

Developing a Framework of Information Governance Addressing Online Health Information Quality

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Abstract: The adoption of the Internet has increased a large number of users that search for online health information to make healthcare decisions. The quality of these decisions heavily relies on the quality of information identified on the Internet. Prior studies focused on assessing the quality of online health information. Although a few researchers encouraged the use of information governance frameworks to manage the information, while addressing the information quality was not the focus of these frameworks. This paper presents a research protocol that outlines planned steps and procedures of a systematic review and a Delphi method, in order to develop a framework of information governance towards online health information quality. The components in the framework are proposed to be divided into micro, meso and macro levels. Research protocol for establishing the framework has been developed and we have started its implementation. The outcomes of this study will be state-of-the-art of empirical evidence supported to develop an information quality governance framework, establishing links between the components that have received limited attention in the literature. From a practical perspective, the proposed framework will help guide information governance practices from all relevant sectors of society for addressing online health information quality.

Keywords: Online health information, Information quality, Information governance, Systematic review, Delphi method

1. Introduction

Increasing number of adults are turning to online health information for decision aids and health advices (Sillence et al, 2007), while the quality of the information varies from different sources such as websites, social media and smartphone apps (Sun et al, 2019). The quality of online health information determines consumers' intention of use on the information (Bao, Hoque, & Wang, 2017), health behaviours (Bujnowska-Fedak & Węgierek, 2020), and quality of healthcare decision making (Bruce et al, 2015). High-quality information helps consumers make effective decisions. However, poor-quality information results in invalid or wrong decisions that cause the loss of property, health or even life. The quality of health information on the Internet that was low (Eysenbach et al, 2002) and remains low (Zhang, Sun, & Xie, 2015) has been a long-standing concern in society.

Previous research has paid much attention to identifying the dimensions used to assess information quality (IQ) and evaluate the quality of online health information (Eysenbach et al, 2002; Sun et al, 2019; Zhang et al, 2015). While a few studies proposed to apply information governance (IG) (Dong & Keshavjee, 2016; Liaw et al, 2014; Rabiei et al, 2019) that describes decision rights and an accountability framework to encourage expected information practices in the lifecycle of information (Gartner, 2021), addressing online health IQ was only an aspect of their study scope. To this end, this study aims to develop an IG framework to address the quality of health information on the Internet.

To achieve this aim, we will apply a systematic literature review (SLR) to identify IG components and propose an IG framework for online health IQ. Thereafter, we will conduct a Delphi study to improve the proposed framework by capturing experts' opinions. This study thus has two main contributions. Firstly, from a theoretical perspective, we identify IG components related to addressing online health IQ, organise these components in a framework and establish the links between the components that has received limited attention in the literature. Secondly, from a practical perspective, we provide guidelines and references for the participants who involve in IG activities to design and implement IG strategies for achieving high-quality online health information and call all relevant sectors of society to participate in IG for online health IQ.

The rest of this protocol is organised as follows: Section 2 gives a background about this study; Section 3 presents the methods applied to conduct the SLR; Section 4 outlines the Delphi methods utilised in the study; and Section 5 concludes this paper.

2. Background

This section provides the essential concepts applied in the study and a background of developing an IG framework for online health IQ, as presented below.

2.1 Information governance

Generally speaking, governance refers to “the way a business is directed and governed. It deals with the strategies, policies and procedures that directly impact on organisational performance, stewardship and the business's capacity accountable to its stakeholders” (Hendrikse & Hendrikse, 2003). Corporate governance cascades to subdomains such as information technology (IT) to realise business goals cascading to these subdomains (Merkus et al, 2019). Data governance (DG) and IG can be also viewed as corporate governance subdomains (Hagmann, 2013), seeking to control and secure information for achieving business goals in an organisation. Essentially, the terms ‘data’ and ‘information’ are used interchangeably, however, they are not the same. As noted in Tilly et al (2017), data is objective and it presents a phenomenon unrelated to an information system (IS), while information is subjective and it gives a context to the data using an IS that users are easy to understand. In this study, we also distinguish these two terms and focus on the IG literature addressing online health IQ to understand this phenomenon.

According to Kooper, Maes, and Lindgreen (2011), information governance is defined as “the set of activities aimed at establishing a normative foundation to facilitate and stimulate sense making interactions”. Many researchers developed general IG frameworks to guide and support the management of information inside and outside an organisation. For example, Tallon, Ramirez, and Short (2013) proposed an IG framework that consists of three perspectives: antecedents (enablers and inhibitors), compositions (structural, procedural, and relational practices), and consequences (firm performance and risk mitigation), while Bennett (2017) considered that an IG framework contains four dimensions: policies, procedures, people, and technology. Meanwhile, the Association of Records Managers and Administrators (ARMA) International has developed eight principles (accountability, compliance, transparency, availability, integrity, retention, protection and disposition) for records and information management under the umbrella of IG (ARMA International, 2021). These theoretical foundations are used in various application scenarios to study and understand IG (Dong & Keshavjee, 2016; Mikalef, Boura, Lekakos, & Krogstie, 2020). They can be also employed to compare to our research findings on the components of IG in the context of this study, to figure out similarities and differences.

