Proceedings of EHR2025 Workshop on

Implementing Electronic Health Records – Activities, Actors, AI

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Organized by

Morten Hertzum

Gunnar Ellingsen

Tinja Lääveri

Babak Farshchian

Welcome

Welcome to the EHR2025 workshop on implementing electronic health records (EHRs).

EHRs support patient treatment by providing healthcare professionals with the means to order, document, and follow up on the steps taken to treat and care for each patient. EHRs are complex systems. Their implementation is a major undertaking, which has received sustained attention in computer-supported cooperative work (CSCW) and other research fields. While this research has provided important insights, they remain partial and somewhat disconnected. It is difficult to stay up to date.

This workshop aims to provide a forum for participants to get updated on current CSCW studies of EHR implementations and create connections with other researchers who study such implementations. More specifically, the workshop aims to stimulate cross-fertilization among the participants' empirical cases, their conceptual frameworks, and their guiding questions. At the workshop, we will also reflect on what CSCW contributes to the study of EHR implementation.

These workshop proceedings contain the seven papers presented at the workshop. The copyright to the papers remains with their authors.

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Beyond Implementation: Exploring Patient Perspectives on the Electronic Health Record in Germany

Stephan Krayter, M.A.
stephan.krayter@uni-siegen.de;
Chair of Informations Systems, esp. IT for the aging society

Dipl.-Soz.-Wiss. Dennis Kirschsieper
dennis.kirschieper@uni-siegen.de;
Chair of Informations Systems, esp. IT for the aging society

Prof. Dr. Claudia Müller
claudia.mueller@uni-siegen.de
Chair of Informations Systems, esp. IT for the aging society

Abstract. The German electronic health record (elektronische Patientenakte – ePA) represents a key digital infrastructure in Germany's evolving health system. While its technical development and institutional implementation have received considerable attention, the everyday practices and perspectives of patients remain largely invisible in current research and public discourses. This contribution presents an ongoing qualitative study that foregrounds patient experiences, expectations, and barriers regarding the use of the ePA. Drawing on initial interviews, we explore how patients make sense of the ePA, navigate access, and articulate concerns around data control, utility, and trust. Our findings point to a gap between institutional logics and lived practices, raising critical questions about infrastructural (non-)use or user agency. While data collection is ongoing, first insights already highlight the importance of embedding patient perspectives into the design and evaluation of digital health infrastructures. We argue that infrastructuring efforts must extend beyond technical rollout to include patients as co-creators of meaningful, accessible, and trustworthy health systems.

Introduction

Digital infrastructures in healthcare are often introduced with the promise of efficiency, transparency, and improved care (Mitchell & and Kan, 2019). Electronic health records (EHRs) are widely seen as key enablers of digital transformation in healthcare infrastructure regarding an improve in efficiency in care as well as patient empowerment and participation (Mitreska et al., 2021). In Germany, the elektronische Patientenakte (ePA) is a central component of this agenda, aiming to provide patients with access to their health data, improve cross-institutional data exchange, and enhance continuity of care (Bundesministerium für Gesundheit, 2025). Despite these goals, adoption of the ePA (opt-in version from 2021 to 2025) has remained limited – less than 1% of the statutorily insured German population actively uses the system until the nationwide (opt-out) implementation in Spring 2025. While many technical and regulatory efforts have focused on implementation and infrastructure, the perspectives of patients remain strikingly underrepresented.

Our exploratory study addresses this gap by examining how patients understand, experience, and use – or do not use – the ePA. We ask: What expectations and concerns shape patients' relationships to this digital infrastructure? What roles do trust, usability, media literacy, and perceived value play in the everyday engagement – or disengagement – with the ePA? The study examines these issues through qualitative interviews with patients, aiming to uncover how infrastructural arrangements resonate with – or contradict – their everyday health practices, expectations, and concerns. In doing so, we contribute to Computer Supported Cooperative Work (CSCW) and Human-Computer Interaction (HCI) debates on the importance of user agency and bottom-up engagement in the infrastructuring of public health services.

We argue that patient perspectives are not peripheral but foundational to understanding how health infrastructures are enacted in practice. Especially within the broader discourse on patient empowerment and patient-centered care (Epstein & Street, 2011; McMillan et al., 2013; Song et al., 2017; Stroetmann et al., 2002), it is essential to consider patients as active participants in shaping healthcare technologies – not merely as recipients of innovation.

Background / Related Work

The implementation of digital health infrastructures is often driven by assumptions of rational utility and top-down policy logic. Yet the actual use of systems like the ePA unfolds within a complex mesh of social practices,

institutional constraints, and infrastructural frictions for example different modes of infrastructure like software infrastructure, communication and hardware infrastructure or managerial and administrative infrastructures (Moradi & Sarbaz, 2020). Prior studies have shown that patients' acceptance of EHR systems depends on multiple factors, including perceived usefulness, usability, media literacy, functionality, privacy concerns, and the influence of physicians as trusted intermediaries (Kus et al., 2022; Stroetmann et al., 2002).

