for the rehabilitation portal technology as: "*That it works properly; is not constantly offline. But also scientifically reliable*."

S14: Ross et al. (2010) expressed *functionality* as a trust facilitator for HCT as Electronic Medical Record (EMR) functionality including storage, retrieval of test results, dictated notes, electronic prescribing, shared medication and allergy lists increases motivation to use and trust the system.

Usability is explained by S45: Van Velsen et al. (2016) as a set of attributes that bear on the effort needed for use, and on the individual assessment of

such use, by a stated or implied set of users. Usability has previously been identified as a pivotal part of trust in e-services for the healthcare professional. It is also identified as an important antecedent for creating trust by a physician in HCT.

One of the most discussed trust barriers is the *privacy concern* that has been discussed 14 times in the literature. S13: Hsieh (2015) describes this as the potential loss of confidential patient data in EMR exchange systems leading towards low trust by the healthcare professional in the system.

Another highly cited trust barrier is *cost* and issues related with cost. S14: Ross et al. (2010) describe some practices which identified capital costs, such as installing and supporting new computers and upgraded networking in the practice, as a significant barrier to healthcare exchange use.

Lack of efficiency and *poor quality* has been discussed regularly in the literature. Poor technology quality is one of the factors defined by S9: Egea and González (2011) for clinician's resistance to use and trust technology. They explain, "*a physician who uses telemedicine is concerned by the quality of patient's care which causes distrust about the telemedicine*".

'Multilevel' influencing factors include *security* S13: Hsieh (2015) explain that physicians' intentions to use the system are based on the importance of implementing security measures. Security requirements, such as authentication, data integrity, and encryption increases trust beliefs among physicians. Where the integrity of healthcare data – especially patient identifiable information is not assured, it creates distrust by physicians.

2. Individual Factors

In the context of trust factors for healthcare professionals, *perception of the benefits of the technology* is the most frequent trust facilitator factor encountered in the study, discussed 43 times.

Perceived usefulness, *perceived ease of use/ complexity*, *intention to use* and *perceived behavioural control/facilitating conditions* all fall under the umbrella of usefulness of the system. Behavioural intention to use is defined as the individual's interest in using the system for future work. Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her job performance, while perceived ease of use is defined as the degree to which a person believes that using a particular system would be free of effort S5: (Wu et al., 2008).

Successful cases of HCT trust are usually characterised by a clear understanding of the benefits of the innovation by healthcare professionals. Perceived ease of use is a strong and significant determinant of [nurses'] intention to use and trust electronic health records and also influences the perceived usefulness of the system S37: (Hung et al., 2014).

Perceived risks of usage and *task complexity* are also trust barriers. *Perceived risk* is explained as the uncertainty of a user [physician] or risks associated with the usage of information system S14: (Hsieh, 2015). They have explained that the [physicians'] perceived risk has a negative effect on their trust and intention to use an electronic medical record exchange system as perceived risk increases the anticipation of negative outcomes, leading to an unfavourable attitude that typically results in a negative effect on a user's trust. S15: Saleem et al. (2009) explain nine instances where complexity of a task was not supported by the routine workflow or computerized patient record system functionality, resulting in the distrust of the system.

'Multilevel' influencing factors include *knowledge* (experience, awareness) and *attitude*. S45: Van Velsen et al. (2016) explain that they found an indication of prior experience with telemedicine playing a role in the formation of trust beliefs among healthcare professionals, where lack of knowledge and bad experiences led to low trust. S14: Hsieh (2015) describe how positive or negative correlation exists between [physicians'] attitudes toward using the EMR exchange.

3. Organizational Factors

The main 'multilevel' factors, that may act as a facilitator or barrier to HCT trust on organizational level, is *training and technical support*. It is reported a little more often as contributing positively as the facilitator of trust and when it is a negative factor, training could be non-existent, but also inadequate.

S17: Kayyali et al. (2017) describe that, when healthcare professionals used telehealth, it also raised the need for telehealth training packages for clinicians. It is therefore not surprising that in a context where healthcare professionals have very limited time to learn to use a new HCT, *training and technical support* plays an important role in forming trust in the technology. Other influencing trust barriers include *governance/regulatory compliance* and *policies*.

6 CONCLUSION

HCT trust is complex, multi-dimensional, and influenced by a variety of factors at individual and organizational levels. Based on the trust factors identified in this study, the main ingredients for a

successful HCT strategy for any healthcare professional should include: *perceived usefulness*, *usability* and *training and technical support*. The strategy should recognise main trust barriers including *lack of privacy*, *cost issues*, *perceived risks* and *security issues*.

The mapping presented in this paper can guide decision makers through HCT implementation, providing them with issues to avoid to ensure implementation success. HCT trust is complex, multi-dimensional, and influenced by a variety of factors at individual and organisational levels (Kukafka et al., 2003), underscoring the importance of developing interventions aimed at different levels simultaneously.