2.2 Information quality

In the field of information management and IS, information quality is defined as fitness for use by information consumers (Miller, 1996). Researcher have utilised multiple dimensions to describe and measure IQ such as completeness and accuracy (Arazy & Kopak, 2011; Arazy, Kopak, & Hadar, 2017). As noted in Lee et al (2002), IQ dimensions can be grouped into four categories: intrinsic IQ, contextual IQ, representational IQ, and accessibility IQ. To specify, intrinsic IQ concerns the quality of information what a system produces itself; contextual IQ emphasises IQ fulfilling the requirements for a given task; representational IQ addresses whether or not the information generated by a system is interpretable, easy to understand and manipulate, and presented concisely and consistently; and accessibility IQ focuses on whether or not the information is accessible and secure (Lee et al, 2002).

As to healthcare, IQ is an important concern for making a decision. This is especially true for online health information since a large number of consumers seek and use online health information. However, the information derived from multiple sources has the quality at an uneven level that has received extensive attention from both academics and practitioners (Sun et al., 2019). For instance, based on the Principles Governing Advertising in Publications of the American Medical Association, Winker et al (2000) proposed the principles for content, advertising and sponsorship, privacy and confidentiality, e-commerce that can be utilised to govern online health information. The concept of ‘information governance’ was introduced scientifically in the healthcare domain by Donaldson and Walker (2004) as a framework to support security, confidentiality, and high-quality electronic information services for the National Health Society (Kooper, Maes, & Lindgreen, 2011). While a few researchers aimed at developing an IG framework (see the next section) for dealing with health information, addressing IQ is only included as one component in their IG frameworks. To fill this gap in the literature, in this study, we intend to propose an IG framework towards online health IQ.

2.3 Related studies on health information governance

This section reviews prior IG frameworks or models for health information (see Table 1). For example, the American Health Information Management Association (AHIMA) (2014) proposed eight Information Governance Principles for Healthcare (IGPHC) (see Table 1) based on practical experience, information theory, and legal doctrine, assisting in guiding IG practices in healthcare organisations. However, Liaw et al (2014) draw on the theoretical foundation of data quality (DQ) and DQ management (DQM) incorporating IG to support data and information governance and quality management in healthcare organisations. Based on the Digital Governance Institute (DGI)'s data governance model (DGI, 2016), Dong and Keshavjee (2016) integrated the experience of Ontario healthcare system and proposed an IG framework including four components: people (e.g. IG office, data stakeholders, and stewards), processes (e.g. establish accountability, determine decision rights, manage change, stakeholder communication, evaluation and continuous improvement), and policy (e.g. information management, communication, issue resolution, decision rights, and performance management), and technology (e.g. software, hardware, and IT infrastructure). By reviewing relevant literature, Rabiei et al (2019) identified the components in health IG and divided them into eighteen groups: management of information and records, management of information life cycle, data governance, information technology governance, information technology, confidentiality and security of cyber-information, information quality, e-discovery, risk management, change management, project management, roles and responsibilities, training human resources, rules and regulations, working methods and policies, standards, compliance with rules and regulations, and program monitoring. Recently, National Health Service (NHS) updated the IG management framework and strategy that provide policies and procedures for dealing with the information of patients and employees (NHS, 2020).

The aforementioned IG frameworks or models for healthcare information have improved our understanding of the phenomena, while there are still three limitations in the literature. Firstly, prior frameworks were developed based on either theoretical underpinnings or practical experience, lacking a combination of theoretical review and empirical evidence to improve the quality of framework development. Secondly, these IG frameworks or models only looked at IQ as an aspect of IG, concerning more about patients and employees' personal information. The IG strategies for

the quality of online information (accessed by the public) concerning disease or care itself remain unclear. Thirdly, researchers identified various components in their IG frameworks or models for healthcare while they did not describe these components based on different levels (e.g. a high level or a fine-grained level). This could lead to difficulties in organising these components and comparing related studies. Furthermore, limited attention was directed towards the relationships among these components that helps better understand and carry out IG relevant initiatives.