While large-scale surveys provide valuable overviews of patient preferences, qualitative research remains scarce. International work – such as on Patient Accessible Electronic Health Records (PAEHR) in Sweden – has highlighted tensions between professional and patient expectations, showing how healthcare professionals often fear loss of control, while patients report improved transparency, autonomy, and communication (Cajander & Grünloh, 2019). Work on healthcare education adds to this line, illustrating that persons with different healthcare education prefer different functionalities in using EHR´s (Kharko et al., 2024). These findings suggest that design and implementation processes often fail to address the real needs and practices of patients, when the focus in development is only placed on health resp. technically educated users such as healthcare professionals. As the healthcare model shifts from a hierarchical system dominated by providers towards one that emphasizes patient-centeredness, it is essential that patients are equipped to actively participate in their health care journey (Epstein & Street, 2011; Grover et al., 2022; McMillan et al., 2013; Song et al., 2017). This evolving paradigm recognizes individuals as self-determined entities, requiring seamless integration between health services across different stages of care, from prevention to rehabilitation.

From a CSCW perspective, EHR´s are not merely data containers but embedded infrastructures that reconfigure work, responsibilities, and relationships (Kuziemsky et al., 2011; Veinot et al., 2010), if developed by human-centered design (Cajander & Grünloh, 2019). Concepts such as invisible work (Suchman, 1995, 2007), infrastructuring (Gui & Chen, 2019; Pipek & Wulf, 2009), and user appropriation (Carroll, 2004; Stevens et al., 2009) offer productive lenses to investigate how patients interact with – or withdraw from – these systems.

This study contributes to this line of work by foregrounding the lived experiences of patients navigating the socio-technical complexities of the ePA in Germany. Our qualitative approach enables us to explore not only acceptance factors, but also broader narratives of control, trust, and meaning-making in digital health infrastructures.

Methodology

This study adopts an exploratory and ongoing qualitative approach to investigate how patients experience and interpret the ePA. The aim is not only to identify

usage patterns, but also to explore the meanings, expectations, and concerns patients associate with this digital infrastructure. We aim to conduct 15–20 semi-structured interviews with a diverse group of patients, including both users and non-users of the ePA. Participants are recruited through a combination of channels: 1) a flyer campaign, 2) existing personal and professional contacts, and 3) a dedicated information event conducted in collaboration with a general practitioner practice. This approach allows us to reach individuals with different levels of health system exposure, digital literacy, and trust in medical institutions. Diversity in terms of age, health status, and technology experience is actively sought to capture a broad range of patient perspectives.

To date, two interviews have been completed and transcribed, one additional interview appointment is set up. While the dataset is still limited, early insights already suggest key areas in regard to experience, expectations, usability, functionality, usefulness and trust. These preliminary findings guide the iterative refinement of the interview guide and support our analytical focus.

For data analysis, we apply a thematic analysis approach (Braun & Clarke, 2006). This method enables the identification and interpretation of recurring themes across cases while remaining flexible enough to accommodate context-specific nuances. In contrast to grounded theory – which aims to build theory from large and systematically coded datasets (Charmaz, 2014) – thematic analysis is particularly well-suited to exploratory studies with evolving datasets. As our data corpus expands, we may adopt selected elements of grounded theory, such as constant comparison or category development, to deepen the interpretive process.

All participants provide informed consent prior to the interview. Participation is voluntary and can be withdrawn at any time without negative consequences. Given the sensitivity of health-related data and possible concerns around digital privacy, particular attention is paid to ensuring anonymity and secure data handling. Audio recordings and transcripts are pseudonymized and stored in encrypted, access-restricted environments in compliance with German DSGVO regulations. To minimize power imbalances and promote open dialogue, interviews are conducted in neutral or participant-preferred settings.

Preliminary Findings

Uncertainty and Lack of Awareness

Participants expressed varying levels of awareness about the ePA. While one had heard about it through their general practitioner, the other had no prior knowledge of the system. Even among those who were aware, there was confusion about what the ePA does, who controls the data, and how it might be accessed. This uncertainty often led to non-use – not due to opposition, but simply due to a lack of perceived relevance or concrete instruction on how to use the system.

Trust and Control

Trust emerged as a central concern in both interviews. Participants expressed ambivalence about who would access their data and whether they would have meaningful control over it. While some saw the potential benefit of centralized records, others feared misuse or loss of privacy. This illustrates the infrastructural tension between institutional efficiency and user control –especially in systems designed without active user involvement.

Perceived Value and Everyday Relevance

Participants questioned the everyday usefulness of the ePA, particularly when they were healthy or had no chronic conditions. Some described it as a solution in search of a problem, highlighting a gap between institutional logics and user needs. This suggests that the perceived value of the ePA may depend on individual health trajectories and previous experiences with fragmented care.

