

ORGANISATIONAL BARRIERS TO THE IMPLEMENTATION AND ADOPTION OF  
HEALTH INFORMATION TECHNOLOGY (HIT) IN THE UK  
- A SYSTEMATIC REVIEW OF LITERATURE

## Abstract

**Background:** Healthcare digitisation in the United Kingdom has increased in the recent years. Among key strategies for achieving this goal is the implementation and adoption of health information technology (HIT). Despite its perceived benefits, available evidence shows that implementation and adoption rates of HIT are still low in the UK. Therefore, there is need to identify the key organisational factors that limit the acceptance and use of the HIT so that the generated knowledge can be applied in formulating new strategies to increase adoption rates.

**Objective:** To examine and report the organisational factors which prevent successful implementation and adoption of HIT within NHS organisations.

**Methods:** A systematic review of literature approach was employed. The literature reviewed were identified from different data sources such as MEDLINE, Cochrane Library, CINAHL, EBSCO host, SIGIE, ZETOC, ISI, as well as the Department of Health and National Health Service websites. Inclusion and exclusion criteria were used to facilitate identification of the most appropriate literature for review. Specifically, only studies published in English between 2014 and 2020 which assessed the organisational barriers to HIT implementation and adoption among NHS organisations were included for review. The collected data was analysed using thematic analysis.

**Results:** The initial literature research process produced 4317 records. However, only 15 studies were finally selected for systematic review. Four themes explaining the organisational barriers to HIT implementation and adoption were generated: organisational implementation climate, regulation and accreditation issues, financial constraints and personal attributes, knowledge and belief.

**Conclusion:** Limited resources, perceptions and beliefs of healthcare stakeholders and practitioners play an important role in limiting the adoption of health information technologies. Most NHS organisations often fail to involve all of their key stakeholders in the decision-making process of HIT implementation, hence leading to their rejection. Also, in addition to the accreditation issues leading to their low adoption, there are limited regulations and standards targeting the Health Information Technology.

*Keywords:* health information technology and technologies, organisational barriers, NHS organisations

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## Chapter One: Introduction

### *1.1 Introduction*

The health information technology is among the key tools that have been developed to facilitate provision of better patient care and help in the realisation of health equity (Wachter 2016). Nonetheless, the adoption of these technologies has not been successful in most countries including the United Kingdom (Wachter, 2018). Therefore, the present systematic review of literature is focused on assessing and reporting the organisational factors that prevent implementation and adoption of the health information technology in the UK's public health sector. The primary purpose of this chapter is to provide background information about health information technologies as well as to state the problem statement for the present study. The chapter also explains the purpose and significance of the review, formulates the research question, identifies aims and objectives and provides a comprehensive explanation of the structural organisation of the whole project.

### *1.2 Background Information*

Health information technology (HIT) is made up of a variety of technologies for transmitting and managing the health care data used by all the stakeholders in the sector (Wachter, 2018). These stakeholders include the payers, providers and all other groups which have interest in the health care technology in general (Nugroho et al., 2016). Health related information technology is an important aspect of the public health sector because it is the foundation for campaigns, policies and programmes which are specifically aimed at promoting, maintaining and improving the quality of health care services offered to the general population. Albeit information can be derived from different channels, important types of data rich sources such as the vital statistics and cause-of-death statistics often play a central role during the



formulation and implementation of public health policies (Wager et al., 2017; The King's Fund 2019). The health information technologies of a country are made up of different population-based and health facility-based data sources. Nonetheless, there are still important disparities that exist among different countries especially since there is still limited improvement in the quality and amount of data among the developing countries compared to the developed countries (Sun and Qu, 2015).

HIT plays an important role in improving the patient safety, enhancing the efficiency of health care organisations and promoting the satisfaction of clients within the health care sector (DHSC, 2019). Conversely, a randomised clinical controlled study by Lin et al. (2015) established that the computerised physician order entry with decision support services helped in reducing the occurrence of serious medication errors by 55%, hence improving the efficiency of the health care technology. Additionally, it is reported that the electronic medical records (EMR) promote realisation of positive returns on investments within the health care technology (Wachter, 2018; DHSC, 2019). Even though the use of these technologies has been associated with positive results, their adoption rate is still limited. THIS leads to the need to research, report and critically appraise the factors influencing the reduced rates of adoption and use. It is understandable to seek short-term financial return on investments following the adoption and use Health Information Technology but such outcomes are likely to be registered in terms of quality and safety improvements rather than raw financial terms. The cost savings may take up to 15 years or more to be realised because the explanations for such gains are in the form of reconfiguration of the workplace, improvements in technology and reimagining of the work (Nugroho et al., 2016; NHS England 2018).

Remarkably, the England General Practice sector started its digitisation process in the 1980s and most of their activities were almost 100% digitised by the mid-2000s (Wager et al., 2017). By contrast, the NHS developed an ambitious programme to facilitate the digitisation of the secondary care sector, the National Programme for Information Technology (NPfIT) in 2002 but was later shut down in 2011 because of its inability to achieve most of its intended goals (NHS Improvement 2019). The programme was mainly criticised for being too centralised, failing to engage with the trusts and their health care professionals and focusing on achieving too many goals within a short time. As a result, the health care stakeholders reached a consensus that there was a need to develop more strategies for ensuring that the digitisation process of NHS is fully realised, with the Treasury allocating £4.2 billion for financing the digitisation process in 2016 (Mackert et al., 2017). Furthermore, the need to promote successful adoption of HIT led to the formation of the National Advisory Group on Health Information Technology in England so as to guide NHS England and the Department of Health on the most appropriate strategies that can be used for digitising the secondary care technology.

Utility of HIT within clinical settings both in the United Kingdom and globally has attracted a lot of debates in the recent years. According to NHS England (2018), some health care stakeholders believe that the implementation of these technologies would help in improving the overall quality of care because of the ability of the health care managers to make ethical and timely decisions influenced by real data. However, increased cost associated with the implementation of the health information technologies has limited its adoption (Nugroho et al., 2016; Wager et al., 2017). Electronic health records (EHR) are currently being moved from institutional to inter-institutional, an act which has raised a lot of concerns regarding the privacy and security of the shared data. For effective prevention of any threat associated with the HIT

adoption in the health care sector, EHRs must adhere to three important security goals such as integrity, confidentiality and availability (King's Fund, 2019). In line with the arguments by NHS Improvement (2019), the clinical decision support technologies have the ability to improve the quality and safety of healthcare by providing professionals with the comprehensive information they need for clinical decision-making processes. The uptake of these clinical decision support technologies has increased in the recent years despite the need to improve its effectiveness and ensure patient safety.

The availability of a tax-funded and competent National Health Service may influence one to perceive that the UK is well positioned to effectively formulate and adopt the use of HIT as well as roll out other forms of eHealth innovations (Mackert et al., 2017). However, the health market of the UK is often significantly complex compared to how it is appreciated by the outside technologies (Wachter, 2016). The first factor that has led to such complexity is the devolution of the National Health Service which has resulted in the occurrence of significant disparities within the health technologies for different countries in the UK (Sun and Qu 2015). NHS Scotland, Northern Ireland and Wales are very different from the NHS England. Also, NHS England is mainly characterised with a mixture of centralisation in terms of policy setting, information governance and regulation framework, but highly fragmented in terms of the general organisation and delivery of care. These factors make it difficult for eHealth companies seeking to enter the UK health technology and scale up innovation (Lin et al., 2015). For example, Office of Life Sciences developed a £35 m Digital Health Technology Catalyst Fund targeting the small and medium sized enterprises involved in the development of health technologies and this initiative was to motivate more companies to invest in the development and provision of health information technologies as an approach for promoting the digitisation of the NHS (OLS, 2015).

### *1.3 Problem Statement*

Formulating a health care delivery technology which is highly responsive to future challenges associated with the aging population is among the key priorities in most of the higher income countries experiencing late epidemiological and demographic transition, and the United Kingdom is no exception (Wang et al., 2014; Rittenhouse et al., 2017). According to the ONS (2019), the average age in the United Kingdom exceeded 40 years old for the first time in mid-2014 and it is projected that 1 in every 7 people would be 75 years old and above by 2040. The trend is likely to be characterised by different incidences such as increased rates of chronic conditions prevalence, cognitive impairments, multi-morbidities and long-term frailty. The government projects that the adoption of advanced technologies would help in the provision of high quality healthcare support to its aging population and management of other health care conditions affecting the general population (Wachter, 2016). The United Kingdom was among the early adopters of health care information and communication technologies in primary care and scoring relatively high among the European member countries in terms of the use of technologies in General Practice. Nonetheless, the country currently registers lower rates of electronic prescribing techniques compared to the Nordic countries, and registering low scores in the digital health technology adoption and eHealth interoperability (NHS Improvement, 2019).