Table 1: A summary of related studies in this review

Author(s) (Publication year)	Drawing on a prior IG model?	Research methods of developing the framework	Components in the framework	Application context	Focussing on online health IQ?
AHIMA (2014)	Not mentioned	Practical experience, information theory, and legal doctrine	Accountability, Transparency, Integrity, Protection, Compliance, Availability, Retention, and Disposition	Healthcare organisations	No
Liaw et al (2014)	Theoretical underpinnings for DQ (Phillips et al, 2010) and DQM (Thiru, Hassey, & Sullivan, 2003)	Literature review	Organisational role, Data types, Data quality Metrix, and Governance	Healthcare enterprises	No
Dong and Keshavjee (2016)	The DGI Data Governance Framework (DGI, 2016)	Practical experience	People, Processes, Policy, and Technology	Ontario health care system	No
Rabiei et al (2019)	Not mentioned	Literature review	Eighteen components in the health IG	Healthcare organisations	No
NHS (2020)	Not mentioned	Not mentioned	Nine policies and nine procedures	Healthcare organisations	No

In this study, our IG framework development differs from existing related studies as shown in Table 2.

Table 2: Differences between related studies and our research

Aspect	Previous related studies	This study
Research methods	either only utilised theoretical underpinnings or only utilised practical experience to develop the IG frameworks	the SLR method used to identify as many relevant IG components as possible to propose a comprehensive IG framework in the study context and a Delphi method applied to assess and revise the proposed framework, assisting in the framework improvement
Scope of study	mainly concerned IG for dealing with personal information (e.g. patients and employees).	addressing the quality of online health information related to disease or care that can be accessed by users
Focus of study	did not describe IG components based on different levels	identifying IG components, providing a novel synthesis that leads to a classification of these components, and establishing the links between the components

3. Systematic literature review protocol

According to Fink (2019), systematic literature review is a methodological approach, defining well-established procedures by which it is conducted and including all relevant material within the study scope, and hence it is reproducible by others who would follow the same approach in reviewing the topic of interest. SLR is therefore utilised to select, analyse and interpret available literature related to a specific research topic, a research question (RQ) or a phenomenon of interest (Kitchenham, Budgen, & Brereton, 2016) that best fits this study to identify the components of IG for online health IQ. The process of SLR includes three main phases, i.e. planning, conducting and reporting (Kitchenham, Budgen, & Brereton, 2016). This section presents the outline of the planning phase in the SLR and an SLR protocol describing planned review steps and procedures is the outcome of this phase. A written, detailed SLR protocol document requires to be validated for its rigour and it plays an essential role in ensuring consistency in the execution of the review in the review team (Kitchenham, Budgen, & Brereton, 2016).

As starting a review with clear, concise RQs helps researchers progressively refine its scope into addressing answerable RQs for the review and serves as a reference to follow in each of the stages and steps (Wolfswinkel, Furtmueller, & Wilderom, 2013), in this study we propose three RQs to guide the SLR (see Table 3).

Having the proposed RQs, we then refer to the guideline of Wolfswinkel, Furtmueller and Wilderom (2013) to plan and organise the SLR procedures because this guideline has been widely used in the fields of information management and IS for conducting an SLR (Senyo, Liu, & Effah, 2019; Zeiss et al, 2021). Accordingly, our SLR incorporates four main steps: defining the scope of the review, searching the initial list of articles, selecting relevant articles, and analysing the included articles, as described below.

3.1 Defining the scope of the review

This step that addresses the scope of the topic and benefits in each of the stages to be organised, includes four main stages: defining the criteria for inclusion and exclusion, identifying the fields of research, determining the appropriate sources, and deciding on the specific search terms.

Table 3: Description of the RQs and rationale to propose the RQs

RQ1: What are the goals of information governance for online health information quality?
The aim of proposing this RQ is to find out the objectives or targets of IG expected to achieve that highlight the role, benefits and values of use of IG in addressing online health IQ. As noted in Liaw et al (2014), IG and organisational objectives must be aligned logically and operationalised in health organisations to ensure IQ that is good enough to support health objectives. Hence, relevant objectives in IG should be taken into account in developing an IG framework in healthcare. In the context of this study, we will look at (1) objectives of online health IQ expected to achieve by use of IG and (2) health objectives supported by quality-assured IQ using IG, thus aligning IQ goals with health goals in the IG process.
RQ2: Are there any participants engaged in information governance for online health information quality? If so, what are their responsibilities?
The motivation of proposing this RQ is to find out the types of participants involved in IG for online health IQ together with their responsibilities in the IG process. Researchers (Donaldson & Walker, 2004; Liaw et al, 2014) have described different governance archetypes for allocating decision rights or responsibilities in the areas of IG, mainly from the perspective of information providers. Due to online health information that is open and freely to access, multiple participants could engage in the IG process. In this study, we will consider roles and responsibilities of multiple participants in IG (e.g. users and police makers), calling the efforts from multiple sectors of society to address online health IQ.
RQ3: What are the factors influencing information governance for online health information quality?
This RQ aims to identify the areas that impact IG for online health IQ. According to Liu, Zowghi, and Talaei-Khoei (2020), to ensure IQ, organisations and individuals need to know what impacts IQ. If the factors influencing IQ and possible relationships between these factors are disclosed, IQ would have better chances to be potentially preserved or systematically improved. In the context of IG for online health IQ, the identification of the factors influencing IG for achieving high-quality IQ will benefit in guiding efforts from multiple perspectives and better strategising the plans and solutions to deal with IQ problems in the IG process.