Missing Communication and Lack of Involvement

Both participants reported feeling insufficiently informed about the ePA. Neither had received comprehensive explanations from healthcare providers, nor had they encountered accessible public information. The decision to introduce the ePA was described as distant and top-down, with little to no opportunity for patient feedback or involvement. This absence of patient-centered communication reinforces a sense of passivity and alienation. While participants were not fundamentally opposed to digital health infrastructures, the lack of clear and targeted engagement made it difficult for them to see themselves as legitimate users – or co-creators – of the system. These observations point to a broader structural issue: digital infrastructures introduced without meaningful patient participation may struggle to gain trust, perceived legitimacy, and everyday relevance.

Opt-out structure

Participants also reflected on the implications of the recent shift to an opt-out model for the ePA in Germany since January 2025. Rather than fostering inclusion, the opt-out strategy seemed to reinforce disengagement: patients did not object to participation per se, but felt uninformed, disempowered, or indifferent. This passive acceptance does not reflect meaningful consent or active use and again highlights a gap between institutional logic and user perspectives. This raises critical questions about the transparency and legitimacy of opt-out infrastructures – especially when they operate silently in the background of people's lives.

Discussion

Our findings reveal a gap between the institutional rollout of the ePA and the everyday experiences of patients. While designed as a national infrastructure for digital health, the system remains largely invisible or confusing to one large group it is meant to serve – the patients. Participants reported limited knowledge, low engagement, and concerns around trust, relevance, and control. The recent shift to an opt-out model was not communicated clear enough nor sufficiently understood by those affected (especially those with less health literacy). Instead of fostering empowerment, it appears to deepen the disconnect between policy intention and patient participation. This reflects broader concerns about "invisible infrastructures" (Star & Strauss, 1999) that operate without meaningful user inclusion, creating friction not through resistance, but through opacity. From a CSCW perspective, this case underscores the importance of infrastructuring as a participatory, iterative process (Gui & Chen, 2019; Pipek & Wulf, 2009). Health infrastructures are not only technical artifacts – they are socio-technical arrangements that require active alignment with users' lived realities. Without clear communication, support, and opportunities for co-creation, even well-designed systems may fail to be adopted meaningfully. This is particularly critical when, as with the ePA, diverse stakeholders (such as health insurance companies) are involved in the final design and delivery to the patients, and a standardized, readily communicable interface is lacking. In sum, the ePA's current implementation strategy may achieve technical coverage, but not user engagement. Recognizing patients as infrastructural actors – rather than passive recipients – is essential to realizing the transformative potential of digital health.

As this study is in its early stages, several limitations must be acknowledged. First, the current findings are based on a limited sample. While these initial interviews already highlight relevant themes, the small sample size restricts the generalizability and depth of the analysis at this point. The insights presented here should therefore be considered preliminary and exploratory in nature. Second, the participants are self-selected, having responded to recruitment efforts via flyers and personal networks. This approach may introduce a selection bias toward individuals who are already interested in digital health or more motivated to engage with the topic, potentially underrepresenting digitally excluded or less engaged patient groups. Third, the study is situated within the specific institutional and regulatory context of the German healthcare system, particularly the national rollout of the ePA. While the findings may resonate with broader concerns around patient engagement in digital infrastructures, they may not be directly transferable to other national contexts. These limitations are acknowledged not as shortcomings, but as characteristic features of exploratory qualitative research at an early stage.

Conclusion

This paper presents early findings from an exploratory qualitative study on how patients perceive and relate to the German elektronische Patientenakte (ePA). Despite its growing institutional presence as a national digital health infrastructure, some participants reported limited awareness, trust-related concerns, and a lack of meaningful engagement. These results highlight a broader socio-technical misalignment between policy-driven digitalization and patient-centered healthcare.

Rather than framing the ePA merely as a technical artifact, we argue that it must be understood as an evolving infrastructure shaped by social practices, values, and relationships. Patients' experiences of confusion, indifference, or passive inclusion – especially in the context of the recent opt-out implementation – point to the need for more transparent, participatory, and contextualized forms of infrastructuring.

Future work will expand the empirical base of this study to include a more diverse group of patients, paying particular attention to digital literacy, health status, and social support structures. We will also examine how patients' past experiences with healthcare systems shape their expectations and trust in digital tools. Additionally, we plan to explore how infrastructural design could better align with patients' values and everyday needs – potentially informing co-creative approaches to digital health governance and design.