Even though most hospital departments in the UK might have competent specialist information technologies (Lin et al., 2015), the adoption rates of electronic patient records (EPR) technology in England and Wales are still very low and the digitisation of the community health services has not been fully achieved by the National Health Service (Wachter, 2018). The existence of low HIT adoption rates in the UK has negatively impacted the quality and efficiency of information sharing among different providers and the general coordination of care.

Additionally, a meta-analysis conducted by NHS England (2018) including studies published between 2010 and 2013 revealed that current literature has not provided comprehensive discussion on the effects of health information technology adoption or how it influences improvements in healthcare outcomes. Some of the probable factors that led to the generation of such outcomes include insufficient measurements and reporting of information about the execution and context of health information technology use, such as the implementation approach, settings, the information technology intervention details, in addition to the application of non-standardised protocols and simple measurement approaches.

#### *1.4 Purpose of the Study*

Though the Health Information Technology are often made up of large sets of modules and functionality, most health information technology adoption studies have mainly focused on precise components such as the computerised order entry, clinical decision support and electronic health records (Agha, 2014). However, the factors that limit successful adoption of these technologies have not been extensively researched. Therefore, this is an important gap in literature which the present study would be focusing on bridging. In order for the NHS to continue providing high quality health care services at affordable costs, it must adopt new techniques that promote its modernisation and transformation, which are characterised by varying changes within its culture, governance, structure, workplace and training (DHSC, 2019). None of these transformations can be as important and challenging as the creation of a fully digitised NHS. That is why the present systematic review of literature is focused on identifying and reporting the different factors that act as barriers to effective digitisation of the NHS. The knowledge generated from this review can be used to develop appropriate strategies for

addressing the identified barriers; hence leading to improved adoption rate of the Health Information Technology within the NHS.

Although over-centralisation is the key factor that led to the failure of NPfIT, it is essential to note that centralisation can sometimes help in improving the efficiency of the national health technology (Mackert et al., 2017). Hence, this review focuses on assessing effective strategies that can be used by the NHS to develop an appropriate balance between local or regional control and engagement and centralisation. Additionally, data privacy and safety have also been identified as some of the key challenges associated with Health Information Technology adoption (OLS, 2015), and as such, concerns raised about confidentiality and privacy can hinder efficient data sharing process which is necessary for effective management of the patients and health care research. Therefore, the present study also determined to generate new knowledge that can be used for achieving the balance between health care data usage and confidentiality protection without causing harm to the health care service users, such as the patients and care professionals.

### *1.5 Significance of the Study*

Despite the availability of different policy developments such as the Accelerated Access Pathway (for prioritising strategic innovation in health care), the Innovation and Technology Payment (for reimbursing the providers of small number of assorted innovations and provision of additional funding to the Academic Health Science Networks) among others, the NHS still registers low scores in terms of basic digitisation and interoperability compared to the other high income countries such as the United States and Germany. So, the generated knowledge from this study about the organisational barriers to effective implementation and adoption of Health Information Technology would be used to formulate effective strategies for bridging the

digitisation gaps currently experienced in the NHS. Successful digitisation of NHS through the adoption of Health Information Technology would foster better patient care and experience via review of healthcare information, diagnosis and minimisation of errors. Furthermore, the outcomes from this systematic review literature may be used for developing a protocol for implementing the newly formulated Health Information Technology, as previous literature in this area have reported that most of the HIT programmes often collapse at the programme implementation stage.

### *1.6 Research Question*

What are the key organisational factors that prevent successful implementation and adoption of Health Information Technology in the United Kingdom?

### *1.7 Structure Organisation*

The dissertation is organised into five chapters. Following successful identification of the research problem and aims in the first chapter, the second chapter identifies, explains and justifies the research methods and methodologies employed during the database identification, literature search process and generation of themes from the reviewed literature. Chapter 2 also explains the inclusion and exclusion criteria that were utilised to identify the appropriate literature for review. In the third chapter, the outcomes from literature search process are presented using a PRISMS diagram and the selected studies for review are critically appraised to enhance the generation of important themes about the organisational barriers to effective implementation and adoption of Health Information Technology. A summary table describing the aims, methods, results, limitations and implications for each of the selected study for review is also presented in this chapter. In the discussion chapter, the generated themes following the review of the selected studies are presented, discussed and interpreted to enhance development of

new knowledge about the organisational barriers to successful implementation and adoption of Health Information Technology. In the last chapter (conclusion and recommendations), the research question is restated to determine whether it was comprehensively answered, and recommendations for both health care practice and future research are also provided.

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## Chapter Two: Methods

### *2.1 Introduction*

The primary purpose of the methods chapter is to identify, explain and justify the use of the selected methodologies for data collection and analysis in a manner that allows for easy replication of the study (Choy, 2014). THIS review, this chapter explains the sources of data and the search strategies that were used to identify and select the most appropriate studies. This chapter also explains the inclusion and exclusion criteria for literature selection. Furthermore, the outcomes from the literature search process are demonstrated using a PRISMA diagram, and the strategies used for extracting and synthesising evidence from the included literature are provided.

### *2.2 Study Design*

A qualitative systematic review design was used in this study. According to Okoli (2015), a qualitative systematic review involves bringing together different research studies about a specific topic by analytically searching for the research evidence from primary studies which met all the inclusion criteria and drawing findings together. The selection of a systematic review design was influenced by the availability of a large number of primary studies about the factors limiting digitisation of healthcare organisations, including the implementation and adoption of Health Information Technology. The employed study design involved the following processes: generation of research question, literature search from the selected databases using keywords and terminologies, study selection and quality appraisal, data extraction and synthesis of themes and then reporting of the results.

### *2.3 Data Source and Search Strategy*

The quality of evidence generated from a systematic review of literature study mainly depends on data sources and search strategies employed (Aromataris and Riitano, 2014). A

systematic reviewer has the responsibility of ensuring that only the data sources with reputations of hosting high quality literature about the research problem under investigation are included and that the search strategies to be used must promote homogeneity of the collected data and general outcomes from the review (Choy, 2014; Ho et al., 2016). Therefore, the reviewer in this study ensured that only databases with up-to-date literature on organisational barriers to the implementation and adoption of Health Information Technology are searched. The literature search was conducted on the selected databases using keywords such as “organisational barriers”, “health information technology”, “health information technologies”, “National Health Service”. The keywords were combined during the search process by using different Boolean operators such as “AND” and “OR”. Table 1 below shows different data sources that were search for identification of relevant literature for review.

**Table 1:** Data Sources and Types of Data Indexed During the Literature Search

Data Sources	Types of Data Indexed
Medical Literature Analysis and Retrieval Technology Online (MEDLINE)	The four databases were used for searching primary qualitative studies that have assessed the organisational barriers to implementation and adoption of Health Information Technology.
Cochrane Library	
Cumulative Index of Nursing and Allied Health Literature (CINAHL)	
EBSCO host	
Technology for Information on Grey Literature in Europe (SIGIE)	All the three data sources were used for identifying the most appropriate grey literature such as the conference abstracts, regulatory data, unpublished trial data, government publications (including working papers and internal documentations) and conference proceedings.
ZETOC	
Institute for Scientific Information (ISI)	
Department of Health ( <a href="http://www.dh.gov.uk">http://www.dh.gov.uk</a> )	The two are websites were used for searching internet sources.
National Health Service ( <a href="https://www.nhs.uk/">https://www.nhs.uk/</a> )	

## *2.4 Inclusion and Exclusion Criteria*

As explained by Patino and Ferreira (2018), inclusion criteria are the key characteristics that a study must have in order to be included in the review while the exclusion criteria define the key aspects that make a study ineligible for use in the review. The primary features that are often taken into considerations when developing the inclusion and exclusion criteria are the study design, study aim and target population, outcomes and implications of the study (Harris et al., 2014). Additionally, properly designed inclusion and exclusion criteria must limit or completely eliminate the occurrence of selection bias, ensure that included studies are selected based on predefined and justified standards, and ensure that personal interests of the reviewers do not influence the process.

### *2.4.1 Inclusion criteria*

Inclusion was limited to studies originally published in English language. Even though Patino and Ferreira (2018) clarified that the reviewer can use translation services to convert studies to languages of choice, the process often compromises the original quality of evidence presented in the studies as not all evidence can be properly translated. Therefore, the use translation service was omitted in this review. Only English based literature was selected for review as the present study focused on the UK. Also, only primary studies of different design such as qualitative, quantitative and mixed methods with full-text formats were included in the review. Peer reviewed primary studies were selected for review as they would lead to the generation of high-quality evidence upon review. The area of organisational barriers to the implementation and adoption of Health Information Technology has been widely researched. In order to include only those studies with up-to-date and high-quality evidence, publication date ranged between 2014 and 2020.