3.1.1 Defining the criteria for inclusion and exclusion

Table 4 presents the inclusion and exclusion criteria used to screen relevant articles on IG for online IQ in healthcare.

Table 4: Inclusion and exclusion criteria for literature selection in the SLR protocol

Number	Inclusion criteria	Exclusion criteria
1	The articles included are published in English or Chinese.	The articles are duplicates.
2	The articles included are published up to September 2021.	The articles cannot be accessed online.
3	The articles included has a topic on use of IG to address online IQ.	The articles are not peer-reviewed research publications nor industrial/technical reports (e.g. thesis, editorial letters, and book reviews).
4	The articles included contextualise the study backdrop in healthcare.	The researchers of the articles did not provide empirical findings themselves.
5		The articles do not address any of the proposed RQs.
Empirical refers to collection of data using evidence that is collected from real world.		

3.1.2 Identifying the fields of research

In this study, we focus on IG for addressing online IQ in healthcare that spans multiple research disciplines such as IS, Information Management, Information Technology Management, and Health Informatics, assisting in determining all probable corresponding databases and outlets applied in the search and generating an abundant set of relevant articles on the topic.

3.1.3 Determining the appropriate sources

Firstly, as advised by prior related studies (Liaw et al, 2014; Rabiei et al, 2019), we will utilise 8 databases as our initial sources for automatic search (see Table 5), covering multidisciplinary and health-focus types. These sources contain the potential largest set of English literature related to the topic of interest that will contribute to establishing an exhaustive view of this field.

Secondly, we will use a list of specific journals for manual search in this study. These outlets have been identified in prior review studies of online health IQ (Kim, 2016; Sbaifi & Rowley, 2017; Zhang et al, 2015) and health IG (Liaw et al, 2014; Rabiei et al, 2019) in their paper selection that will help improve the completeness of the set of articles found in the present study. They are: Journal of the American Medical Association (JAMA), Journal of the Association for Information Science and Technology (JASIST), Journal of Medical Internet Research (JMIR), International Journal of Medical Informatics (IJMI), Methods of Information in Medicine (MIM), and Journal of the American Health Information Management Association (J AHIMA).

Thirdly, we will refer to several official reports or documents on IG from ARMA, AHIMA, National Health Service (NHS), Digital Governance Institute (DGI), and International Organization for Standardization (ISO), as advised by the researchers (Donaldson & Walker, 2004; Dong & Keshavjee, 2016; Lomas, 2010; Rabiei et al, 2019). Furthermore, we will also include the articles identified in prior literature reviews on health IG (Liaw et al., 2014; Rabiei et al, 2019), to have a comprehensive view of IG principles, standards, and regulations.

Table 5: Databases selected in the SLR protocol

Number	Type of database	Database name	Link
DB1	Multidisciplinary	Google Scholar	https://scholar.google.com
DB2	Multidisciplinary	ProQuest	https://www.proquest.com
DB3	Multidisciplinary	ScienceDirect	https://www.sciencedirect.com
DB4	Multidisciplinary	Scopus	https://www.scopus.com
DB5	Multidisciplinary	SpringerLink	https://link.springer.com
DB6	Multidisciplinary	Web of Science	https://www.webofknowledge.com
DB7	Health-focus	Medline	https://www.nlm.nih.gov/medline/index.html
DB8	Health-focus	PubMed	http://www.ncbi.nlm.nih.gov/pubmed

Lastly, snowballing methods will be employed in this study to identify the relevant articles that might have been missed in the aforementioned automatic and manual search, checking articles that are cited in the included articles in this review (backwards snowballing) and articles that cite the included articles in Google Scholar (forwards snowballing).

3.1.4 Deciding on the specific search terms

To develop the search terms, we examine the RQs and identify important terms used in the RQs to generate a set of major search terms for the review: information governance, online, health, and information quality.