One limitation of this study is that we did not assess the extent to which proposed interventions addressed trust barriers or the extent to which they built on trust facilitators. This would constitute an interesting avenue for further research in trust in HCT. Other limitations are the unanswered questions that are related to the impact of interventions taking the barriers and the facilitators identified into account. The relative importance of each trust factor in specific HCT contexts remains to be explored by studies using prospective designs. It is also important to consider how these factors change over time with the use of a specific technology and with overall computer literacy.

In this study, we focused on trust in HCT by healthcare professionals, but we have to acknowledge that trust in HCT in healthcare organizations is a multifaceted process since various stakeholders are involved (Menachemi et al., 2004). Also, trust is just the first step to consider for the adoption of the healthcare technology. As noted by Menachemi et al. (2009), it is important to consider the viewpoints of all key adopter groups, because resistance in any of these groups could slow the overall trust and would not provide essential information for decision-makers.

For future work, we plan to undertake a systematic literature review to synthesize evidence, considering the strength of evidence in assessing the extent to which interventions addressed the trust facilitators and barriers in HCT.

ACKNOWLEDGEMENT

This work was supported with the financial support of the Science Foundation Ireland grant 13/RC/2094 and co-funded under the European Regional Development Fund through the Southern & Eastern Regional Operational Programme to Lero - the Irish Software Research Centre (www.lero.ie).

REFERENCES

Abbas, R. M., Carroll, N., Richardson, I. & Beecham, S. 2017. Protocol for Mapping Study of Trust Factors in Healthcare Technology: A Healthcare Preofessional Perspective [Online]. LERO Technical Report. Available: http://www.lero.ie/sites/default/files/TR_2017_04.pdf [Accessed 29/10/2017].

Alford, J. Building Trust in Partnerships Between Community Orgnization and Government. Changing the Way Government Works Seminar, Melbourne, 2004.

Almenárez, F., Marín, A., Campo, C. & Garcia, C. PTM: A pervasive trust management model for dynamic open environments. First Workshop on Pervasive Security, Privacy and Trust PSPT, 2004. 1-8.

Anderson, J. G. 2007. Social, ethical and legal barriers to E-health. International Journal of Medical Informatics, 76, 480-483.

Bélanger, F. & Carter, L. 2008. Trust and risk in e-government adoption. The Journal of Strategic Information Systems, 17, 165-176.

Berner, E. S., Detmer, D. E. & Simborg, D. 2005. Will the Wave Finally Break? A Brief View of the Adoption of Electronic Medical Records in the United States. Journal of the American Medical Informatics Association, 12, 3-7.

Brooks, R. G. & Menachemi, N. 2006. Physicians' Use of Email With Patients: Factors Influencing Electronic Communication and Adherence to Best Practices. Journal of Medical Internet Research, 8, e2.

Car, J. & Sheikh, A. 2004. Email Consultations In Health Care: 2-Acceptability And Safe Application. BMJ: British Medical Journal, 329, 439-442.

Carroll, N. 2016. Key success factors for smart and connected health software solutions. Computer, 49, 22-28.

Carroll, N., Kennedy, C. & Richardson, I. 2016. Challenges towards a connected community healthcare ecosystem (CCHE) for managing long-term conditions.

Cocosila, M. & Archer, N. 2014. Perceptions of chronically ill and healthy consumers about electronic personal health records: a comparative empirical investigation. BMJ Open, 4.

Egea, J. M. O. & González, M. V. R. 2011. Explaining physicians' acceptance of EHCR systems: an extension of TAM with trust and risk factors. Computers in Human Behavior, 27, 319-332.

Gagnon, M.-P., Desmartis, M., Labrecque, M., Car, J., Pagliari, C., Pluye, P., Frémont, P., Gagnon, J., Tremblay, N. & Légaré, F. 2012. Systematic review of factors influencing the adoption of information and communication technologies by healthcare professionals. Journal of medical systems, 36, 241-277.

Gollmann, D. 2006. Why Trust is Bad for Security. Electronic Notes in Theoretical Computer Science, 157, 3-9.

Grandison, T. & Sloman, M. 2000. A survey of trust in internet applications. IEEE Communications Surveys & Tutorials, 3, 2-16.

Hall, M. A., Zheng, B., Dugan, E., Camacho, F., Kidd, K. E., Mishra, A. & Balkrishnan, R. 2002.