#### *2.4.2 Exclusion criteria*

With reference to research aims, studies that focused on other aspects of health information technology such as professional barriers, importance of Health Information Technology, patient and family related barriers were excluded from the study. Inclusion of such studies would have interfered with the homogeneity of the final outcomes from the review and quality of the generated knowledge. The Table 2 below describes the inclusion and exclusion strategies that were employed during the literature search process.

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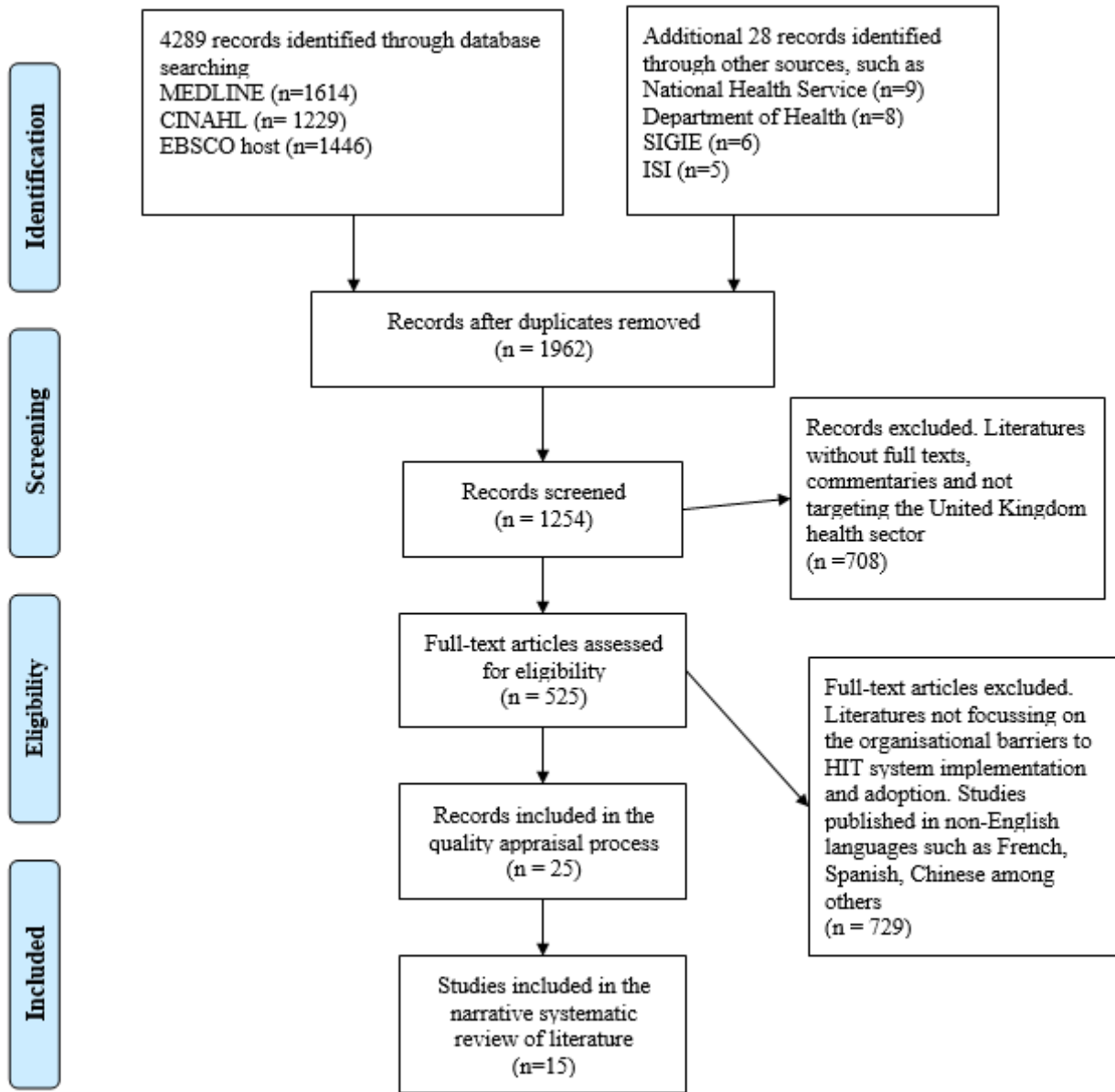
**Table 2:** The Inclusion and Exclusion Criteria

<b>Variable of Interest</b>	<b>Inclusion Criteria</b>	<b>Exclusion Criteria</b>
Population	NHS hospitals, trusts and subsidiaries United Kingdom health sector	Non-UK health sector
Exposure	Studies on the use of Health Information Technology	Studies focusing other healthcare topics such as care provider training and development, motivation.
Outcomes	Studies identifying the key organisational barriers to effective implementation and adoption of Health Information Technology	Literature reporting other barriers to effective implementation and adoption of Health Information Technology apart from the organisational barriers. Some of the possible barriers include professional and resource barriers. Studies focusing on the importance and limitations of Health Information Technology.
Types of Studies	Qualitative, quantitative and mixed research literature. Studies with full-text format Studies originally published in English language	Literature without full-text formats, such as with abstracts and summaries only.

## 2.5 Search Strategy and Search Outcome

The initial literature search process on the selected databases and additional websites led to the production of 4317 records, with 4289 being generated from the databases and 28 records from the websites and grey literature sources. All the records were reviewed in a process that led to the elimination of 2355 duplicates, allowing 1962 records that were subjected to additional inclusion and exclusion criteria. Following successful evaluation of the titles, abstracts and population of interest, a total of 1254 literature were obtained after the elimination of 708 records on the basis that they did not have full-text or failing to target the United Kingdom health sector. Afterwards, 525 records were obtained following the elimination of full-text literatures which did not aim at assessing and reporting the organisational barriers to the implementation and adoption of Health Information Technology. Full-text studies that were published in non-English languages such as French, Spanish and Chinese were also eliminated at this stage. Manual assessment of the remaining literature led to the identification of 25 studies whose quality was appraised using the Critical Appraisal Skills Programme (CASP) tool. After successful application of all the inclusion and exclusion criteria, only 15 studies were selected for review. The PRISMA diagram in *Figure 1* below summarises the literature search strategy and search outcomes for this review.

**Figure 1: PRISMA Diagram for the Literature Search and Selection Process**



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## *2.6 Quality Appraisal*

The quality appraisal process was executed using the Critical Appraisal Skills Programme (2020) for qualitative research checklist (see Appendix 1 for details). The Critical Appraisal Skills Programme is a tool used by researchers to assess the trustworthiness and rigor of qualitative studies. Specifically, the tool allows for the assessment of aims, methodology, sampling approach, data collection and analysis approach, ethics and findings of selected studies. The tool is made up of ten questions which are to be answered using “yes”, “can’t tell” or “no” depending on the nature of the question asked and its relevance to the content of the study being assessed. The “yes” option is equal to 1 point while both the “can’t tell” and “no” options have 0 point. For a study to pass the quality appraisal process and included in the final review, it must have at least 8 out of 10 points.

## *2.7 Data Extraction and Synthesis*

The data extraction process was executed using the data extraction form provided in the study by Munn et al. (2014). The form is made up of different columns for the authors and year of publication, study aim, design and target population, quality appraisal, methods of data collection and analysis, and the key findings from the studies which are relevant to the present review. The data extraction process was conducted on each study individually, a process which was then followed by data analysis and synthesis. Based on the fact that this was a qualitative systematic review of literature, thematic analysis was adopted for the data analysis and synthesis process. Thematic analysis is a qualitative method for analysing data and involves the generation of themes using evidence and coding the recurring concepts provided in the selected studies for review (Alhojailan, 2014; Le and Gulwani, 2014). Table 3 provides comprehensive descriptions

of the codes that were extracted from the reviewed studies, leading to the development of specific themes for further interpretation and knowledge generation.