To decide the synonyms and alternative terms for the major search terms, we firstly have conducted a preliminary survey to identify a few of literature reviews on (1) health IG and (2) online health IQ (Hapudeniya, Dissanayake, & Hewapathirana, 2019; Kim, 2016; Sbaffi & Rowley, 2017; Zhang et al, 2015). From these review studies, we have generated a group of synonyms and alternative terms for the major search terms (see Table 6). Accordingly, our search will begin with the keywords by using the Boolean operators as the following search strings: ('information governance' OR 'governance of information') AND ('online' OR 'internet' OR 'web*' OR 'ehealth' OR 'e-health' OR 'cyber' OR 'electronic') AND ('health*' OR 'medical' OR 'clinical') AND ('information quality' OR 'quality of information').

Table 6: Search terms developed in the SLR protocol

Major search terms	Information governance	Online	Health	Information quality
Synonyms and alternative terms	governance of information	internet web* ehealth e-health cyber electronic	medical clinical	quality of information

The symbol for truncation is usually an * at the end of a word where allows the search for a word to have multiple endings. For example, web* would find articles with the terms such as web or website in them.

3.2 Searching the initial list of articles

With the search strings, we will carry out the search in the Title, Abstract, and Keywords fields of the online databases to centralise our search. Due to different functions in databases, we will customise the search in the selected databases to identify the initial list of articles.

3.3 Selecting relevant articles

This step aims to filter relevant articles for data analysis. We will screen the articles from multiple sources (see Section 3.1.3) based on the developed inclusion and exclusion criteria (in Table 4). After that, each article of the final list of the included articles will be given a unique identifier (the letter S followed by a number) and the article can be referenced in the reporting of the findings in relation to the RQs.

3.4 Analysing the included articles

To better analyse the content of the included articles and identify the findings and insights in the text that seem relevant to the review scope, we will utilise a data extraction form to extract data that specifically addresses our RQs. The extracted data for RQs is shown in Table 7.

While Dong and Keshavjee (2016) have defined four components of the IG framework together with specific examples for each of these components (see Table 8), they focused on the context of electronic health systems and these examples of IG might not be able to accommodate all elements in IG for online health IQ in the context of this study. We therefore only take advantages of the view of people, process, policy, and technology as the analytical lens to extract relevant factors influencing IG for online health IQ.

After data extraction, we will aggregate and organise the results into three levels (i.e., micro, meso and macro level) that establish the main skeleton of the IG framework for online health IQ. Looking at IG from the micro-meso-macro perspective (Liaw et al, 2016) that enables to accommodate all findings identified in the SLR related to RQs, will benefit both researchers and practitioners to develop a tolerant and comprehensive view of IG to better participate in relevant activities. According to Junior et al. (2018), the macro-level of analysis concerns a cultural and social system surrounding and guiding the subject (i.e. IG for online health IQ in the context of this study) to fulfil a purpose or pursuit a goal, being used to accommodate the findings related to RQ1, RQ2 and the policy perspective of RQ3. At the micro-level, concrete operation (addressing online health IQ by IG in the context of this study) (i.e. the findings for people and technology perspectives of RQ3) must be subject to a series of processes occurring at the meso-level (in relation to the process perspective of RQ3), contributing to realising the purpose or the goal. In light of this, the micro-meso- macro classification scheme used in this study allows us to accommodate and structure all research findings and relationships among the categories of data will be also established (see Figure 1). Note that we do have certain

plans and strategies for the data analysis, however, we will revise and update the research findings when we have all the results available.

Table 7: Data analysis strategies of identifying IG components for addressing online health IQ

Number of RQ that needs to be addressed	The information extracted from the included articles
RQ1	Goals, objectives, or targets of IG for addressing online health IQ (e.g. expectations on (1) IQ addressed in IG and (2) health products and services supported by quality-assured IQ within use of IG)
RQ2	- Types of the participants involved in IG for online health IQ (e.g. users of online health information, information publishers, third-party detection institutions and stakeholders) - Responsibilities of these participants in IG activities for online health IQ
RQ3	- From the people perspective (e.g., digital literacy, information literacy and IQ awareness) - From the process perspective (e.g., IG activities that are carried out at different stages of information life cycle (Yusof & Chell, 2000)(this theoretical lens of information life cycle used in the study as it is well-accepted in the field of information management that helps us better extract and analyse the data from the articles for understanding the information processes from its creation to retirement), including creation and collection, production, protection, dissemination, retrieval, access and use, and retirement) - From the policy perspective (e.g. policies for online health IQ) - From the technology perspective (e.g. dimensions of online health IQ and manifestations of IQ problems)

A thorough qualitative analysis of the findings for addressing RQs and their relationships will draw certain research patterns, existing research gaps and future research directions. Based on the IG framework for online health IQ, we can also have a better chance to develop an IG toolkit to assess the performance of online health IG towards IQ.