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The Impact of Electronic Health Records on Meaningful Work in Healthcare

Sameer Bhattarai, Babak A. Farshchian
NTNU-Norwegian University of Science and Technology
Contact Author: sameer.bhattarai@ntnu.no, babak.farshchian@ntnu.no

Abstract. Electronic Health Records (EHRs) are deeply reshaping how clinicians experience their work: they can enhance efficiency and decision-making, yet also impose burdens that erode professional values. Drawing on a review of 38 empirical studies, we examine how EHRs affect four dimensions of meaningful work in healthcare – mastery, purpose, connection, and autonomy. We find that while tools like decision-support and shared data can support clinical mastery and coordination, poor usability and rigid interfaces often make clinicians feel like "data clerks," undermining their sense of purpose and skill. Likewise, constant screen use can fragment patient and team relationships, weakening connection, and standardized templates constrain professional judgment, reducing autonomy.These impacts result from underlying sociotechnical contradictions between efficiency-driven infrastructures and the humanistic values of care. We discuss how clinicians adapt (e.g. workarounds, customization) to reclaim meaning, and advocate participatory, value-sensitive design approaches that support narrative flexibility, visible value-alignment, and customization. We conclude with questions for CSCW discussion on aligning EHRs that reflect clinicians' lived experiences, values, and the deeper sense of meaning they find in their work.

1 Introduction

Electronic Health Records (EHRs) have become integral to the digital transformation of healthcare and substantial research has examined how EHRs reshape documentation, coordination, and decision-making processes (3; 4), less attention has been given to their effect on the meaningfulness of clinicians' work. Meaningful work—defined as work experienced as intrinsically valuable and aligned with professional identity—plays a vital role in job satisfaction, retention, and quality of care (7; 8; 6).

Technologies like EHRs are not neutral tools but sociotechnical systems that mediate relationships, redistribute cognitive and affective labor, and transform the rhythms of everyday clinical work (9). The introduction of EHRs, while intended to streamline workflows and enhance care quality, often introduces tensions between efficiency-driven infrastructures and clinicians' values (5). These tensions raise important questions about autonomy, relational care, and the conditions that support a sense of professional purpose.

The liteature review paper responds to these concerns by drawing on a concept-centric literature review of 38 empirical studies. We examine how EHRs influence four dimensions of meaningful work: mastery, purpose, connection, and autonomy. These dimensions are rooted in organizational and psychological theories of work.

2 Background

EHRs mark a major shift from paper-based recordkeeping to interconnected digital infrastructures. Their promised benefits include improved coordination, reduced errors, and enhanced operational efficiency (3; 4). However, extensive research has highlighted that EHRs often introduce unintended consequences: workflow fragmentation, interface-related cognitive burdens, alert fatigue, and disruptions to patient–provider interaction(1; 2).

While prior work has addressed the operational consequences of EHR systems, their role in shaping the subjective and relational aspects of clinical work has received comparatively little attention. As Vikkelsø (2005) argues, the deployment of EHRs entails a subtle redistribution of attention, labor, and risks—reshaping the moral and emotional terrain of care delivery (9). Similarly, Ellingsen and Monteiro (2003) characterize hospital information systems as "patchwork infrastructures" requiring ongoing alignment with local practices (3)—a notion echoed in Goh et al.'s (2011) framing of "adaptive routinization" (4).

Meaningful work encompasses mastery (skillful expertise), purpose (meaningful outcomes), connection (interpersonal relationships), and autonomy (decision-making discretion) (7; 6). To explore how meaningful work is constructed and challenged within these evolving digital infrastructures, we focused our review on empirical studies addressing both the technical and social dimensions of EHR systems. The literatures were searched in PubMed, out of 652 papers 38 were selected based on inclusion criteria that emphasized studies

published between 1995–2025 and used qualitative, quantitative, or mixed-methods approaches in clinical settings. Thematic synthesis was structured around the four key dimensions of meaningful work: mastery, purpose, connection, and autonomy.

3 Findings and Discussion

3.1 Mastery: Using Skills Effectively

Clinicians often report that EHRs impede the effective use of their professional skills . Poor usability – slow, non-intuitive interfaces and information overload – interrupts workflow fluency and undermines clinical judgment . Repetitive data-entry tasks leave little time for reflection or learning, making clinicians feel more adept at navigating software than practicing medicine . For instance, one nurse noted feeling "deskilled" by rigid checkbox forms that oversimplify complex cases. However, studies also find that certain EHR features can enhance mastery: decision-support alerts and smart templates help clinicians make more informed choices, and AI-based documentation aids (e.g. voice recognition or scribes) can offload clerical work . The key is aligning tools with workflow. Participants in these studies recommended robust training, responsive support, and streamlined interface design to reduce friction . Suggestions include adopting voice recognition and feedback analytics so that clinicians see how their documentation improves care. In short, well-designed EHR features can support skill development, but current interfaces often feel like barriers to using one's expertise.