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**Table 3:** Summary of the 15 Studies Selected for Systematic Review

Author(s) and Year	Purpose of the Study	Study Design and Methodology	Key Findings
Nancy, Currie and Whitley (2016)	To evaluate barriers to Health Information Technology adoption as well as to identify the roles of stakeholders and their performance towards Health Information systems.	A longitudinal study involving stakeholder theory approach was employed. Primary qualitative data was collected for analysis from the healthcare stakeholders in the UK NHS.	General perception that Health Information Technology may lead to workflow disruption and their initial high costs negatively impacted their adoption.
Meinert et al. 2018	To assess the benefits and risks in relation to the security, privacy and adoption of health information technology in value-based NHS healthcare system.	A grounded theory approach was employed. primary qualitative data from healthcare professionals was collected and analysed in order to identify the key barriers to Health Information Technology adoption.	Challenges associated with Health Information Technology use include unsustainability issues, lack of scale-up plans, poor evaluation processes, noncompliance with data protection policies.
Kumar et al. (2016)	To explore the factors influencing implementation and management of Health information Technology in NHS, with special focus on Reverse Exchange systems.	An exploratory case study approach was employed in this study. The first case study was conducted on NHS Hospital Trusts, with the second one built using secondary resources.	The sophistication of Health Information Technology implementation increases with the risks and value associated with medical devices. Key factors influencing technology adoption in UK NHS include pressure from the government,

			competitive pressure, organisational size, top management support and availability of adequate resources.
Papoutsis et al. (2015)	To assess the views of patients and public (as key factors for Health Information Technology adoption) about the security and privacy of EHRs used for health provisions, research and policy within the UK NHS.	A mixed-methods approach involving cross-sectional survey and focus group discussion was employed. A total of 5331 survey participants were recruited into the study from primary and secondary care setting in West London, UK. Data then analysed in 13 focus groups.	About 79% of the participants reported that they worry about security of their data in EHR, with 71% believing that the NHS cannot guarantee them that their data in EHR are secured.
Cresswell and Sheikh (2015)	To assess the factors that influence slow adoption of Health Information Technology within the UK hospitals and formulate recommendations for addressing such barriers.	A qualitative research approach involving collection and analysis of HIT technology adoption data from the UK hospitals. Thematic approach was used for analysing the collected data; outcomes organised into themes.	The key barriers to HIT technology adoption were organised into four themes; strategic context, organisational approach, social consequences and technical characteristics. Poor planning of the organisational changes associated with the HIT adoption, including identification of the needs and procuring the right solutions in

			addition to strategic planning.
Harvey et al. (2018)	To identify the key barriers to clinical technology adoption and role of national agency in the implementation of technology at NHS England.	An empirical case study approach involving four healthcare organisations in England was employed. qualitative semi-structured interviews were used for data collection and analysed using integrated-PARIHS framework.	Positive progress in clinical technology implementation was registered among healthcare organisations which received active facilitations from the Implementation Manager in the national agency. High level of receptiveness to implementation was registered when the care professionals were made aware of the possible benefits of adopting the clinical technologies.
Faulds et al. (2016)	To assess feasibility of using 'bring your own device' (BYOD) technology for electronic data capture among the NHS organisations.	A qualitative research approach was adopted, with the study population being seven hospital Trusts in South Yorkshire. Data collected by 17 investigators for 392 individual theatre list, leading to the capturing of 14148 individual data points.	Despite the ability of BYOD to facilitate collection of large number of patient data within a short time, its adoption rate is still very low because of constant resistance by care professionals.
Llewellyn et al. (2014)	To investigate organisational and policy context for the adoption and implementation of clinical	A qualitative research method involving data collection through semi structured interviews of NTAC	The study revealed that NHS providers fail to perceive any central push from the Department of Health or NICE to

	technologies. They include, insulin pump therapy (IPT); breast lymph node assay (BLNA) and ultrawide field retinal imaging (UFRI).	staff, clinicians, managers and commissioners was employed. the collected data was supplemented using documentary evidence, as well as participant and non-participant observation of meetings and videos.	adopt, implement and diffuse new clinical technologies.
Cresswell et al. (2017)	To explore the social and technical challenges associated with integration and interfacing experienced by adopter hospitals of standalone and hospital-wide multi-modular integrated electronic prescribing (ePrescribing) systems.	A qualitative longitudinal approach was employed. data was collected from six NHS hospitals in England, with a total of 173 interviews being collected from Health Information Technology users, implementers and software suppliers, and analysed thematically.	Poor cooperation among the healthcare stakeholders limited successful adoption of the technologies. Poor two-way transfer of data between hospitals and primary care necessitating workarounds was also reported.
Huddy et al. (2016)	To assess the barriers and facilitators of point of care C reactive protein (POC CRP) testing at the NHS primary care setting.	A qualitative research methodology based on grounded theory design was employed. Data was collected from general practitioners, biochemists, clinical laboratory scientists, pharmacists, and analysed using thematic analysis	Barriers to effective adoption of POC CRP technology include negative perception of the care professional about the technology, resource limitations. Key themes identified include quality control and training, laboratory services, practitioner

		approach.	attitude and experiences, effects on clinic flow and workload.
Currie (2014)	To identify factors impacting the translation process of Health Information Technology policy into practice within the UK NHS.	A longitudinal study of the National Care Record Service was employed. Primary data was collected from healthcare stakeholders using interviews.	The study revealed that government agencies need to embed cultural, social and economic criteria into health IT policy-making.
Sood and McNeil (2017)	To evaluate the role of hospital management in the implementation and adoption of Health Information Technology, as well as how their involvement limits the success of the process	An exploratory design involving collection of qualitative data from 18 healthcare professionals – 7 medical professionals and 11 hospital management officials.	Poor assessment of the patients’ needs by designers and poor perception of HIT by clinicians prior to the adoption of the HIT leads to the creation of tension between the healthcare professionals and top hospital leadership regarding the adoption and use of such technologies.
Castle-Clarke, Edwards and Buckingham (2017)	To identify the factors that make NHS to still struggle with making most of new innovations, including adoption of HIT systems.	A grounded theory approach involving analysis of qualitative data collected from healthcare industry representatives, AHSNs, NHS procurement departments, clinicians and policy organisations.	Procurement departments and NHS organisations consider adopting innovations for producing short-term cash realising savings. Tension exists between policy push towards large-scale organisations and capacity of SMEs to satisfy the needs of large

			contracts.
Waterson (2014)	To assess the barriers to successful implementation and use, adoption and evaluation different Health Information Technology such as electronic patient records and virtual wards among the NHS organisations.	A qualitative study design involving collection of data from NHS hospitals from England offering primary, secondary and community care services. Data was analysed using thematic analysis approach, leading to the generation of themes.	There are often tensions between the national and local strategies for Health Information Technology implementations as well as poor fit between the healthcare work technology and the HIT designs to be adopted.
Asthana, Jones and Sheaff (2019)	To assess and report the macro, meso and micro factors influencing eHealth innovation in the English NHS.	A qualitative explorative research approach. The analysed data was collected from NHS organisations located in England. Thematic analysis was used for analysing the collected data.	Even though barriers to HIT systems exist at almost all scales, fragmentation of the NHS is the most important factor limiting adoption and diffusion. The national policy is mainly focused on intensifying the digital divide rather than addressing problems of fragmentations.



## *2.8 Chapter Summary*

Chapter 2 has provided details about the research methods and methodologies that were employed during the literature identification, extraction and synthesis of evidence from the selected studies for review. Furthermore, the inclusion and exclusion criteria employed during the selection of the most appropriate studies for review were also provided and justified in this chapter. A PRISMA diagram explaining the process for identifying the 15 studies finally selected for review is presented in this chapter, with detailed clarifications of the quality appraisal, and data synthesis and extraction tools that were used. In the next chapter, the results generated from thematic analysis of literature (themes) are presented.

## Chapter Three: Results

### *3.1 Introduction*

Research studies to identify the key obstacles to NHS digitisation process, including adoption of HIT systems, have intensified in the recent years. Budget silos limit the ability of most NHS organisations to invest in HIT systems (Castle-Clarke, Edwards and Buckingham, 2017). Failure to inform all care stakeholders about the importance of adoption new Health Information Technologies is key to increased resistance among the team (Harvey et al., 2018; Sood and McNeil, 2017). Also, there are high-profile implementation failures that are often reported almost on an annual basis; for example, the adoption and use of Health Information Technology like the e-health technology in most of the major UK teaching hospitals (Waterson 2014; Cresswell and Sheikh, 2015). Such failures have led to reduced performance rates, demoralisation of staff, poor service delivery, financial losses worth approximately £200 million and putting healthcare trust on special measures. The consequences prompted a strong need to perform a systematic review of literature in order to understand the key factors that limit the implementation of Health Information Technology and to develop strategies that can be used for improving their adoption rates. In this chapter, the outcomes generated from the thematic analysis of collected evidence from the selected studies during literature search process are presented in the form of themes. The chapter also provides a summary of selected studies with reference to the methodologies, designs and generated outcomes.