Table 8: The components in the IG framework of Dong and Keshavjee (2016)

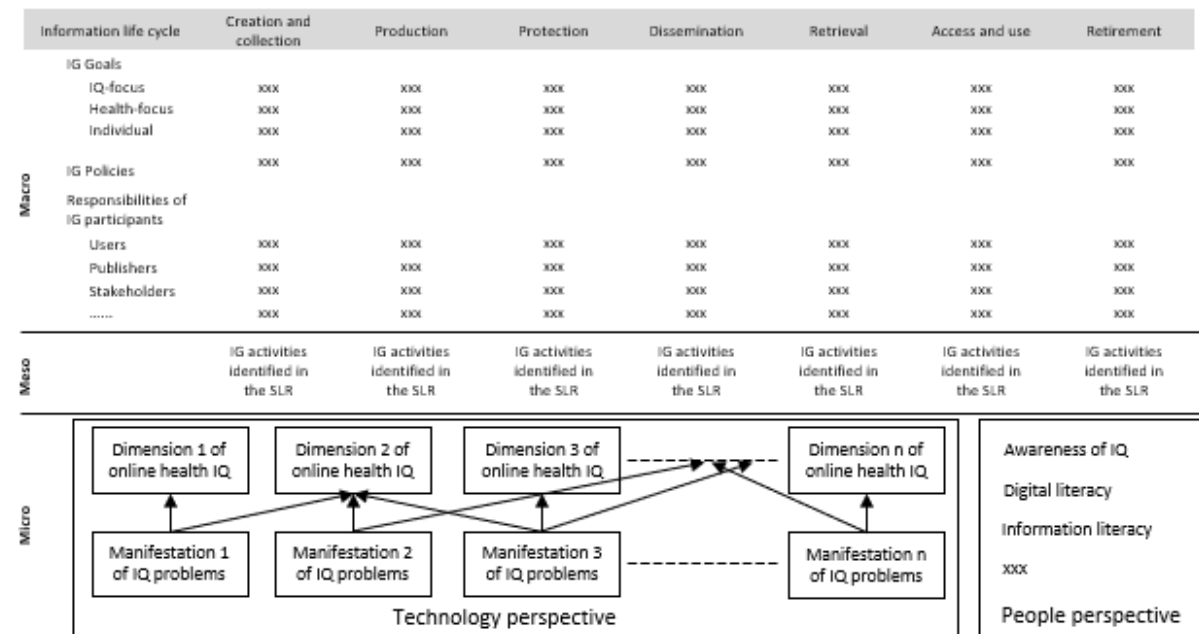
Component	Description (extracted from Dong and Keshavjee (2016))	Items under each component (these terms have been explicitly mentioned in Dong and Keshavjee (2016))
People	To identify key stakeholders involved in the IG process and their information needs	Primary clinical data providers and users
		Secondary data users
		IT service providers
		General public
Process	To reach a high-level maturity of IG through implementing a set of key processes	Data element definition
		Data integration/harmonisation
		Information sharing and accountabilities
		Building governed information into technologies
		Issues/dispute resolution
		Monitoring and change management
		Stakeholder support and communication
Policy	To legitimise the importance of IG and guide the formulation of responsibilities for key stakeholders	Measurements and report
		Mandatory data entry and data collection
		Mandatory incorporation of defined information requirements into IT systems
Technology	To provide quality healthcare supported by IT that permeates many aspects of healthcare systems	Mandatory information governance committee, composition, and accountability
		Compatibility and performance of software and hardware deployed
		Openness, capacity, and scalability of IT infrastructure

4. Delphi study protocol

Delphi method is a structured process that collects and extracts knowledge from a panel of experts, using multiple iterations of questionnaires and feedback to achieve an agreement on specific topics or RQs (Paré et al, 2013). In this study, we will use the Delphi method to investigate the IG components addressing online health IQ for three main reasons (Okoli & Pawlowski, 2004). Firstly, there is an incomplete state of knowledge about what components in IG may be desired for online health IQ. This complex phenomenon requires the knowledge from experts who understand IG principles, methods and processes. A Delphi study that offers a means of handling experts' opinions helps better understand this phenomenon. Secondly, Delphi does not require the experts to meet physically, allowing to collect data from transregional experts that leads to a more comprehensive understanding of the RQs. Thirdly, the

Delphi panel size requirements are modest and practical, soliciting opinions from 10 to 18 experts suggested in the literature (Paliwoda, 1983).

