Review Article

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Review of Qualitative Research Methods in Health Information System Studies

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Objectives: The aim of this study was to review hospital-based health information system (HIS) studies that used qualitative research methods and evaluate their methodological contexts and implications. In addition, we propose practical guidelines for HIS researchers who plan to use qualitative research methods. **Methods:** We collected papers published from 2012 to 2022 by searching the PubMed and CINAHL databases. As search keywords, we used specific system terms related to HISs, such as "electronic medical records" and "clinical decision support systems," linked with their operational terms, such as "implementation" and "adaptation," and qualitative methodological terms such as "observation" and "in-depth interview." We finally selected 74 studies that met this review's inclusion criteria and conducted an analytical review of the selected studies. **Results:** We analyzed the selected articles according to the following four points: the general characteristics of the selected articles; research design; participant sampling, identification, and recruitment; and data collection, processing, and analysis. This review found methodologically problematic issues regarding researchers' reflections, participant sampling methods and research accessibility, and data management. **Conclusions:** Reports on the qualitative research process should include descriptions of researchers' reflections and ethical considerations, which are meaningful for strengthening the rigor and credibility of qualitative research. Based on these discussions, we suggest guidance for conducting ethical, feasible, and reliable qualitative research on HISs in hospital settings.

Keywords: Hospitals, Health Information Systems, Qualitative Research, Research Methodology, Research Ethics

I. Introduction

Health information systems (HISs) are designed to improve patient health and safety in healthcare settings. These systems support the administrative and management tasks necessary for medical and nursing services, using standardized clinical patient data. These data are utilized for patient treatment, healthcare plans, and clinical research, thereby improving the healthcare environment [1]. Additionally, the effective use of HISs contributes to improving hospital management efficiency and helps achieve cost savings [2,3]. Therefore, HISs play an essential role in current healthcare services.

Over the last few decades, medical settings have widely adopted information technologies. However, despite the progress made in HISs, several issues have emerged concerning

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the optimization and utilization of HISs in hospitals [4]. These problems and challenges arise at various levels. For instance, there are macro-level issues related to the external environment and policies, conflicting perspectives among stakeholders, changes in work practices, unintended consequences within hospital organizations, and resistance among users. Therefore, it is crucial to consider personal, social, psychological, and physical aspects beyond the system engineering and design approach to understand and address the limitations associated with HISs.

Recent HIS studies have taken a multidisciplinary approach, incorporating theories and methods from various fields such as sociology, anthropology, organizational studies, and systems engineering. These studies aim to identify problems and provide recommendations for improving HISs [5-10]. For example, the Systems Engineering Initiative for Patient Safety is a framework focusing on the interaction between human and computer system elements to support work performance and patient safety when HISs are used [5]. Other frameworks have proposed process-oriented research methods and perspectives to identify the unintended consequences of HIS applications. These studies consider the actors who use the system and utilize a socio-technical perspective to recognize problems and propose solutions [6-8]. They consider multiple dimensions of the individual, organization, system, and environment to provide a holistic approach to addressing HIS-related issues.

In HIS studies, qualitative research methods offer a perspective that helps to understand and interpret phenomena, meanings, and context. Some HIS researchers emphasize qualitative methodologies to capture personal and social factors surrounding systems [10] and understand the contextual meaning, including social, cultural, organizational, and political issues related to information technology [11]. Moreover, qualitative methods are useful for uncovering psychological and sociocultural factors that are difficult to capture with quantitative research methods. In other words, qualitative research can contribute to person-centered healthcare by examining multilayered and complex contexts among actors surrounding information systems.

However, there are still many challenges in applying qualitative research methods in studies on information systems in general. For example, one common criticism is that qualitative studies may lack objectivity, making it difficult to generalize the results and ensure methodological rigor. The perspectives and interpretations of researchers often influence the outcomes, necessitating systematic approaches to maintain research rigor [9,12,13]. Moreover, qualitative researchers must interact with study participants, which requires attention to ethical dilemmas as they arise at the moment [14]. Therefore, assessing the reflexivity of qualitative researchers and the ethical considerations they employ during the research process is crucial for strengthening the rigor and credibility of qualitative research.

Therefore, this study aimed to conduct a review of researcher characteristics and reflections, research participant sampling, and data collection and management processes reported in participatory observations, in-depth interviews, and focus group interviews (FGIs) used in existing hospital-based HIS research. It is hoped that this article will provide contextual considerations and insights to help researchers conduct ethical, feasible, and reliable qualitative HIS research in hospital settings.

II. Methods

1. Research Questions

This study set out to address the following research questions dealing with qualitative research methods within the field of HISs:

What research processes are reported in participant observation, in-depth interviews, and FGIs of hospital-based HISs and related people with respect to researcher characteristics and reflection, participant sampling, and data collection and analysis?

What are the ethical and practical dilemmas in qualitative research found in the reported research process?

2. Search Strategy

We searched for qualitative research methods in HIS studies to collect articles published from 2012 to 2022 using the PubMed (MEDLINE) and CINAHL databases, referring to the COSI model, a literature search protocol for health technology assessment proposed by the U.S. National Library of Medicine [15].