3.2 Purpose: Data Entry vs. Healing

Clinicians' sense of purpose arises from providing effective, compassionate care. Many report that EHRs obscure this purpose by shifting focus from healing to administrative tasks . For example, rigid templates and billing-driven forms turn documentation into a "data clerk" activity . One physician lamented that what used to be narrative clinical notes for patient care has become filling boxes for compliance and reimbursement . This disconnect means that data entry feels like a bureaucratic chore, weakening clinicians' perception that their work serves a greater good. Yet EHRs can also reinforce purpose when designed to do so. For instance, accessible data can improve patient safety, and registries or dashboards enable population-level insights (e.g. tracking outcomes) that remind clinicians of impact beyond individual visits . Several studies noted that when clinicians see how EHR use leads to timely interventions or better follow-up, their motivation increases. To enhance purpose, participants advocated making documentation clinically relevant: minimize redundant inputs, align alerts with care goals, and share outcome data through the EHR . Flexible note structures (letting clinicians write patients' stories) were emphasized as a way to preserve the meaningful

narrative of care . In sum, EHR design should make the value of data entry visible, so that each task feels tied to patient well-being.

3.3 Connection: Patients and Teams

Meaning in healthcare is heavily relational. Human connection with patients and colleagues is central to job satisfaction. However, EHR use can strain these connections. Clinicians frequently describe screenfocused consultations: "I spend more time looking at the computer than at the patient," said a physician. Empirically, EHR use often reduces eye contact and conversational flow , which can impair empathy and trust. Similarly, team communication may shift from casual hallway chats to terse electronic messages, reducing the warmth of collegial interactions . Thus, EHRs are seen as a double-edged sword: they can improve coordination (e.g. shared records and messaging improve continuity) but also block spontaneous social interaction .

Clinicians have proposed ways to mitigate disconnection. For example, adjusting exam room layouts (placing screens so patients can see them), and training clinicians in "patient-friendly" charting techniques, can help maintain rapport . Patient portals and telehealth must support, not replace, face-to-face time. Combining digital tools with regular in-person check-ins to keep relationships strong . Thus, EHRs should be integrated into care in ways that preserve human contact, acknowledging that what matters is not the absence of tech, but how it's used in the human context

3.4 Autonomy: Control and Judgment

Clinicians value autonomy – the ability to exercise judgment and adapt to each patient – and report that EHRs often constrain this autonomy . Standardized fields, checklists, and pop-up alerts, while promoting consistency, make some clinicians feel "scripted" . Moreover, remote access blurs work–life boundaries (e.g. pressure to respond to inbox messages at home). Many practitioners feel excluded from EHR design, leading to misaligned workflows and less confidence in their own decisions. In response, clinicians develop adaptive strategies to reclaim autonomy. These include creating personal workarounds, maintaining parallel informal notes, and customizing the EHR where possible . Studies consistently found that giving clinicians a voice in system selection and customization restores control. Proposed measures include personalizable templates, local order sets, and limiting nonessential alerts . In short, maintaining autonomy requires flexibility: systems should allow clinicians to tailor workflows and protect time for reflective practice .

3.5 Sociotechnical Tensions and Adaptation

Across all dimensions, a clear tension emerges: EHR infrastructures prioritize efficiency, standardization, and measurable outputs, whereas clinicians value flexibility, narrative complexity, and ethical care . This misalignment is not just a

technical flaw but the result of how technology interacts with social practice . We can understand this through the concepts of stratification and meshworking. EHRs impose rigid structures (stratification) – fixed templates and protocols – that constrain autonomy and silence narrative voices . In contrast, clinicians engage in meshworking by creating unofficial notes, customizing templates, and informal workarounds to reintroduce judgment and relational care . These adaptive practices are generative: they show how meaningful work emerges not solely from design, but from users reshaping infrastructures to fit their values. Recognizing this, designers and managers should view tensions as a space for innovation rather than problems to erase .

3.6 Implications for Design and Practice

Our findings suggest several principles for aligning EHRs with meaningful work. First, participatory and value-sensitive design is essential. Involve clinicians and care teams early to ensure systems support their values of expertise, ethics, and connection . Second, promote narrative flexibility: design hybrid documentation interfaces that blend structured data with free-text storytelling, so patients' stories and clinicians' judgments are captured . Third, ensure value visibility: make it easy for clinicians to see how data entry relates to patient outcomes (e.g., outcome dashboards, feedback on patient safety metrics) . Fourth, design for presence: optimize physical workflows to reduce screen distraction (e.g., exam room layouts, use of scribes) so that EHRs enable rather than impede human engagement . Finally, support customization: offer modular templates or role-specific views, and limit unnecessary alerts, to balance standardization with autonomy . These principles draw on CSCW ideas of infrastructuring and configuration (e.g. understanding that some tension is productive). Rather than enforcing uniform compliance, EHR design should accommodate the diversity of clinical practice and even the friction between technology and values .