The Delphi procedure applied here is customised in the context of this study. Since the initial IG framework for online health IQ is proposed based on the SLR findings, in the Delphi study, we will (1) identify IG components for online health IQ from the experts' side, (2) incorporate the experts' opinions and revise the initial proposed framework, and (3) carry out an expert assessment of the framework, in which the procedure is similar with Holsapple and Joshi (2002). Hence, our Delphi procedure contains two main stages: preliminary stage and Delphi rounds.



xxx the content analysed from the SLR

→ one IQ dimension contain one or more than one manifestations of IQ problem

-- multiple IQ dimensions or manifestations of IQ problems identified

Figure 1: An initial prototype of the IG framework for online health IQ

4.1 Preliminary stage

In this stage, professional panel selection criteria and boundary conditions and evaluation criteria of framework are determined before starting the Delphi process as advised by Holsapple and Joshi (2002) and Lang, Wiesche, and Krcmar (2018).

4.1.1 Professional panel selection criteria

Referring to Okoli and Pawlowski (2004), to obtain valid and robust results, we will recruit those professionals with significant work experience in the field of online health IG. We will locate our panel of professionals who are responsible for designing and implementing IG activities in relation to online health information. The initial name list of potential participants will be identified from the included studies in the SLR and workshops and forums of online health information management. Professionals practicing in this field and known to the researchers of this study are also considered. To ensure a reliable panel, we will use the below criteria to select the professionals (see Table 9). We will select as many types of professionals as possible, to cover all relevant roles of participants involved in online health IG in the study sample.

Table 9: Professional panel selection criteria

Number	Selection criteria	Description
1	Information management decision makers in a health organisation	Professionals who make decisions on information management in a health organisation
2	Online health information publishers	Professionals who create and release a piece of health information on the Internet
3	Developers of health online platforms/websites/social media	Professionals who design and develop an online platform/website/social media involving health information
4	Information service supervision person	Professionals who guide and monitor information services related to health
5	Users of online health information	Individuals who use online health information
6	Non-novice person	Individuals who have more than one year of experience in dealing with online health information

4.1.2 Boundary conditions and evaluation criteria of the framework

We defined three boundaries for the framework development of online health IG toward IQ and four evaluation criteria for the framework as inspired by Holsapple and Joshi (2002). As such, each Delphi iteration will address questions of assessing the framework based on these boundaries and criteria and meanwhile revise the framework incorporating professional panel's comments.

Three boundaries of the framework development include context, prescriptive, and descriptive. The context boundary confines the development to a consideration of IG towards online health IQ. The prescriptive boundary confines it to constructing the IG framework in the context of this study using three levels, i.e. macro, meso, and micro level (see Section 3.4). As the framework is developed in a top-down fashion and the IG components at each of the three levels are indefinite, a descriptive boundary confines it to describing online health IG from a micro-meso-macro perspective at the first level and their detailed components at the second level.

For the evaluation criteria of the framework, we will refer to the guiding criteria for development and evaluation of a framework that are similar with the key criteria utilised in theory evaluation (Gbededo & Liyanage, 2020; Holsapple & Joshi, 2002). They are completeness, correctness, conciseness and clarity, as shown in Table 10. These evaluation criteria contribute to developing the initial framework and assessing the framework. In light of this, we can gain an insight into strengths and limitations of the framework as well as possibilities for improvements.

Table 10: Evaluation criteria developed for the framework

Number	Evaluation criteria	Description	Reference(s)
1	Completeness	A framework addresses the broadest perspective of IG principles, methods and processes for online health IQ as well as the need of the framework and its origins.	Adapted from Gbededo and Liyanage (2020)
2	Correctness	The context and content of a framework are compatible with all elements of the philosophical claims, concepts and propositions.	Adapted from Gbededo and Liyanage (2020)
3	Conciseness	A framework is structured in a way of using fewer concepts and propositions required to explain the phenomena of interest explicitly.	Adapted from Gbededo and Liyanage (2020)
4	Clarity	The proposed framework can be used in practice for sustainability users.	Adapted from Gbededo and Liyanage (2020)

4.2 Delphi rounds

The initial framework of IG for online health IQ is derived from the analysis and synthesis of relevant literature in the SLR. A Delphi study will be conducted to obtain the opinions and comments from IG researchers and practitioners for framework revisions and improvements. This also addresses an assessment of the framework from the expert perspective. We will take suggestions from the professionals included in the study to revise the framework and stop the Delphi process when a consensus of the experts' opinion appears.

First of all, we will design a questionnaire based on the findings from the SLR to elicit comments on the framework components and its completeness, correctness, conciseness, and clarity. The instrument consists three parts: the first part gives the research objectives; the second part gives 4-point Likert scale (i.e., 'Strongly Agree', 'Agree', 'Disagree' and 'Strongly Disagree' used) for the IG components identified from the SLR, evaluation criteria, and open-ended questions for structured elicitation (allowing professionals to provide other relevant IG components that are not included in the instrument, reasons for their disagreement and suggestions to improve the framework)

(Gbededo & Liyanage, 2020); and the last part gathers the experts' personal information. It is worth mentioning that the 'Neither Agree nor Disagree' item was not used in the Likert scale in order to avoid indecisive outcomes from a Delphi study (Gbededo & Liyanage, 2020). The questionnaire will be then pilot tested by two experts in the field of health information management and their feedback will be used to refine the instrument in order to address the content validation. Finally, a web-link to the questionnaire with an invitation letter, a document describing the initial framework and a notice of post-paid participation (\$50.00) will be emailed to each candidate and all are given 4 weeks to reply.