The search terms were strategically made by combining three categories: types of HISs, operational terms such as "implementation" or "adaptation," and qualitative research methods. It is useful to enter these multiple search terms because it allows for a more targeted search that matches the research objectives. It has also been demonstrated to be highly reliable, comparable to manually searching articles using a single search term [16]. Table 1 shows the search commands for merging several terms.

Table 1. Search strategy

Search keyword = (A) and (B) and (C)
A: (electronic medical records) OR (electronic health records) OR (clinical decision support system) OR (computerized physician order entry system)
B: (implementation) OR (operation) OR (usability) OR (performance)
C: (exp attitude) OR (qualitative) OR (ethnography) OR (interview) OR (phenomenology) OR (grounded theory) OR (focus group) OR (content analysis) OR (narrative analysis) OR (discourse analysis) OR (participant observation)

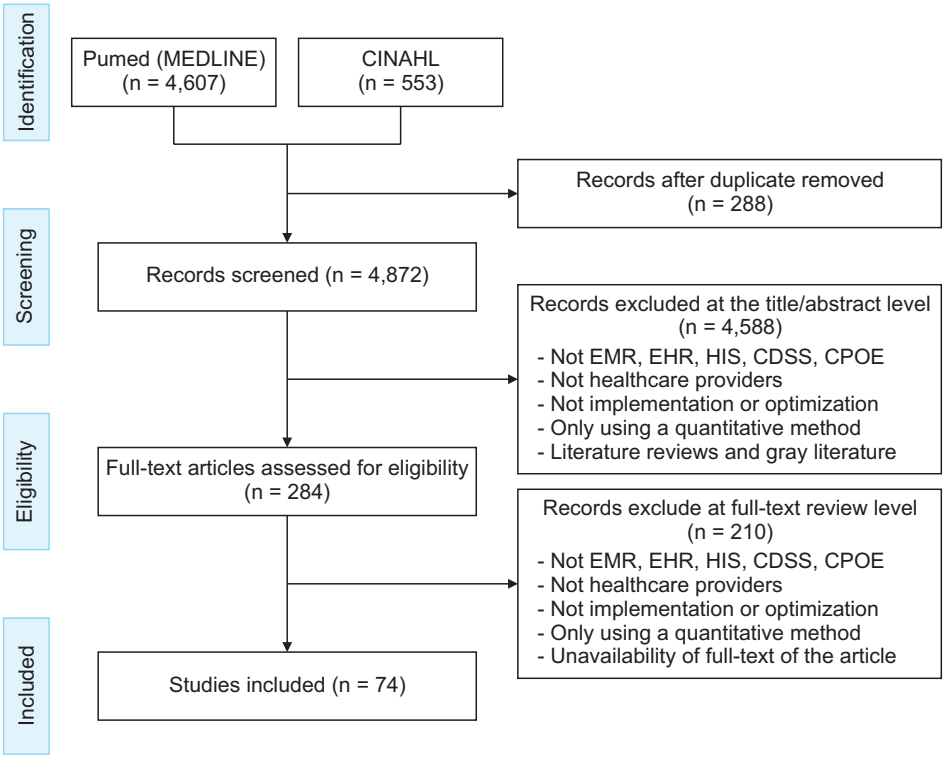

Figure 1. Flow diagram of study selection. EMR: electronic medical record, EHR: electronic health record, HIS: health information system, CDSS: clinical decision support system, CPOE: computerized physician order entry.

3. Study Selection

We found 4,607 articles in PubMed (MEDLINE) and 553 articles in CINAHL following the search strategy and identified 4,872 articles after excluding 288 duplications. After identifying the research articles, two researchers decided on inclusion/exclusion criteria in a meeting. We limited the language of our search to English. We excluded pilot research, clinical reports, policy study reports, any studies not published in peer-reviewed journals, only study abstracts published, or where the full text was unavailable. The inclusion criteria were: (1) the study is relevant to the HIS technology included in the search keywords; (2) the study reports appropriate empirical data and findings on implementing and adapting an HIS in a hospital setting; (3) the research participants must be involved in the hospital and HIS development industry; and (4) the study utilizes representative qualitative research methods (i.e., participant observation, in-depth interviews, and FGIs).

Two researchers independently reviewed the article titles and abstracts based on inclusion/exclusion criteria. After reaching a consensus, 284 articles were selected. The researchers then reviewed the full text of these articles and excluded irrelevant studies in a subsequent meeting. After this review, 74 articles were selected that matched the objective of the study, which is to investigate qualitative research methods applied in the HIS field. Figure 1 shows the process of study selection.

4. Data Analysis

Two authors used the Standards for Reporting Qualitative Research (SRQR) checklist to analyze the research process of selected articles [17]. According to the SRQR developers, the checklist is a list of key factors that should be reported in utilizing qualitative research methods rather than criteria to be used to evaluate qualitative research. Therefore, we used it to determine which data to extract from the papers. To

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ensure the rigor of this research, we repeatedly validated the analysis while forming categories based on extracted data. We used Zotero as a bibliography management program and Microsoft Excel to organize the selected papers. A summary of the selected articles is shown in Table 2 and Appendix 1.