4 Conclusion and Questions

As a participant in the workshop , I am particularly interested in discussion of how digital systems shape clinicians' experiences in ways that are deeply subjective and personal. Concepts such as mastery, autonomy, purpose, and connection are not just abstract categories—they reflect how professionals relate to their work, their patients, and their own sense of identity.

EHRs have become essential infrastructure in clinical settings, but their implementation often disrupts established routines and shifts how care is delivered and documented. I see this workshop as a valuable opportunity to discuss how CSCW can help us better understand these subjective experiences and support the development of systems that reflect what clinicians actually find meaningful in their work.

A key question I hope to explore in the workshop is:

- How can CSCW research contribute to a deeper understanding of EHRs by focusing on the healthcare professionals— lived experiences, values, and the everyday practices that give their work meaning?

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Learning while implementing a large-scale Health Information System

Pieter Jelle Toussaint
Norwegian University of Science and Technology
Trondheim, Norway
pieter@ntnu.no

Abstract. The implementation of a large-scale health information system in the middle region of Norway has progressed in several phases, both small and large. In this study we focus on three sub-sequent implementations. We are interested to find out to what extend these different implementations learned from each other. Based on semi-structured interviews we will present and discuss some important lessons learned, learning activities implemented, and how learning was experienced by the informants. In the discussion at the workshop we hope to get more insight how literature on implementation of large-scale systems, organizational learning theory and relevant CSCW literature can inform the analysis of our data material.

Introduction

In May 2022 the implementation of a large-scale health information system (called Health Platform and based on the EPIC system) started in the middle health region of Norway. The system was first taken into use by the community health services in Trondheim. In November 2022 the system was implemented in the biggest hospital in the region. In April 2024 three other hospitals took the system in use, followed in November 2024 by the two last hospitals in the region. In the meantime, had the system also been implemented by several other communities. So, the implementation of the health platform consisted of four larger and a number of smaller implementations (in the communities) over a period of two year.

The study presented here focusses on three of the four larger implementations: the ones that involved the hospitals in the region. The main question posed, is ***what*** was learned form

previous implementations and also ***how*** this was learned. We address three research questions in our study:

RQ1: Were there insights or best practices transferred from one implementation to subsequent ones?
RQ 2- Which learning activities have been conducted in the implementation of HP?
RQ 3- What where the positive and negative aspects with each learning form?

Background

In (Toussaint, Ellingsen, Hertzum, & Melby, 2024) we reviewed literature on implementing (large-scale) information systems in health care. One finding was the lack of published best-practices. We also did not find many detailed case descriptions of implementations, highlighting measures that work. Or to use the words of Damschroder et al., there is lack of insight into "…what works where and why across multiple contexts" (Damschroder et al., 2009). By addressing research question 1 we hope to fill part of this knowledge gap.

Another interesting observation discussed in (Toussaint et al., 2024) is a difference in character of the knowledge presented in studies of implementation. Some studies present check lists of factors that are important to take into consideration when implementing systems. Examples are (Sligo, Gauld, Roberts, & Villa, 2017) and (Damschroder et al., 2009). Other studies focus more on the activities or processes that are critical in conducting an implementation. Examples are (Murray et al., 2010) and (Greenhalgh et al., 2017). In (Hertzum, 2021) implementation of large scale information systems is also discussed from a process perspective, distinguishing three phases, each of which has several activities comprising it.

Learning, both while the implementation is on-going and after it is finished, is important. In (Sligo et al., 2017) it is phrased as: "Ongoing evaluation throughout the implementation process", and in (Hertzum, 2021) as: "Following up on effects realization." So, monitoring what happens and adjusting course when needed, should be a crucial part of an implementation project. But how is this learning organized? Which learning activities should be put in place? In (Basten & Haamann, 2018) several so-called learning approaches are described, such as: dyadic relationships, events for informal interactions, action learning, post mortem evaluations, and knowledge repositories. They distinguish between 18 learning approaches, organized in three categories: people, process and technology. Research questions 2 and 3 aim to use this theoretical lens to analyze learning activities in our case.

Method

We conducted a qualitative study, based on the interpretative approach within IS research (Walsham, 2006). Nine semi-structured interviews were conducted. The nine informants were recruited to cover different responsibilities in the implementation process. Three of our informants were so-called local implementation leaders for each of the three implementations we

focused on. They were full time allocated to the implementation project, with an overall responsibility for (parts of) the implementation of the health platform at their location. The second group of three informants consisted of so-called health platform coordinators. This was a newly established role after the first implementation round. It had become clear that clinical department heads in the hospital needed a full time assistant to organize all the activities required in the implementation (organize meetings, schedule training for staff, communicate information, etc.). The last group consisted of department heads. Their responsibility was mainly to keep the department running well, making it fulfill its clinical responsibilities.

The interviews with the implementation leaders and the health platform coordinators were conducted in the second half of 2024. The department leaders will be interviewed in the end of May, early June 2025. While the implementation leaders were representing all three implementations, were both the health platform coordinators and the department leaders recruited from one of the implementations (the second and the third, respectively).