### *3.2 Study Characteristics*

Out of the initial 4317 records identified from the first literature search process, only 15 studies were finally selected for systematic review of literature after meeting all the provided inclusion criteria. The quality of the studies was appraised with 9 studies registering CASP score

of 9 and the remaining 6 scoring 8 (see *Table 5; Appendix 1*). Furthermore, 13 studies employed the qualitative approach, while the remaining two employed mixed methods approach and quantitative approach respectively. Out of the 13 qualitative studies, 4 employed grounded theory design, 2 used focus group design, 3 used exploratory design and 4 used the phenomenological design. Data analysis was executed in all the qualitative studies using thematic analysis and Statistical Package for the Social Sciences (SPSS) for the quantitative study that used descriptive analytical design.

Seven studies identified regulation and accreditation issues as factors which play important role in limiting the implementation and adoption of Health Information Technology. The studies which reported such evidence include Nancy, Currie and Whitley (2016), Meinert et al. (2018), Faulds et al. (2016), Huddy et al. (2016), Currie (2014), Waterson (2014) and Asthana, Jones and Sheaff (2019). Five studies found organizational implementation climate as a barrier (Papoutsi et al., 2015; Cresswell et al., 2017; Sood and McNei, 2017; Castle-Clarke, Edwards and Buckingham, 2017), six identified financial constraints (Meinert et al., 2018; Kumar et al., 2016; Papoutsi et al., 2015; Cresswell and Sheikh, 2015; Harvey et al., 2018; Currie, 2014) and seven identified personal attributes, knowledge and beliefs (Cresswell and Sheikh, 2015; Faulds et al., 2016; Cresswell et al., 2017; Huddy et al., 2016; Currie, 2014; Sood and McNei, 2017; Asthana, Jones and Sheaff, 2019) as factors which limit their successful adoption. The systematic review and thematic analysis of evidence obtained from the selected studies led to the generation of four themes describing the organisational barriers to the implementation and use of Health Information Technology. Summary of generated themes and subthemes are presented in *Table 4* below.

**Table 4:** Summary of Themes and Subthemes (Thematic Analysis)

Studies	Subthemes	Themes
Nancy, Currie and Whitley (2016)	<ul style="list-style-type: none"> <li>• Most of the Health Information Technologies are not compatible with other devices within the healthcare centres.</li> </ul>	Regulation and accreditation issues
Meinert et al. (2018)	<ul style="list-style-type: none"> <li>• Noncompliance with the data protection policies</li> <li>• Inadequate standards for assessing efficiency of all Health Information Technologies.</li> </ul>	Regulation and accreditation issues
	<ul style="list-style-type: none"> <li>• High costs of installation and management</li> </ul>	Financial constraints
Kumar et al. (2016)	<ul style="list-style-type: none"> <li>• Limited resources to support the NHS digitisation process.</li> <li>• High costs of Health Information Technology adoption and management.</li> </ul>	Financial constraints
Papoutsis et al. (2015)	<ul style="list-style-type: none"> <li>• Some healthcare practitioners do not have comprehensive knowledge about efficiency of Health Information Technology in personal data protection and privacy.</li> </ul>	Organisational implementation climate
	<ul style="list-style-type: none"> <li>• Limited resources for successful adoption of Health Information Technology is a key barrier.</li> </ul>	Financial constraints
Cresswell and Sheikh (2015)	<ul style="list-style-type: none"> <li>• High initial costs during the purchase and installation of the Health Information Technology</li> </ul>	Financial constraints
	<ul style="list-style-type: none"> <li>• Level of patient and healthcare professional involvements</li> </ul>	Personal attributes, knowledge and belief
Harvey et al. (2018)	<ul style="list-style-type: none"> <li>• Most of the Health Information Technologies have high cost of installation and management.</li> </ul>	Financial constraints

Faulds et al. (2016)	<ul style="list-style-type: none"> <li>Personal data privacy threats have negatively impacted perception of both care practitioners and patients towards using BYOD technology.</li> </ul>	Regulation and accreditation issues
	<ul style="list-style-type: none"> <li>Belief that the Health Information Technology may interfere with the quality of patient-professional interactions.</li> </ul>	Personal attributes, knowledge and belief
Llewellyn et al. (2014)	<ul style="list-style-type: none"> <li>Poor NHS organisational management involvement in HIT decision making process.</li> </ul>	Organisational implementation climate
Cresswell et al. (2017)	<ul style="list-style-type: none"> <li>Some care professionals have negative perceptions about the efficiency of Health Information Technology.</li> </ul>	Organisational implementation climate
	<ul style="list-style-type: none"> <li>Organisational management support for the Health Information Technology adoption is key for NHS digitisation.</li> </ul>	Personal attributes, knowledge and belief
Huddy et al. (2016)	<ul style="list-style-type: none"> <li>Approvals for POC CRP use in NICE guidelines should be an initial facilitator for change, organisations should be supported to achieve this goal.</li> </ul>	Regulation and accreditation issues
	<ul style="list-style-type: none"> <li>Health practitioners believe that POC CRP and other technologies may interfere with their daily work routines and responsibilities.</li> </ul>	Personal attributes, knowledge and belief
Currie (2014)	<ul style="list-style-type: none"> <li>Security threats of patients' data shared through the Health Information Technology limit adoption of such systems.</li> </ul>	Regulation and accreditation issues
	<ul style="list-style-type: none"> <li>Inadequate resources to support the technology adoption process is a key obstacle.</li> </ul>	Financial constraints

	<ul style="list-style-type: none"> <li>• Some of the Health Information Technology are highly labour intensive</li> </ul>	Personal attributes, knowledge and belief
Sood and McNeil (2017)	<ul style="list-style-type: none"> <li>• Improper stakeholder engagement limits HIT adoption</li> </ul>	Organisational implementation climate
	<ul style="list-style-type: none"> <li>• NHS organisational managers and leadership have varying attitudes towards Health Information Technology.</li> </ul>	Personal attributes, knowledge and belief
Castle-Clarke, Edwards and Buckingham (2017)	<ul style="list-style-type: none"> <li>• HIT adoption requires adaptive leadership and processes across all departments and sectors.</li> </ul>	Organisational implementation climate
Waterson (2014)	<ul style="list-style-type: none"> <li>• Need to develop recognised standards for Health Information Technology</li> </ul>	Regulation and accreditation issues
Asthana, Jones and Sheaff (2019)	<ul style="list-style-type: none"> <li>• NHS fragmentation is a key limiting factor.</li> </ul>	Regulation and accreditation issues
	<ul style="list-style-type: none"> <li>• Limited standards for regulating HIT systems at NHS.</li> </ul>	
	<ul style="list-style-type: none"> <li>• Perception of NHS organisation leadership and stakeholders about Health Information Technology.</li> <li>• Tensions between the Information Governance framework of the NHS organisations</li> </ul>	Personal attributes, knowledge and belief

### *3.3 Generated Themes*

#### *3.3.1 Theme 1: organisational implementation climate*

According to Castle-Clarke, Edwards and Buckingham (2017), siloed work environment has eroded the ability of leaders to effectively change pathways across departments and organisations. Implementation climate is described as the general fit between the Health Information Technology and the healthcare organisation (Castle-Clarke, Edwards and Buckingham, 2017; Sood and McNeil, 2017). Five of the fifteen studies identified the implementation climate as a key barrier to the adoption and use of Health Information Technology. One of the most important reasons for unsuccessful implementation of HIT is the lack of compatibility between the information technology and the work practices or daily clinical practices. Furthermore, Cresswell et al. (2017) established that some of the healthcare professionals were fearful did not support technological adoption because of the fear that such process might interfere with their daily workflow.

Four studies provided varying approaches that may be used for minimising disruptions to the workflow often experienced during the implementation and adoption of Health Information Technology. The strategies include integration of healthcare technologies into the usual care process (Llewellyn et al. 2014), elimination of workflow disturbances during the adoption process (Castle-Clarke, Edwards and Buckingham, 2017), and adoption of manageable technologies (Cresswell et al., 2017). Sood and McNeil (2017) and Llewellyn et al. (2014) recognised that health technologies are often implemented so as to efficiency of workflows efficiency. However, Sood and McNeil (2017) also reported that the implementation of such technologies may lead to the disruption of the already established professional responsibilities and roles, as some of the functions will be performed by these technologies. Studies which

provided evidence on implementation climate, apart from Papoutsis et al. (2015), identified healthcare practitioner resistance to HIT technology implementation with reference to job insecurity, possible dissatisfaction and the uncertainties caused by the technologies such as establishment of new roles and responsibilities. Furthermore, Llewellyn et al. (2014) noted large percentage of the NHS providers often fail to perceive any central push from the Department of Health or NICE to adopt clinical technologies. Therefore, knowledge and information accessibility are key facilitators of the HIT technology implementation and adoption.