III. Results

Applying the SRQR checklist, we found that many of selected articles did not report their research methods in a detailed and systematic manner (Tables 3–6). About a quarter of the studies had no information on the ethical approval process. In some studies, limited reporting prevented a clear description of how research participants were identified or recruited. In general, selected studies did not include researcher characteristics, reflexivity, or data privacy during data collection.

1. Researcher Characteristics and Reflexivity

The characteristics of the researchers and interviewers were briefly reported in terms of qualitative research experiences or professional roles, such as doctoral students, nurse practitioners, or clinicians. A few studies reported collaborative work with medical specialists. Some articles indicated they had received additional training in qualitative research methods or HIS utilization to conduct research in hospital settings [A14, A17, A19, A28, A47, A66]. In the context of multi-disciplinary research teams engaging in HIS research, some articles reported a variety of researchers' backgrounds, including health informatics, clinicians, nurses, and social scientists [A10, A52, A54, A70].

It was rare for authors to provide information about the researchers' position, role, and impact on the study participants or settings. Only a few studies mentioned having no prior relationship with the research participants [A20]. Moreover, researchers rarely described the observer's role and interactions with the participants in participant observation studies. However, they sometimes briefly reported how they intended to avoid influencing the participants during data collection and analysis. For example, researchers asked participants to confirm the collected data during interviews and observations, described procedures to minimize potential bias in data processing and analysis [A02, A05, A34, A50, A53, A54], or scheduled data collection at the participants' convenience to avoid disrupting hospital workflows [A35].

2. Participant Sampling, Identification, and Recruitment

The findings related to participant sampling, identification, and recruitment are presented in Table 5. These findings were determined by reviewing the research methods. The most common sampling method was purposive sampling, in which researchers primarily used hospital expert databases or previous research records to identify participants with specific knowledge or experience in HIS utilization or selected participants with changing characteristics and information-rich cases. At the purposefully selected study sites, some researchers utilized convenience sampling to expand the diversity of sample characteristics [A47, A65], maximum variation sampling until new information emerged [A17, A18, A24], or snowball sampling, in which participants were referred to other potential participants during observations or interviews [A04, A61, A65].

Most studies provided detailed information about the study setting, but only a few described the process of selecting the sites and the contact made with them. In cases where the identification of participants was reported, researchers identified potential participants during site visits, which was mostly done through participatory observation. Researchers visited sites as part of a preliminary survey and attended hospital meetings or workshops.

Participants in studies were recruited through various methods, such as personal invitations, emails, and telephone contacts made by researchers. Researchers used emails, flyers, and posters to encourage interested individuals to get in touch voluntarily to express their interest in participating in the study. Although researchers identified potential participants through field contact, we noticed that some studies recruited participants through direct invitations by the researchers or bulk mail sending. This was mainly because the researchers also worked as clinicians or nurses and thus fulfilled dual roles.

3. Data Collection, Processing, and Analysis

Table 6 presents a comprehensive review of data collection, processing, and analysis. The data were collected using one or more methods, including participatory observation, in-depth interviews, and FGIs. According to the data presented in Table 6, in-depth interviews were conducted in 29 instances, participatory observation with in-depth interviews was done in 23 studies, and FGIs were utilized in 12 studies.

Among the studies that specified the data collection process, studies that utilized participatory observation specified and pseudonymized the study site, describing the bed size, hospital staff, and brief information about the implementation and adaptation process of HISs. Studies that reported the use of participatory observation generally described the

Table 2. Summary of the selected articles

Author (year)	Research topic	Research participant	Researcher		IRB approval process	Sampling methods	Data collection methods	Data processing		Data analysis	
			Characteristic	Reflexivity				Data management	Coding process	Analysis process	Software use
[A01] Ngugi et al. (2021)	Barriers and facilitators of HIS implementation and adaptation	Hospital staff	0	0	1	A purposive sampling	FGI	1	1	1	NVivo
[A02] Scantlebury et al. (2017)	Barriers and facilitators of HIS implementation and adaptation	Hospital staff	1	1	1	A purposive sampling	IDI	0	1	1	0
[A03] Koskela et al. (2016)	Barriers and facilitators of HIS implementation and adaptation	Hospital staff	1	1	0	A purposive sampling	FGI	0	1	1	0
[A04] McCrorie et al. (2019)	Barriers and facilitators of HIS implementation and adaptation	Hospital staff	0	0	1	A purposive snowball sampling	IDI	0	1	1	NVivo
[A05] Jedwab et al. (2021)	Barriers and facilitators of HIS implementation and adaptation	Nurses	1	1	0	A convenience sampling	FGI	0	1	1	Microsoft Excel
[A06] Tissera et al. (2021)	Barriers and facilitators of HIS implementation and adaptation	Nurses	0	0	1	A convenience sampling	IDI, FGI	0	1	1	0
[A07] Njane et al. (2021)	Barriers and facilitators of HIS implementation and adaptation	Nurses	0	0	0	Unclear	FGI	0	1	1	0
[A08] Or et al. (2018)	Barriers and facilitators of HIS implementation and adaptation	Physicians	1	0	1	A purposive sampling	IDI	0	1	1	0
[A09] Chao et al. (2013)	Barriers and facilitators of HIS implementation and adaptation	Physicians	0	0	0	A random sampling	IDI	0	0	1	0
[A10] Cifuentes et al. (2015)	Barriers and facilitators of HIS implementation and adaptation	Physicians	1	0	1	Unclear	PO, IDI	1	1	0	ATLAS.ti
[A11] de Hoop & Neumuth (2021)	Barriers and facilitators of HIS implementation and adaptation	Physicians	0	0	1	Unclear	PO, IDI	0	1	1	0
[A12] Nimjee et al. (2020)	Barriers and facilitators of HIS implementation and adaptation	Physicians	0	0	1	Unclear	IDI, FGI	0	1	0	0
[A13] Gumede-Moyo et al. (2019)	Barriers and facilitators of HIS implementation and adaptation	Stakeholders	0	0	0	A purposive sampling	PO, IDI, FGI	1	1	1	Microsoft Excel
[A14] O'Malley et al. (2015)	Barriers and facilitators of HIS implementation and adaptation	Stakeholders	1	0	0	A random sampling	IDI	0	1	1	ATLAS.ti