The interviews were transcribed. In the thematic analysis we looked for both lessons learned, learning mechanisms identified and how they were evaluated by the informants.

Results

At the moment of writing this position paper, six of the nine interviews have been conducted. We lack the three interviews with the department heads. At the time of the workshop we expect to be able also to include material from these last three interviews.

We present the preliminary results below in two sub-sections: lessons learned, and learning approaches.

Lessons Learned

One of the lessons learned from the first implementation, mentioned by all the local implementation leaders, was the need for a dedicated role, referred to as the health platform coordinator, that would take the responsibility to help the head of a clinical department in organizing activities needed in the implementation.

> *but the biggest success factor we have were the Health Platform coordinators in each clinic... They sit quite close to the clinic manager, often a quality advisor who is involved in the clinics' meetings and is the point of contact with us... They were each responsible for their own support room during the go-live period. They were very involved in the implementation, had a dialogue with their leading super users, and with their managers, they have rigged in their own clinics. IL2*

Another important lesson learned was that the three main user groups (administrative staff, nurses and physicians) required a different approach in learning them to use the system and helping them to overcome problems.

Who is used to taking instructions or giving instructions in their job?... the nurses and all under them came: "If I don't get it right, it's my fault" and the doctors, "there's something wrong in the system, don't come and tell me how to do it"... And mercantile we often see learn by someone standing behind their shoulder and pointing. "Now you have to go there, then you have to go there, and you have to press that button there"INL1

However, it is recognized that learning from each other can be challenging, due to differences in organization, culture and other contextual factors.

Well, we try to learn from each other... But it is not necessarily so that there is such a good best practice recipe. IL3

Learning approaches

In the interviews five learning approaches were discussed. We will present them below with quotes highlighting the informants' assessment of their value.

Post mortem evaluations

Both for the first and the second implementation internal evaluations were conducted. These evaluations resulted in two reports and one full day meeting, where the results of the evaluation of the first implementation were presented and discussed. The implementation leader of the first implementation (INL1) was very positive about the evaluation and its usefulness:

I think that we did it according to the textbook, by evaluating our project and transfer to the next project, what is wise to do and what is not wise? Some advice to them on what they shouldn't do, and then it's up to them at the end. I had the impression that they did a lot of what we recommended to them. INL1

The receivers of the evaluation results, implementations 2 and 3, seemed to be a bit more reserved about the usefulness.

...they have written reports and final reports and such, but it was for us completely unnecessary because we had hung on to that work so much that we were very well informed already. INL2.

There were also evaluation reports produced by external actors (consultancy companies and the auditing organization form the Norwegian state).

There were BCG reports and KMPG reports. They have all been read and reported experiences have been taken in from it, but I didn't feel that there was much new for us. INL2

Implementation team meetings

During the different phases of the implementation meetings were organized between people involved in the three implementations.

...regional implementation team, we called it. Where the implementation managers and clinical managers and those who were employed in the various implementation projects met. So, we have had weekly meetings throughout the period and we have also had gatherings 1-2 times a year where we have met. INL2.

The fact that we had spent so much time together and had physical meetings and met as much as we did – that was a real success factor. INL3

Visiting

During the preparation phase and go-life there were visitations as a means of learning from each other. These included both implementation team members from one implementation following go-life in one of the other implementations, clinical staff from a site where the systems was not yet implemented visiting a site where the system had been taken into use, and staff from a site where the system was used visiting a site that was still in the preparation phase.

And when we came to go-live at {the first implementation}, we had subject experts from {the second implementation} who were up and working as subject experts. There were also some clinicians ... which {the second implementation} sent upwards, and we from the implementation team who could not do anything practical were there as observer. INL2

relatively many from {the third implementation} took part in {the first implementation} go-life. I was also there in the go-live phase. To observe and learn from them and what {the first implementation} did. INL3

It was also mentioned that visitations can have a negative effect when users who are very negative about the new system visit a site where it is not yet taken into use.

The worst, I think, is that we borrowed clinicians. I really think so. Because there we had no control over who they were and.. There was took with them resistance... INL2

Improving the system/More knowledge in the project organization

Another way of learning discussed is more indirect, but nevertheless very important. The system that is implemented is not static. It is improved and extended based on the experiences in each implementation. The same holds for the project organization responsible for the implementation. They learn while doing.

So since all this was in place, error correction process, optimization process and construction process throughout 2023, {impmentation 2} had completely different conditions to be able to do this type of job towards GoLive...INL1

But we have clearly noticed that the project organization has learned and that we have a much more mature solution than what they had at {the first implementation}. A lot has happened in that time. Plus, we as a customer have matured and understand the system better. INL2

Learning Technology

It was also mentioned that different kinds of learning technologies were used, like a knowledge management system and a project database where all kinds of project documentation was available.