Measuring patients' trust in their primary care providers. Medical care research and review, 59, 293-318.
Hsieh, P.-J. 2015. Physicians' acceptance of electronic medical records exchange: An extension of the decomposed TPB model with institutional trust and perceived risk. International Journal of Medical Informatics, 84, 1-14.
Hung, S.-Y., Tsai, J. C.-A. & Chuang, C.-C. 2014. Investigating primary health care nurses' intention to use information technology: An empirical study in Taiwan. Decision Support Systems, 57, 331-342.
Jøsang, A., Ismail, R. & Boyd, C. 2007. A survey of trust and reputation systems for online service provision. Decision Support Systems, 43, 618-644.
Kayyali, R., Hesso, I., Mahdi, A., Hamzat, O., Adu, A. & Nabhani Gebara, S. 2017. Telehealth: misconceptions and experiences of healthcare professionals in England. International Journal of Pharmacy Practice, 25, 203-209.
Krishna, K. & Maarof, M. A. 2002. An Hybrid Trust Management Model for MAS Based Trading Society, Universiti Teknologi Malaysia.
Kukafka, R., Johnson, S. B., Linfante, A. & Allegrante, J. P. 2003. Grounding a new information technology implementation framework in behavioral science: a systematic analysis of the literature on IT use. Journal of Biomedical Informatics, 36, 218-227.
Leroy, G., Chen, H. & Rindflesch, T. C. 2014. Smart and connected health. IEEE Intelligent Systems, 29, 2-5.
Massa, P. 2007. Trust in E-services: Technologies Practices and Challenges. A Survey of Trust Use and Modeling in Real Online Systems, 51-83.
Mays, N., Pope, C. & Popay, J. 2005. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. Journal of health services research & policy, 10, 6-20.
Mcknight, D. H., Choudhury, V. & Kacmar, C. 2002. Developing and validating trust measures for e-commerce: An integrative typology. Information systems research, 13, 334-359.
Menachemi, N., Burke, D. E. & Ayers, D. J. 2004. Factors affecting the adoption of telemedicine—a multiple adopter perspective. Journal of medical systems, 28, 617-632.
Menachemi, N., Matthews, M., Ford, E. W., Hikmet, N. & Brooks, R. G. 2009. The relationship between local hospital IT capabilities and physician EMR adoption. Journal of medical systems, 33, 329.
Michael, J. B., Hestad, D. R., Pedersen, C. M. & Gaines, L. T. 2002. Incorporating the Human Element of Trust into Information Systems. IAnewsletter, 5, 4-8.
Miles, A. & Asbridge, J. E. 2014. The European Society for Person Centered Healthcare (ESPCH)–raising the bar of health care quality in the Century of the Patient. Journal of Evaluation in Clinical Practice, 20, 729-733.
Misztal, B. 2013. Trust in modern societies: The search for the bases of social order, John Wiley & Sons.
Pagliari, C. 2005. Implementing the National Programme for IT: what can we learn from the Scottish experience? Informatics in Primary Care, 13, 105-111.
Park, H., Chon, Y., Lee, J., Choi, I.-J. & Yoon, K.-H. 2011. Service design attributes affecting diabetic patient preferences of telemedicine in South Korea. TELEMEDICINE and e-HEALTH, 17, 442-451.
Petersen, K., Vakkalanka, S. & Kuzniarz, L. 2015. Guidelines for conducting systematic mapping studies in software engineering: An update. Information and Software Technology, 64, 1-18.
Pluye, P., Gagnon, M.-P., Griffiths, F. & Johnson-Lafleur, J. 2009. A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in Mixed Studies Reviews. International Journal of Nursing Studies, 46, 529-546.
Raya, M., Papadimitratos, P., Gligor, V. D. & Hubaux, J.-P. On data-centric trust establishment in ephemeral ad hoc networks. INFOCOM 2008. The 27th Conference on Computer Communications. IEEE, 2008. IEEE, 1238-1246.
Robinson, S. L. 1996. Trust and breach of the psychological contract. Administrative science quarterly, 574-599.
Ross, S. E., Schilling, L. M., Fernald, D. H., Davidson, A. J. & West, D. R. 2010. Health information exchange in small-to-medium sized family medicine practices: Motivators, barriers, and potential facilitators of adoption. International Journal of Medical Informatics, 79, 123-129.
Saleem, J. J., Russ, A. L., Justice, C. F., Hagg, H., Ebright, P. R., Woodbridge, P. A. & Doebbeling, B. N. 2009. Exploring the persistence of paper with the electronic health record. International Journal of Medical Informatics, 78, 618-628.
Van Velsen, L., Van Der Geest, T., Van De Wijngaert, L., Van Den Berg, S. & Steehouder, M. 2015. Personalization has a Price, Controllability is the Currency: Predictors for the Intention to use Personalized eGovernment Websites. Journal of Organizational Computing and Electronic Commerce, 25, 76-97.
Van Velsen, L., Wildevuur, S., Flierman, I., Van Schooten, B., Tabak, M. & Hermens, H. 2016. Trust in telemedicine portals for rehabilitation care: an exploratory focus group study with patients and healthcare professionals. BMC Medical Informatics and Decision Making, 16, 11.
Who. 2017. Available: http://www.who.int/topics/technology_medical/en/ [Accessed 5th July 2017].
Wu, I.-L. & Chen, J.-L. 2005. An extension of Trust and TAM model with TPB in the initial adoption of on-line tax: An empirical study. International Journal of Human-Computer Studies, 62, 784-808.
Wu, J.-H., Shen, W.-S., Lin, L.-M., Greenes, R. A. & Bates, D. W. 2008. Testing the technology acceptance model for evaluating healthcare professionals' intention to use an adverse event reporting system. International Journal for Quality in Health Care, 20, 123-129.
Yarbrough, A. K. & Smith, T. B. 2007. Technology Acceptance among Physicians. Medical Care Research and Review, 64, 650-672.
Yusof, M. M., Stergioulas, L. & Zugic, J. 2007. Health information systems adoption: findings from a systematic review. Studies in health technology and informatics, 129, 262.