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Table 2. Continued

Author (year)	Research topic	Research participant	Researcher		IRB approval process	Sampling methods	Data collection methods	Data processing		Data analysis	
			Characteristic	Reflexivity				Data management	Coding process	Analysis process	Software use
[A15] Terry et al. (2014)	Barriers and facilitators of HIS implementation and adaptation	Stakeholders	0	0	1	A snowball sampling	IDI, FGI	0	1	1	NVivo
[A16] Aldosari (2017)	Barriers and facilitators of HIS implementation and adaptation	Vendors	0	0	1	Unclear	FGI	0	1	1	NVivo
[A17] Goldberg et al. (2012)	HIS implementation and adaptation planning and strategy	Hospital staff	1	0	1	A purposive maximum variation sampling	IDI	0	1	1	NVivo
[A18] Cracknell (2020)	HIS implementation and adaptation planning and strategy	Hospital staff	0	0	0	A purposive maximum variation sampling	FGI	0	1	1	Microsoft Excel
[A19] Sherer et al. (2015)	HIS implementation and adaptation planning and strategy	Hospital staff	1	0	0	A theoretical sampling	IDI	0	1	1	NVivo
[A20] Umstead et al. (2021)	HIS implementation and adaptation planning and strategy	Hospital staff	1	0	1	Unclear	PO	0	1	1	Dedoose
[A21] Bouamrane & Mair (2013)	HIS implementation and adaptation planning and strategy	Physicians	0	0	1	Unclear	IDI, FGI	0	1	1	0
[A22] Moon et al. (2018)	HIS implementation and adaptation planning and strategy	Stakeholders	0	0	1	A purposive sampling	IDI, FGI	0	1	1	NVivo
[A23] Militello et al. (2014)	Impact on hospital work practice	Hospital staff	0	0	1	A maximum variation sampling	PO, IDI	0	1	1	0
[A24] Xiao et al. (2021)	Impact on hospital work practice	Hospital staff	0	1	1	A purposive maximum variation sampling	PO, IDI	1	1	1	MAXQDA
[A25] Nelson et al. (2017)	Impact on hospital work practice	Hospital staff	0	0	1	A purposive sampling	PO, IDI	0	1	1	0
[A26] Lanham et al. (2012)	Impact on hospital work practice	Hospital staff	0	0	1	A purposive theoretical sampling	PO, IDI	0	1	1	0
[A27] Macabasag et al. (2022)	Impact on hospital work practice	Hospital staff	0	0	1	A snowball sampling	PO, IDI	0	1	1	TAMS Analyser

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Table 2. Continued

Author (year)	Research topic	Research participant	Researcher		IRB approval process	Sampling methods	Data collection methods	Data processing		Data analysis	
			Characteristic	Reflexivity				Data management	Coding process	Analysis process	Software use
[A15] Terry et al. (2014)	Barriers and facilitators of HIS implementation and adaptation	Stakeholders	0	0	1	A snowball sampling	IDI, FGI	0	1	1	NVivo
[A16] Aldosari (2017)	Barriers and facilitators of HIS implementation and adaptation	Vendors	0	0	1	Unclear	FGI	0	1	1	NVivo
[A17] Goldberg et al. (2012)	HIS implementation and adaptation planning and strategy	Hospital staff	1	0	1	A purposive maximum variation sampling	IDI	0	1	1	NVivo
[A18] Cracknell (2020)	HIS implementation and adaptation planning and strategy	Hospital staff	0	0	0	A purposive maximum variation sampling	FGI	0	1	1	Microsoft Excel
[A19] Sherer et al. (2015)	HIS implementation and adaptation planning and strategy	Hospital staff	1	0	0	A theoretical sampling	IDI	0	1	1	NVivo
[A20] Umstead et al. (2021)	HIS implementation and adaptation planning and strategy	Hospital staff	1	0	1	Unclear	PO	0	1	1	Dedoose
[A21] Bouamrane & Mair (2013)	HIS implementation and adaptation planning and strategy	Physicians	0	0	1	Unclear	IDI, FGI	0	1	1	0
[A22] Moon et al. (2018)	HIS implementation and adaptation planning and strategy	Stakeholders	0	0	1	A purposive sampling	IDI, FGI	0	1	1	NVivo
[A23] Militello et al. (2014)	Impact on hospital work practice	Hospital staff	0	0	1	A maximum variation sampling	PO, IDI	0	1	1	0
[A24] Xiao et al. (2021)	Impact on hospital work practice	Hospital staff	0	1	1	A purposive maximum variation sampling	PO, IDI	1	1	1	MAXQDA
[A25] Nelson et al. (2017)	Impact on hospital work practice	Hospital staff	0	0	1	A purposive sampling	PO, IDI	0	1	1	0
[A26] Lanham et al. (2012)	Impact on hospital work practice	Hospital staff	0	0	1	A purposive theoretical sampling	PO, IDI	0	1	1	0
[A27] Macabasag et al. (2022)	Impact on hospital work practice	Hospital staff	0	0	1	A snowball sampling	PO, IDI	0	1	1	TAMS Analyser