### *3.3.2 Theme 2: regulation and accreditation issues*

Six of the reviewed studies identified regulation and accreditation issues to play an important role in limiting the adoption of HITs and eventual digitisation of the NHS. According to Waterson (2014), an important challenge faced by professionals tasked with the role of planning and commissioning NHS programmes in their local areas is the need to develop a robust evidence of safety, quality and cost-effectiveness so as to inform the authorising decisions. The hospital doctors and consultants in Nancy, Currie and Whitley (2016) provided contradictory stakes as most of them voiced criticisms about the centralised nature of government policy for health information technology. Even though data related activities in the UK such as collection, storage, processing and transfer of sensitive personal information must accord with the statutory provisions of Data Protection Act 1998, cybercrimes and privacy threats are still experienced (Faulds et al., 2016). Besides, Waterson (2014) has noted that most pharmaceutical companies are currently producing cost-effective analyses for both technical appraisal and licencing of their products.

According to Currie (2014) and Meinert et al. (2018), the UK healthcare sector is dominated by small and medium sized enterprises (SMEs), many of which do not have



competency levels for technical and clinical standards required by the NHS Digital and the National Institute for Health and Care Excellence (NICE). Nancy, Currie and Whitley (2016) and Asthana, Jones and Sheaff (2019) acknowledged the fact that limited policies and strategies for addressing fragmented NHS has significantly impacted slow adoption of HIT systems within the NHS organisations. Three studies (Asthana, Jones and Sheaff, 2019; Faulds et al., 2016; Meinert et al., 2018) identified the lack of recognised and efficient standards for the HIT technology provisions as an important barrier to their implementation and low effectiveness. The standards set by NICE may help in reducing the magnitudes of concerns to be raised by healthcare professionals regarding their professional liability and the safety of patient data. Lastly, Currie (2014) suggested that the NICE needs to develop more comprehensive standards for Health Information Technologies for their monitoring and evaluation. Despite the availability of strict regulations on NHS providers, the health sector has an open private market with limited regulations for digital providers.

### *3.3.3 Theme 3: financial constraints*

Seven of the reviewed studies identified limited financial support as an important barrier to effective implementation and adoption of HIT technology among NHS organisations. Transformation of any technology is a very challenging process and cannot be achieved within a short period and with limited financial support (Cresswell and Sheikh, 2015). Even though HIT adoption has been identified to be cost-effective intervention, concerns have been raised that their inappropriate use may counteract any financial savings (Huddy et al., 2016; Harvey et al., 2018; Currie, 2014). For successful implementation of Health Information Technology, the NHS organisations must have adequate number of competent workforces with technology-based skills

(Kumar et al., 2016; Currie, 2014). However, most of the NHS organisations such as those in the rural areas lack such competent workforce which limit the adoption process.

As a result of their high cost of installation and adoption, most of the NHS organisations often prefer using external vendors to provide the required services (Papoutsi et al., 2015; Cresswell and Sheikh, 2015; Harvey et al., 2018). Some of the key forms of costs associated with Health Information Technology adoption include high initial purchasing cost and monitoring costs (Kumar et al., 2016). Evaluation of healthcare technology is not straightforward because it needs examination of different factors such as strategic implementation, engineering, uptake and cost (Meinert et al., 2018).

High set-up costs which include the costs incurred during purchasing and implementation are also recognised as key obstacles HIT adoption (Cresswell and Sheikh, 2015; Huddy et al. 2016). Additionally, Currie (2014) and Kumar et al. (2016) mentioned apprehensions linked with the ongoing costs as significant barriers to Health Information Technology adoption and use. Two examples of ongoing costs concerns that were highlighted in these studies include poor cost-saving nature of most Health Information Technology and low returns on investments. The implementation and use of Health Information Technology often consume a lot of healthcare organisations' resources for less than the projected benefits (Cresswell and Sheikh, 2015). Likewise, Meinert et al. (2018) and Harvey et al. (2018) argued that lack of comprehensive information about cost-effectiveness of every Health Information Technology has limited their uniform adoption as only those with such information are considered for adoption regardless of their efficiency. Hence, different strategies for addressing the cost-related barriers were also reported in some of these studies and they include redesigning the business models and

incentives, formulation of cost-effectiveness by using formal evaluations, and practicing large scale financing of Health Information Technologies.

#### *3.3.4 Theme 4: personal attributes, knowledge and beliefs*

The acceptance rate of Health Information Technology among NHS organisations influences the overall acceptability, implementation and adoption of such technologies. Out of the fifteen studies selected for review, seven provided evidence to show that personal attributes, knowledge and beliefs often play an important role in influencing the implementation and adoption of Health Information Technology. According to Sood and McNeil (2017), Health Information Technology must fit the values, routines and priorities of healthcare staff and patients in order to be accepted and adopted. Three studies (Faulds et al., 2016; Cresswell and Sheikh, 2015; Huddy et al., 2016) identified the belief that Health Information Technology may interfere with the quality of patient-professional interactions as a limiting factor to the implementation and adoption of such technologies. Furthermore, Currie (2014) reported that some of the Health Information Technologies, such as HER are labour intensive, leading to their rejection by healthcare practitioners on the basis that they may interfere with their daily work routines. Asthana, Jones and Sheaff (2019) noted that at the commissioner and provider organisation scale, important roles are played by capabilities of adopters and organisational conditions, which are highly fragmented within the NHS England that has more than 200 Clinical Commissioning Groups, 7500 primary care, 200 provider trusts as well as structural separations between social care and NHS.

Besides, interpersonal connection is an imperative factor that influences the creation of necessary trust in healthcare innovation. Beliefs and attitudes of healthcare stakeholders can act as both facilitators and barriers to effective implementation of Health Information Technology

across all NHS organisations (Sood and McNeil, 2017). Positive attitudes increase the HIT acceptance and implementation rates while negative attitudes influence resistance and poor adoption of such technologies (Asthana, Jones and Sheaff, 2019). Some of the key negative perceptions reported in the reviewed studies include the interference of Health Information Technology with the care delivery process (Cresswell and Sheikh, 2015), inability of the Health Information Technology to increase rate of patient care and satisfaction in the technology (Huddy et al., 2016) and unwillingness of healthcare staff to digitisation changes such as adoption of Health Information Technology (Faulds et al., 2016). Healthcare professionals' computer and technological skills, experience and abilities impact the implementation and adoption of the Health Information Technology. Additionally, NHS organisation managerial support is needed for improved adoption rates of Health Information Technologies.

### *3.4 Chapter Summary*

THIS chapter has successfully presented themes generated from the thematic analysis of the evidence collected from selected studies. Four themes were generated; organisational implementation climate, regulation and accreditation issues, financial constraints and personal attributes, knowledge and beliefs. All the four themes explain the key organisational barriers to the implementation and use of Health Information Technology in the NHS. The next chapter discusses these themes by comparing and contrasting the evidence from the review in order to facilitate generation of new knowledge that may be used for bridging the gaps in literature previously identified.

## Chapter Four: Discussion

### *4.1 Introduction*

After successful generation of themes using thematic analysis in chapter 3, the primary purpose of this chapter is to provide an interpretation of those themes and develop new knowledge that may be used for filling the identified gaps in literature such as the key organisational barriers to effective implementation of Health Information Technology among NHS organisations. THIS chapter is organised into four main sections following the themes; organisational implementation climate, regulation and accreditation, financial constraints, personal attributes, knowledge and beliefs. Each of these themes are discussed by critically appraising the studies selected during review, comparing the quality of their evidence, identifying their possible weaknesses and facilitating the generation of new knowledge for understanding the reason why most NHS organisations have not adopted the use of Health Information Technology comprehensively.

### *4.2 Organisational Implementation Climate*

Successful integration of Health Information Technology into health care organisations has been a great concern in the United Kingdom. Specifically, the evidence revealed that most of the Health Information Technologies are not often compatible to the health care organisation in terms of their resource requirements. Hence leading to their slow adoption and use by these organisations (Castle-Clarke, Edwards and Buckingham, 2017; Sood and McNeil, 2017). Similarly, arguments presented by The King's Fund (2019) and Wager et al. (2017) claimed that most of the Health Information Technology being developed are not compatible with the existing hospital technology, thus their adoption requires reorganisation of such technologies in order to accommodate the new technologies. Only those Health Information Technologies that are

perfectly compatible with the work practices within NHS organisations like hospitals and care centres are likely to be considered for adoption and use compared to those that lead to the disruption of daily clinical practices.