4.3 Data analysis strategy

When the responses are captured, we will organise these responses into two groups: a numeric quantitative group for individual information and IG components and an open-ended qualitative group. In the quantitative group for the IG components, we will employ the following weighting strategy to present the degree of agreement: Strongly Agree = 4, Agree = 3, Disagree = 2, and Strongly Disagree = 1. As advised by Lang et al (2018), we will utilise Kendall's coefficient of concordance that is frequently applied in Delphi studies to indicate whether a consensus in the professional panel has been achieved and the extent to which the consensus appears (Schmidt, 1997). To specify, when Kendall's coefficient of concordance is greater than 0.7, it shows a strong consensus; values between 0.5 and 0.7 refer to that a moderate consensus has been achieved, while values are less than 0.5 indicating weak consensus among experts in the panel (Schmidt, 1997).

The open-ended qualitative group will be carefully reviewed and analysed, assisting in required basic revisions, additional changes and further clarification for the components included in the framework. We will fine tune the aforementioned strategy of data analysis when we capture the responses from the experts.

5. Conclusion and future work

Addressing the quality of online health information derived from various sources remains a significant challenge in society. Identifying dimensions used to measure IQ and assessing the quality of online health information have received much attention in the literature (Eysenbach et al, 2002; Sun et al, 2019; Zhang et al, 2015). Using an IG framework that formulates activities of information management assists in guiding information practices to achieve quality-assured information, while there lacks an IG framework focussing on addressing online health IQ. Furthermore, researchers applied either theoretical underpinnings (e.g. literature review) or practical experience (e.g. personal knowledge and experience) alone to develop IG frameworks (in Table 1), lacking a combination of theoretical review and empirical evidence collected to improve the quality of framework development. This paper therefore presents the plan for conducting such a study including two stages: (1) identifying IG components using an SLR to propose an initiate framework and (2) improving the framework by seeking opinions from experts in a Delphi study.

5.1 Theoretical implications

This article includes a unique study of documenting planned steps and procedures of a systematic review and a Delphi method used to develop an IG framework towards online health IQ. The protocol thus assists in proposing and conducting similar studies in future to improve the development of IG frameworks. The analysis of related studies and categories of the components in the IG frameworks reveals that research efforts have been directed towards studying IG components from macro and meso levels, however, specific IQ issues from a micro level are missing in the IG frameworks, in the context of online health information. Investigating the IQ issues helps identify their root causes for resolution that contributes to IQ improvements and cannot be overlooked. Furthermore, related studies only discussed different roles of participants in IG practices as the IG components from a people perspective. In this study, we consider individual capabilities and awareness of achieving IQ as the people perspective for implementing IG and these IG components can determine IQ that users would obtain. Accordingly, studying and understanding human factors influencing IQ from a more a fine-grained level helps better strategise IG practices for IQ and should be taken into account when developing IG frameworks for addressing IQ.

5.2 Practical implications

Our protocol of developing the IG framework for online health IQ will attract the attention from developers and creators of online health information to this phenomenon. As IQ issues could appear from the information creation to its delivery, both developers of platforms/tools for providing health information services and information creators need to deal with IQ at each stage in the information lifecycle. As to governments and the third-party regulatory bodies, they should improve relevant policies and monitor information practices to ensure an IQ-assured online environment. Our study is also of relevance to the users who seek and use online health information. The analysis of the IG comments implies that a training for users is expected to carry out in order to

improve their capabilities and awareness of IQ. User manuals of achieving IQ by using online platforms/tools are also required to be developed and broadcasted in public.

5.3 Future work

The implementation of the SLR protocol is under progress. We have pilot tested our search strings in 8 online databases for identifying relevant English literature and applied the inclusion and exclusion criteria on a sample of the first 10 papers¹ from the results of these databases. The future work includes execution of the research plan presented in this paper to give an overview of IG components for online health IQ in order to structure an IG framework of online health IQ and outline existing research gaps and future research directions. Furthermore, the framework will benefit practitioners to assess the IG performance, for better revealing problem areas and strategise solutions to address the problems, in the context of dealing with online health IQ.

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¹ The search records for the first 10 papers from the selected databases (shot screens) are available at the following link: <https://www.dropbox.com/s/90xwjyqjde10sn/Results%20of%20pilot%20testing%20.pdf?dl=0>.

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