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Table 2. Continued

Author (year)	Research topic	Research participant	Researcher		IRB approval process	Sampling methods	Data collection methods	Data processing		Data analysis	
			Characteristic	Reflexivity				Data management	Coding process	Analysis process	Software use
[A28] Klarenbeek et al. (2020)	Impact on hospital work practice	Hospital staff	1	0	0	A snowball sampling	IDI	0	1	1	ATLAS.ti
[A29] Bergey et al. (2019)	Impact on hospital work practice	Hospital staff	0	0	1	Unclear	IDI, FGI	0	1	1	NVivo
[A30] Pontefract et al. (2018)	Impact on hospital work practice	Hospital staff	0	0	1	Unclear	FGI	0	1	0	NVivo
[A31] Grando et al. (2021)	Impact on hospital work practice	Hospital staff	1	0	1	Unclear	PO, IDI	0	1	0	Morae
[A32] Prater et al. (2019)	Impact on hospital work practice	Hospital staff	0	0	1	Unclear	IDI	1	1	1	Microsoft Excel
[A33] Howard et al. (2013)	Impact on hospital work practice	Hospital staff	1	0	1	Unclear	PO, IDI	0	1	0	ATLAS.ti
[A34] Friedman et al. (2014)	Impact on hospital work practice	Hospital staff	1	1	1	Unclear	PO, IDI	1	1	0	ATLAS.ti
[A35] Bar-Lev (2015)	Impact on hospital work practice	Hospital staff	0	1	1	Unclear	PO, IDI	0	1	0	ATLAS.ti
[A36] Boonstra et al. (2021)	Impact on hospital work practice	Hospital staff	0	0	0	Unclear	PO, IDI	0	1	1	ATLAS.ti
[A37] Chao (2016)	Impact on hospital work practice	Hospital staff	0	0	1	Unclear	PO, IDI	0	1	1	0
[A38] Acharya et al. (2017)	Impact on hospital work practice	Hospital staff	0	0	1	Unclear	FGI	0	1	1	0
[A39] Rudin et al. (2020)	Impact on hospital work practice	Hosptial CEO	1	0	1	A maximum variation sampling	IDI	0	1	1	Dedoose
[A40] Tran et al. (2021)	Impact on hospital work practice	medical scribes	0	0	1	A snowball sampling	IDI	0	1	1	Dedoose
[A41] Soriano et al. (2019)	Impact on hospital work practice	Nurses	0	0	1	A convenience sampling	IDI	0	1	0	NVivo
[A42] Despins & Wakefield (2018)	Impact on hospital work practice	Nurses	0	1	1	A convenience sampling	IDI	0	1	1	Microsoft Excel
[A43] Staggers et al. (2012)	Impact on hospital work practice	Nurses	0	0	1	A purposive sampling	PO, IDI	1	1	1	ATLAS.ti