Furthermore, failure to create awareness among the healthcare professionals regarding the Health Information Technology to be adopted often lead to the development of negative perception about the possible consequences associated with the use of such technologies (disruption of their workflows and creation of new roles and responsibilities). High rates of HIT technology rejections are often influenced by the inability of the respective organisations to develop strategies for creating awareness and informing their key stakeholders about the Health Information Technology to be adopted (Sun and Qu, 2015). Strategic planning is necessary for ensuring that all the resources needed for HIT technology implementation and adoption are available or can be accessed (Wachter, 2016). And a lack of strategic plan for HIT implementation and adoption has been identified as another key barrier within this theme. Precisely, the strategic plan must include information about role description, evaluation of associated policies and process changes, organisational readiness evaluation, as well as establishment of innovative structures (Papoutsis et al., 2015; Castle-Clarke, Edwards and Buckingham, 2017). Within the healthcare setting, commissioning practice was determined to play an important role as a barrier to technology adoption rather than enabler of innovation (Llewellyn et al. 2014). So, there is need to inform all the healthcare stakeholders about the Health Information Technology to be implemented and adopted in order to create awareness of the benefits associated with such technologies and assurance that it may not interfere with their workflows but would rather help in improving the quality care services provided to the patients.

In regards to solutions, Papoutsis et al. (2015) and Castle-Clarke, Edwards and Buckingham (2017) cited behavioural and cultural barriers as key factors that limit successful digitisation and eHealth system adoption in the NHS. Fortunately, these barriers can be addressed using the solutions proposed by Sood and McNeil (2017). These authors stressed on significance of management support during the development, implementation, adoption and utilisation of Health Information Technology. They particularly noted that through management involvement, the other care professionals and health care stakeholders would be provided with access to knowledge and information about the key roles of Health Information Technology. Other literature by Nugroho et al. (2016) and The King's Fund (2019) also stressed on the need for regular in-service training programmes among the NHS staffs in matters of technology and technological developments so as to equip them with relevant knowledge during the digitisation process. For positive organisational implementation climate to be realised, the educational programmes should comprehensively provide the healthcare stakeholders with adequate knowledge about the anticipated benefits and possible challenges they may face when using such technologies.

#### *4.3 Regulation and Accreditation Issues*

Inadequate regulations and policies for controlling formulation of Health Information Technology were identified as other important barriers to their implementation (Currie, 2014) and the need to develop recognised standards for the Health Information Technology was suggested (Meinert et al., 2018; Waterson, 2014). The whole process of developing, implementing, patching and updating the Health Information Technology and associated technologies should be error-free (DHSC, 2019). Inconsistent compliance with the data protection policies such as General Data Protection Regulation and Data Protection Act 1998 has

also threatened efficiency of these Health Information Technology (Meinert et al., 2018; Lin et al., 2015). Despite the ability of Health Information Technology to improve quality of care services to patients, data privacy and security threats have significantly increased following their adoption (Nancy, Currie and Whitley, 2016). The national policy such as the decision to invest on Trusts which have been digitally advanced has impaired the digital divide in the United Kingdom. Despite the plans by NHS to go paperless, limited resources have negatively impacted success of such plans.

Nancy, Currie and Whitley (2016) recommended that the Health Information Technologies to be adopted should be compatible to both the hardware and software of other devices within the NHS organisations. The King's Fund in 2019 and NHS England in 2018 similarly noted that poor user interface designs of the Health Information Technology often led to data input and comprehension errors which limited the efficiency of these technologies. Nugroho et al. (2016) and Asthana, Jones and Sheaff (2019) noted that despite a proliferation of HIT systems and eHealth technologies, few meet evidential requirements as provided by the NHS Digital. Users of HIT systems are required to acknowledge their acceptance of the inputted data in different ways and various selection options for data entry choices. The format of data often varies among the different types of software packages and technologies because of lack of consistent data standards within the industry. For that matter, the efficiency of data exchange process between the health technologies is often limited. As a result, Waterson (2014) noted that Health Information Technology may not be compatible with the already existing practice technologies and that most of the healthcare professionals are often reluctant to eliminate the functional technologies in order to have an integrated technology into the HIT. The present



review revealed that this problem is often common among smaller practices compared to the larger ones as a result of relatively limited organisational resources like experience and expertise.

#### *4.4 Financial Constraints*

Health information technology costs and the costs associated with the implementation, adoption, management and maintenance of these technologies were identified as other key organisational barriers among the reviewed studies (Kumar et al., 2016; Huddy et al., 2016; Harvey et al., 2018). Disparity in financial strengths among NHS organisations has influenced varying adoption rates of Health Information Technology (Kumar et al., 2016; Wachter, 2018; DHSC, 2019). On the contrary, Currie (2014) noted that the UK Government has in the recent years allocate more financial resources to the NHS for supporting its digitisation process. Regardless of evidence showing that Health Information Technology improves the quality of care services and efficiency of the NHS, contrary clarifications are provided in the reviewed studies. Some of the Health Information Technologies often have low returns on investments and so are not economically viable in most of the NHS organisations such as the small healthcare centres located in the rural areas. The cost associated concerns can be addressed through the establishment of cost-effectiveness by formal evaluation, organisational business model redesigning and financing the Health Information Technology on a bigger scale (Lin et al., 2015; Mackert et al., 2017).

As a result of the significant role played by the costs in the HIT implementation and adoption processes, there is need for supporting financial incentives to enable organisations to meet their technological goals (Cresswell and Sheikh, 2015). The NHS uses a Payment by Results (PbR) approach to finance most of its activities. There are a lot of disparities in the financial resource allocation among NHS organisations. Therefore there is slow adoption of

Health Information Technology in the organisations with limited financial resources (Nugroho et al., 2016; NHS Improvement, 2019). For example, Clinical Commissioning Groups serving the elderly in the rural areas often experience more financial shortfalls compared to their metropolitan equals. Therefore, such varying financial strengths explains why most of the NHS organisations in the metropolitan areas are more digitised than their counterparts from rural areas despite almost the same care demands in both areas.

#### *4.5 Personal Attributes, Knowledge and Beliefs*

Despite the availability of strong evidence and mandatory NICE guidelines, the adoption of Health Information Technology has not been assured and adoption processes are often left up to the individual trusts, which lack appropriate arrangements for managing these implementation processes (Cresswell and Sheikh, 2015). Furthermore, reviewed studies showed that the NHS managers and leadership may only approve adoption of Health Information System which they believe are effective rather than basing their selection on available evidence (Huddy et al., 2016; Sood and McNeil, 2017). Other literatures also identified complexity factors such as slow technology performance, difficulty in using the HIT hardware and software, and inability to provide real-time access to required data to play a central role in creating negative perception among healthcare professionals about the efficiency of Health Information Technology. Therefore, HIT technology vendors should develop technologies which are user-friendly, involving end-user in the design and development, providing simplified guides for their use and providing necessary technical assistance (Mackert et al., 2017; Wager et al., 2017; Nugroho et al., 2016). Benefit realisation and mitigation of safety risks associated with the Health Information Technology adoption are widely dependent on the level of healthcare professional cooperation and support from the NHS organisation management (Cresswell et al., 2017). Within

the UK health service sector, there is limited interaction between primary care and other types of care settings (Asthana, Jones and Sheaff, 2019; Huddy et al., 2016).

(Cresswell et al., 2017). Additionally, studies have reported that Health Information Technology with technical adjustments made to them to suit constant modifications and promote easy use by healthcare professionals often have higher acceptance and adoption rates (Sood and McNeil, 2017; NHS England, 2018; NHS Improvement, 2019). Therefore, it is recommended that the end user's input in the design and development of Health Information Technology is considered as an important approach for overcoming the barriers of adaptability which lead to negative perceptions among healthcare professionals (Cresswell and Sheikh, 2015; Mackert et al., 2017). The procurement and evaluation committees are often actively involved in the decision-making process about digital migration policies, such as adoption of HIT systems (Faulds et al., 2016; Asthana, Jones and Sheaff, 2019). With such committees, doctors and other healthcare professionals will have important role in defining the desirable characteristics of the technology to be adopted as well as reviewing evidence about costs and benefits of the technologies. In NHS organisations where the health practitioners have negative perceptions towards the Health Information Technology, the adoption rates are often very low (Huddy et al., 2016).

As much as some authors (Faulds et al., 2016; Currie, 2014) argued that the level of stakeholder involvement at various stages of new technology implementation and adoption can influence the nature of decisions to be made about such Health Information Technology, other authors (Lin et al., 2015; Mackert et al., 2017) have reported that NHS organisations are currently being encouraged to improve the level of their public participation and stakeholder awareness programmes during change development processes, including the adoption of new

technologies. According to Asthana, Jones and Sheaff (2019), interpersonal connections play important role in the creation of necessary trust in innovation. However, the health and social care in England is characterised by high number of isolated clusters in need of connectivity. Likewise, Sood and McNeil (2017) that reported inadequate stakeholder involvement negatively impact the implementation and adoption of different technologies in the healthcare sector. As mentioned earlier, some care professionals and stakeholders generally have negative perceptions about the efficiency of Health Information Technology, with most of them believing that such technologies may disrupt their workflows and rate of care delivery process. Therefore, there is need for organisations to comprehensively engage all their stakeholders during the decision-making process about the Health Information Technology to be adopted in order to increase their chances of registering positive outcomes in technological adoption and use (Mackert et al., 2017; NHS Improvement, 2019).