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Table 2. Continued

Author (year)	Research topic	Research participant	Researcher		IRB approval process	Sampling methods	Data collection methods	Data processing		Data analysis	
			Characteristic	Reflexivity				Data management	Coding process	Analysis process	Software use
[A44] Ozkaynak et al. (2019)	Impact on hospital work practice	Nurses	1	0	1	Unclear	PO, IDI	0	1	1	ATLAS.ti
[A45] Abbott et al. (2015)	Impact on hospital work practice	Nurses	1	1	1	Unclear	IDI	0	1	1	ATLAS.ti
[A46] Zhao et al. (2019)	Impact on hospital work practice	Physicians	1	0	1	A maximum variation sampling	IDI	0	1	1	0
[A47] Moeren-hout et al. (2020)	Impact on hospital work practice	Physicians	1	0	1	A purposive conve-nience sampling	IDI	0	1	1	NVivo
[A48] Jensen & Bossen (2016)	Impact on hospital work practice	Physicians	0	0	0	A snowball sampling	PO, IDI	0	1	1	NVivo
[A49] Schweitzer et al. (2016)	Impact on hospital work practice	Physicians	0	0	0	A theoretical sampling	IDI	0	1	1	MAX-QDA
[A50] Patel et al. (2021)	Impact on hospital work practice	Physicians	1	1	1	Unclear	PO	1	1	1	Microsoft Excel
[A51] Denton et al. (2018)	Impact on hospital work practice	Physicians	0	0	1	Unclear	IDI	0	1	1	Microsoft Excel
[A52] Quinn et al. (2019)	Impact on hospital work practice	Physicians	1	1	1	Unclear	PO, IDI, FGI	0	1	1	Microsoft Excel
[A53] Lanham et al. (2014)	Impact on hospital work practice	Physicians	0	1	1	Unclear	PO, IDI	1	1	1	0
[A54] Ash et al. (2015)	Stakeholders perspective	Stakeholders	1	1	1	A purposive sampling	PO, IDI	0	1	1	NVivo
[A55] Olayiwola et al. (2016)	Stakeholders perspective	Stakeholders	1	0	1	A purposive sampling	IDI	0	1	1	ATLAS.ti
[A56] Hollin et al. (2012)	Stakeholders perspective	Stakeholders	0	0	0	A purposive sampling	IDI	0	1	1	0
[A57] Mozaffar et al. (2016)	Stakeholders perspective	Vendors	1	0	1	A purposive sampling	PO, IDI	0	1	1	0
[A58] Cresswell et al. (2015)	Stakeholders perspective	Vendors	0	0	1	Unclear	FGI	1	1	1	NVivo
[A59] Cohen et al. (2020)	User experience	Hospital staff	0	0	1	A purposive sampling	PO, IDI	1	1	1	Trello

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Table 2. Continued

Author (year)	Research topic	Research participant	Researcher		IRB approval process	Sampling methods	Data collection methods	Data processing		Data analysis	
			Characteristic	Reflexivity				Data management	Coding process	Analysis process	Software use
[A60] Sicotte et al. (2017)	User experience	Hospital staff	0	0	1	A purposive sampling	IDI	0	0	0	0
[A61] Rathert et al. (2019)	User experience	Hospital staff	0	0	1	A purposive snowball sampling	IDI	0	1	1	0
[A62] Gonzalez et al. (2015)	User experience	Nurses	0	0	0	A convenience sampling	PO, IDI	0	1	0	0
[A63] Zadvinskis et al. (2014)	User experience	Nurses	1	0	0	A purposive sampling	IDI	0	1	1	NVivo
[A64] Wisner et al. (2021)	User experience	Nurses	1	1	1	A purposive snowball sampling	PO, IDI	1	1	1	ATLAS.ti
[A65] Holden (2012)	User experience	Physicians	1	1	1	A purposive convenience sampling	IDI	1	1	1	NVivo
[A66] Al Alawi et al. (2014)	User experience	Physicians	1	0	1	A purposive sampling	FGI	0	1	1	0
[A67] Terry et al. (2018)	User experience	Physicians	1	1	1	Unclear	IDI	0	1	0	NVivo
[A68] Meigs & Solomon (2016)	User experience	Physicians	1	0	0	Unclear	IDI	0	1	1	NVivo
[A69] Hobensack et al. (2021)	User experience	Physicians	1	0	1	Unclear	IDI	0	1	1	Dedoose
[A70] Abramson et al. (2012)	User experience	Physicians	1	0	1	Unclear	PO, IDI	0	1	1	ATLAS.ti
[A71] Westerbeek et al. (2022)	User experience	Physicians	0	0	1	Unclear	FGI	0	1	1	ATLAS.ti
[A72] Halas et al. (2015)	User experience	Physicians	1	0	0	Unclear	FGI	0	1	1	0
[A73] Sheikh et al. (2015)	User experience	Stakeholders	0	1	1	A maximum variation sampling	IDI	1	1	1	NVivo
[A74] Xanthidou et al. (2018)	User experience	Stakeholders	0	1	0	A purposive sampling	IDI	0	0	0	0

"1" with details provided, "0" without. See Appendix 1 for details about the selected articles.

IRB: Institutional Review Board, FGI: focus group interviews, PO: participant observation, IDI: in-depth interviews.

IRB approval process information is provided for both IRB approval and IRB exemption.

Table 3. General characteristics of the selected studies (n = 74)

Characteristic	n (%)
Research topic	
Impact on hospital work practice	31 (41.9)
Barriers and facilitators of HIS implementation or adaptation	16 (21.6)
User experience	16 (21.6)
HIS implementation or adaptation strategy	6 (8.1)
Stakeholders perspective	5 (6.8)
Research participants	
Hospital staff	27 (36.5)
Physicians	22 (29.7)
Nurses	11 (14.9)
Stakeholders	9 (12.2)
Vendors	3 (4.1)
Hospital CEO	1 (1.4)
Medical scribes	1 (1.4)
Number of research participants	
0–30	44 (59.5)
31–70	18 (24.3)
71–190	6 (8.1)
No stated	6 (8.1)

HIS: health information system.

Table 4. Research design

Research design process	n (%)
Qualitative approach	
Grounded theory	12 (16.2)
Ethnography	7 (9.5)
The theoretical domains framework	4 (5.4)
Normalization process theory	3 (4.1)
Phenomenology	3 (4.1)
Others	11 (14.9)
No information	34 (45.9)
Researcher characteristics and reflexivity	
Researcher characteristics	
Any information	32 (43.2)
No information	42 (56.8)
Reflexivity	
Any information	17 (23.0)
No information	57 (77.0)
Ethical approval processes	
IRB approval	53 (71.6)
IRB exemption	3 (4.1)
No IRB required, but written consent	3 (4.1)
No IRB required, no written consent	1 (1.4)
No stated	14 (18.9)

IRB: Institutional Review Board.

scope and interaction of observation, with some stating that they used shadowing to avoid disruption or to collect more accurate observations [A23, A31, A34, A50, A52, A64, A70].

In the studies that reported interview locations, the designated places varied, including private clinic rooms, conference rooms, and break rooms. However, the interview location was often unspecified or not stated as a private room for security or confidentiality. This suggests that data were collected by conducting informal interviews during observation or by using interview transcripts and field observation notes to answer questions as they arose.

Some studies reported conducting interviews over the phone or virtual meetings when recruiting participants for large-scale studies or due to concerns about the coronavirus disease 2019 pandemic [A01, A17, A28, A39, A67, A71]. Some studies intentionally conducted interviews during lunch or other breaks to minimize disruption [A66].

The authors of the selected papers ensured that participants' identities were anonymized during data collection and analysis. Some authors specified how data were stored [A23, A48, A60, A64, A68, A72], but most studies did not. Only a few authors requested feedback and revisions of the manuscript from their participants [A20], considering their impact on participants. Certain studies stipluated in their ethical approval procedure that the dataset should be shared only within the research team [A40, A41, A59].

Researchers frequently utilized qualitative research software during data processing and analysis. NVivo was used in 19 of the selected papers, ATLAS.ti in 14, and Microsoft Excel in 8. There were 24 articles that did not state which software, if any, was used. All papers generally described the coding and analysis process. The most commonly reported technique to enhance trustworthiness was member checking among researchers. However, no study specified participant involvement in the review.

IV. Discussion

Researchers must provide detailed information about their characteristics, sampling, and data collection and analysis when conducting qualitative research in hospital-based HISs. This is essential for strengthening the rigor and credibility of research [18]. However, the selected articles we reviewed did

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Table 5. Participant sampling, identification, and recruitment (n = 74)

Methods	n (%)
Sampling methods	
Purposive	17 (23.0)
Purposive maximum variation	3 (4.1)
Purposive snowball	3 (4.1)
Purposive convenience	2 (2.7)
Purposive theoretical	1 (1.4)
Maximum variation	4 (5.4)
Convenience	5 (6.8)
Snowball	5 (6.8)
Theoretical	2 (2.7)
Random	2 (2.7)
Unclear	30 (40.5)
Identification strategy	
Fieldwork contacts	16 (21.6)
Researcher presented to group (including meetings for other purposes)	13 (17.6)
Linked research, researcher contacts	9 (12.2)
Health database and records	9 (12.2)
Unclear	27 (36.5)
Recruitment strategy	
Individual invitation by researchers	22 (29.7)
Response to flyers, emails, or calls	22 (29.7)
Unclear	30 (40.5)

not meet these requirements for providing adequate detail. As a result, the credibility of qualitative research results may be compromised.

To establish credibility in hospital-based research, examining how the research process influenced the findings is essential. Ethical considerations related to accessing hospital sites, recruiting participants, and providing detailed information about the data collection and analysis process are critical. However, providing a principled recommendation about researchers' access to and sampling of hospitals may not be feasible because hospital-based research is specific to each specialty.

Nevertheless, a detailed examination of procedures regarding the process of sampling, data collection, and the analysis of study participants will help researchers consider whether they can apply the methods used by other researchers to their situations. In summary, it is essential for researchers to consider ethical considerations regarding the research process to strengthen the credibility of qualitative research results. We discuss some key points highlighted in the review below.

1. Qualitative Research Rigor and Ethical Dilemmas

The rigor of qualitative research is strengthened by an explicit description of the researcher's position and role in relation to the subjects of the study [14]. Researchers must continue to consider this requirement beyond the formal ethical approval process. However, around half of the selected articles did not provide details about the researcher or interviewer. Moreover, many clinicians or nurse researchers tended to use their workplace as the research site to conduct qualitative research in hospital settings. While this has obvious advantages for the research site, it is important to consider whether one is a researcher or a hospital worker throughout the research process. For example, if researchers are clinicians or nurses, can they remain neutral from an outsider's perspective when investigating personal and social factors in HIS utilization? In a place that is both a workplace and a research site, can the researcher address concerns about patient care and privacy?