#### *4.6 Chapter Summary*

The discussion chapter has provided in-depth analysis of the themes describing the organisational barriers to effective implementation, adoption and use of the Health Information Technology in NHS organisations. Specifically, this systematic review has revealed that most of these organisations do not have the required resources, including financial resources and human resources that are needed for the implementation, adoption and use of Health Information Technology. Also, there is anxiety among the healthcare professionals regarding the possible impacts of those technologies on their professional roles and responsibilities hence leading to their resistance. Lastly, issues with regulation and accreditation of the available Health Information Technology were identified as most of these technologies often lack a specific

standard for their assessment and implementation, hence the slow acceptance, adoption and use within the UK healthcare sector.

## Chapter Five: Conclusions and Recommendations

### *5.1 Introduction*

In this chapter, the research question is restated in order to determine if the generated evidence from the systematic review successfully answered it. Recommendations for addressing the identified organisational barriers and how the generated knowledge can be used to improve the efficiency of NHS organisations in HIT technology implementation and adoption are presented. Both the limitations of the present systematic review and recommendations for future research in this area are finally provided in this chapter.

### *5.2 Conclusions*

The primary goal of this systematic review was to assess and report the organisational factors that prevent successful implementation and adoption of Health Information Technology in the NHS. With reference to the generated outcomes, it is justifiable to note that the present review successfully achieved its purpose. Specifically, four themes explaining the organisational barriers to HIT technology implementation and adoption were generated. The themes include: organisational implementation climate, regulation and accreditation issues, financial constraints and the personal attributes, knowledge and belief. These themes can be used to formulate strategies for increasing implementation and adoption rates of Health Information Technology in the NHS. For example, the organisational implementation climate can be addressed by creating awareness among the stakeholders on the benefits and cost-effectiveness of the intended Health Information Technology to enable them develop positive perception towards such technologies.

### *5.3 Recommendations for NHS Organisation Practice*

THIS paper identified organisational implementation climate as one of the key barriers to the implementation of Health Information Technology. Therefore, the management of NHS

organisations have the responsibility of allowing all the stakeholders such as healthcare practitioners and patients to provide their opinions regarding the decisions to implement and adopt certain Health Information Technology. These decisions should be subjected to public participation. Furthermore, the NHS should develop standards for evaluating and validating all its Health Information Technology and provide its organisations with comprehensive knowledge about cost-effectiveness of every technology so as to positively influence their decision-making process about the implementation and adoption of those technologies. Finally, the UK Government through NHS England the Department of Health and Social Care should allocate more funds to organisations to enable them finance their HIT implementation programmes and create awareness among their stakeholders.

#### *5.4 Study Limitations*

The present study employed a systematic review approach which included studies that discuss the organisational barriers to various types of Health Information Technology. Consequently, the homogeneity of evidence included in this review was compromised as the study did not acknowledge that different Health Information Technology may have specific factors limiting their implementation and adoption. THIS study also collected and analysed secondary data; hence the researcher had no opportunity of collecting data that are specific to the research needs. The use of secondary research approach also limited the quality of outcomes generated as there were higher chances that the limitations of the studies systematically reviewed were transferred into the present review. Furthermore, the barriers to HIT technology implementation and adoption were assessed on larger NHS organisations yet most of these organisations have different management structures like NHS Scotland, England and Wales.

Therefore, the generalisability of the study outcomes on a specific group of NHS organisations was limited.

### *5.5 Recommendations for Future Research*

Future research in this area should consider collecting primary data in order to generate first-hand and new knowledge about the key barriers to HIT technology implementation in NHS organisations. Specifically, a mixed methods approach would more appropriate as it would allow for the collection of quantitative data from large sample size for increased generalisability of study outcomes and the qualitative data for understanding the perception of the stakeholders included in the study. In addition, there is need to specify the types of Health Information Technology whose implementation and adoption barriers are to be assessed because such technologies often have varying acceptance rates among NHS organisations. Lastly, in addition to their barriers to implementation and use, future research can consider evaluating strategies for increasing the acceptance rates of the Health Information Technology within the targeted organisations.



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## Appendices

### *Appendix 1: Quality Assessment of the Selected Studies*

**Table 5:** Quality Assessment Using CASP (2020) Tool

Study and Year	CASP Scores/10	Comments
Waterson (2014)	9	Even though the methods and methodologies employed in this study were appropriate, it failed to register a score of 10 because the author failed to clearly state the study aim.
Sood and McNeil (2017)	8	The study involved collection and analysis of data from 18 healthcare professionals based in 11 hospitals hence increasing the comprehensiveness of the study outcomes. However, the study outcomes could not be generalised to larger UK healthcare population because of the small sample size.
Cresswell and Sheikh (2015)	9	The convenience sampling approach used in this study was appropriate as it enabled the researchers to collect data from readily available healthcare professionals. However, the study failed to register a score of 10 because of its inability to collect data from large population area which would have increased the generalisability of the study outcomes.
Castle-Clarke, Edwards and Buckingham (2017)	8	The grounded theory approach involving collection of data different representatives of healthcare industry in UK. Nonetheless, the study failed to specify the type sampling approach it employed for participant recruitment; hence it was awarded 8 out of 10 points.
Harvey et al. (2018)	8	The methodological approach is appropriate. The study is organised into various sections such as abstract, introduction, research background, methodology, results and discussion and conclusion. However, implications for the study outcomes are not provided.

Papoutsis et al. (2015)	9	The study employed a mixed method approach hence addressing limitations of both qualitative and quantitative studies. Structural organisation of the study is appropriate. The authors defined all the inclusion criteria for participant selection as well as justified the sampling approach selection. Nonetheless, data was only collected from patients and general public about the security and privacy issues of HER, with limited information about care professional views.
Huddy et al. (2016)	9	The study has a detailed structural organisation. Furthermore, the authors explained inclusion criteria used for participant section. Thematic analysis used is explained and generated themes are highlighted. However, sampling method used in this study is not stated and justified.
Llewellyn et al. (2014)	9	Despite its strengths in collecting primary qualitative data, the study failed to explain the sampling approach used for participant recruitment. However, it indicated that data was collected from NHS Technology Adoption Centre (NTAC) staff, clinicians, managers and commissioners.
Kumar et al. (2016)	9	Methodological approach (exploratory design) is appropriate as it allowed for collection of more comprehensive data for analysis. Structural organisation of the study is appropriate, as it is subdivided into various sections such as abstract, introduction, review of previous literature, methodology, results and discussion. The study specified the type of Health Information Technology under investigation, reverse exchange systems.
Nancy, Currie and Whitley (2016)	8	Structural organisation of the study is appropriate. The selected methodological approach fits the needs of this study. Research summary is presented in the abstract section. However, the study fails to explain sampling method and inclusion criteria for participant selection process.
Meinert et al. (2014)	9	The methodological approach selected is appropriate. The authors described the research backgrounds and key factors that led to research development. Nonetheless, it failed to explain



		the inclusion criteria for participants into this study; hence a score of 9 out of 10.
Cresswell et al. (2017)	8	A longitudinal qualitative was used as a research approach, which was appropriate for this study. The research identified the key gaps in literature that is focused on filling, stated the research problem and implications of its outcomes. However, sampling methods and inclusion criteria for the participants included in the study are not comprehensively stated.
Faulds et al. (2016)	9	Research background, aims and objectives are stated. The methodological approach is also explained. However, the authors failed to explain sampling approach used as well as the key inclusion criteria used for participant identification and recruitment.
Asthana, Jones and Sheaff (2019)	8	The employed exploratory analytical approach allowed for the collection of data for a prolonged period of time and improving the comprehensiveness of the outcomes generated. Nonetheless, the study failed to mention professional backgrounds of the individuals included in the study as participants. It also failed to highlight its possible limitations hence a score of 8/10.
Currie (2014)	9	The use of a longitudinal approach allowed for the collection of comprehensive data about Health Information Technology adoption as well as to compare perception of health stakeholders over a long period of time. Sampling strategy (purposeful) is defined and justified. However, the study failed to mention specific types of Health Information Technology whose adoption was assessed during this period.

**The Quality Assessment Questions**

1. Was there a clear statement of the aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?

5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
8. Was the data analysis sufficiently rigorous?
9. Is there a clear statement of findings?
10. How valuable is the research?