This also implies ethical and practical dilemmas regarding participant observation and research data collection in hospital-based research [18,19]. Formal ethical approval procedures require researchers to provide informed consent and notice to participants of their participation in the study. However, there is a practical challenge in obtaining informed consent in participatory observational research [20]. This challenge is further amplified when the research is conducted in a hospital setting, which is complex and unpredictable. For instance, in a large and busy environment like the emergency department, obtaining consent from everyone who may come under the scope of observation is extremely difficult. Furthermore, it is difficult in practice to fully explain the scope of the observation area to participants and to limit the data they collect to the scope of observations. The dilemmas associated with conducting qualitative research in the HIS field are considerable, as more than a third of the selected articles adopted participant observation as their primary research method. As a result, it is important for researchers to continually reflect on their position, role, and data collection at the beginning of a project and not just rely on considerations of the ethical approval process [19].

2. Sampling and Accessibility

When researchers access medical settings for their studies, they must deal with multiple stakeholders, not just formal ethical approval. The articles that reported participant sam-

Table 6. Data collection, processing, and analysis (n = 74)

Process	n (%)
Data collection methods	
Participant observation (PO)	2 (2.7)
In-depth interview (IDI)	29 (39.2)
Focus group interview (FGI)	12 (16.2)
PO, IDI	23 (31.1)
IDI, FGI	6 (8.1)
PO, IDI, FGI	2 (2.7)
Setting	
Participant observation setting (n = 27)	
Any information	24 (80.0)
No information	3 (10.0)
Interview place (n = 72)	
Any information	27 (38.0)
No information	45 (63.4)
Data collection instruments and techniques	
Interview guidance (n = 72)	
Yes	51
No stated	21
Audio recording (n = 72)	
Yes	63
No stated	9
Field notes (n = 27)	
Yes	25
No stated	2
Data processing	
Data management	
Yes	14 (18.9)
No stated	60 (81.1)
Description of coding process	
Yes	71 (95.9)
No stated	3 (4.1)
Number of data coders	
Yes	45 (60.8)
No stated	29 (39.2)
Data analysis	
Description of analysis process	
Yes	62 (83.8)
No stated	12 (16.2)
Software use	
NVivo	19 (25.7)
ATLAS.ti	14 (18.9)
Microsoft Excel	8 (10.8)
Dedoose	4 (5.4)
MAXQDA	2 (2.7)
TAMS analyser	1 (1.4)
Morae	1 (1.4)
Trello	1 (1.4)
No stated	24 (32.4)
Techniques to enhance trustworthiness	
Research member checking	
Yes	54 (73.0)
No stated	20 (27.0)
Research participants checking	
Yes	11 (14.9)
No stated	63 (85.1)

pling generally used a purposive sampling technique, in which researchers selected or invited participants, in that the nature of HIS studies is to target participants and settings with specific expertise [12,22]. It is, therefore, important to discuss whether they have selected appropriate sampling methods. This convenience and accessibility coinciding with the purpose of the study runs up against an inevitable issue—namely, the potential for biased selection by the researcher in the process of identifying and recruiting research participants. This dilemma needs to be fully discussed in hospital-based qualitative research [22].

As we reviewed the researcher's position and role, we noted that many clinicians and nurses decided to conduct research within their workplace. This approach allows researchers to have a dual role in a hospital setting, making it easier to identify and recruit participants. If the study aims to improve the implementation or adaptation of HISs, including examples of successes and failures may be useful. However, researchers must be clear that selecting a research setting based on accessibility is intentional [19]. It is essential to recognize that the researcher's perceptions and decisions about accessibility can affect the research design and process of carrying out the research [23,24].

3. Data Management and Privacy

Privacy can be compromised in healthcare settings during participant recruitment and data collection. The increasing use of HIS has expanded access to personal health records and, subsequently, the number of stakeholders collecting, using, and sharing them. This has raised new ethical, pri-

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vacy, and trust issues [25,26]. While discussions on patient privacy are ongoing [18,27], privacy concerns for healthcare professionals who become research participants are often overlooked. Several researchers stated that they had gone through ethical procedures regarding the privacy and confidentiality of the research participants, but most of the selected articles did not provide details on how the data from participants were managed. This may be due to researchers' potential bias toward participants whose records exist on websites and official healthcare databases. Therefore, researchers conducting HIS research in hospital settings need to consider the confidentiality and privacy of the research participants, who are often represented as experts in specific knowledge.

In participant observation studies, researchers observe healthcare work practices related to HIS utilization. As part of this process, the researcher may observe the computer screen, which can pose a significant risk of privacy violations when recording observational data. Due to the system features of HISs, direct personal information of medical workers and patients would be coded, but the researcher could inadvertently capture medical records and notes. As discussed earlier, this is a realistic limitation of participatory observation, but it is crucial to consider the presence of such information when categorizing and writing field notes [12,19].

In conclusion, although qualitative research has been used to study hospital-based HISs and the people who use them, there needs to be more examination of researcher characteristics and reflections, participant sampling, and data collection and management in the hospital setting. Given these issues, it is essential to assess the qualitative research methods utilized in hospital-based HIS research and discuss ethical and practical considerations and issues that require researchers' attention.

4. Limitations

Two databases were used in this study to obtain numerous samples based on our search criteria. However, it is important to note that most of the studies included in the review were from the United States and Europe, which may require different approaches to hospital settings and HISs. While we reviewed and reported on qualitative research methods in general, other factors related to research data analysis were not examined in detail.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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