Discussion

At the workshop we want to discuss the findings against the literature. We see in the empirical data that learning activities have their pro's and con's. There also seems to be a difference in the way the different sub-groups evaluated the different learning activities. This could be something interesting to take a closer look at. Another point that became quite prominent in the data material is the importance of local concerns that are in conflict with attempts to standardize system configuration for the whole region. This issue is also taken up in (Ellingsen, Hertzum, & Melby, 2022). This friction makes learning less straightforward.

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EHRs Today Are Not the Solution — Nurses Deserve Better

JIADA TU
Centre for Digital Innovations in Health Social Care (CDIHSC)
j.tu@bradford.ac.uk

Abstract. Although electronic health record (EHR) systems have played a positive role in improving the efficiency of medical information management, they have also exposed several issues in practice—particularly the cumbersome documentation processes that significantly increase nurses' workloads. This added pressure not only reduces job satisfaction but also exacerbates professional burnout. To effectively address these challenges, there is an urgent need for more intuitive, efficient, and user-friendly tools, along with a systematic approach to identifying and resolving the root causes of administrative burden on nurses. This article critically examines the limitations of current EHR systems and argues for a more balanced integration of technological solutions and human-centered care, aiming to improve nurses' working conditions, enhance job satisfaction, and ultimately optimize the quality of patient care.

Evolution of EHRs in England: A Historical Overview

Medical records were first created by Hippocrates and medieval physicians over 4,000 years ago, but modern medical records began to appear in teaching hospitals across Europe in the 19th century and soon spread globally [2, 6]. Traditional medical records relied on paper, which posed challenges such as low standardisation, poor retrieval efficiency, and the risk of information loss. The first

electronic medical record system was developed by the Regenstrief Institute in the United States in 1972, marking a significant breakthrough in the evolution of medical documentation [18].

The history of the UK's EHR system also dates back to the 1970s [1, 10]. Its development has progressed from decentralised local systems to an ultimately unsuccessful centralised approach, and is now shifting toward a focus on interoperability and regional integration. Although the early National Programme for IT encountered major challenges, it laid the groundwork for ongoing digital transformation. Today, the UK's National Health Service (NHS) is committed to expanding data sharing and system integration in support of a "digital-first" model of care [4]. Future success will depend on continued technological innovation, the adoption of common standards, and enhanced collaboration across organisations.

The Burden on Nurses: An Unintended Consequence

EHRs are now widely adopted in hospitals worldwide. While they offer significant convenience, their complex processes often require hospital staff to spend considerable time on documentation. This administrative burden reduces operational efficiency and contributes to physician burnout. Additionally, the use of workarounds to manage this workload can compromise the quality of clinical records, increasing the risk of staff attrition and patient safety issues.

What This Means for Nursing?

For nurses, the challenges posed by complex EHR systems are particularly pronounced [17, 11]. As frontline healthcare providers, nurses are responsible not only for demanding clinical tasks but also for extensive documentation. The additional paperwork introduced by EHRs often consumes valuable time that could otherwise be devoted to patient care, leading to decreased job satisfaction and diminished quality of care [17, 16, 7].

Moreover, nurses typically need to navigate multiple information systems within a single shift, often under tight time constraints and with insufficient training. This increases cognitive load and can result in errors or incomplete records, posing risks to patient outcomes. To cope with these pressures, some nurses adopt informal workarounds, such as delayed or batch documentation, which further compromise data accuracy and continuity of care [12].

If left unaddressed, these issues can lead to increased burnout, reduced morale, and even early departure from the profession [14].

The time to act is now

While it is important to recognize these challenges and start making meaningful changes, it is just as important to first carefully study the amount of electronic paperwork nurses have to handle. Since EHRs are being used more and more, this

problem could become a widespread issue in the NHS if it is not dealt with. Although nurses are key to clinical documentation, most current research focuses mainly on doctors. In fact, there is a growing need for studies that specifically look at the documentation workload nurses face. As the NHS moves toward a paperless system, this big change offers a good chance to review nursing documentation and find possible solutions.

A Call for Reform: What Nurses Need

Is More Technology?

Although new technologies like auto-suggestions, voice input, or smart pre-filling can help reduce repetitive data entry and make documentation easier [15], I wonder if this is really the best way to improve current health systems. I have my doubts.

What is the Core Issue?

The fundamental issue is not a lack of technology, but a deep disconnect between existing EHR systems and the real-world workflows of nurses. Most EHRs are designed primarily for administrative efficiency, financial management (as seen in systems developed for the US), and compliance with national policies and regulations—rather than to meet the clinical, cognitive, and emotional needs of nurses [19]. As a result, nurses must adapt to rigid systems that fail to support their judgment, flexibility, and commitment to patient-centered care. This misalignment leads to inefficiencies, job dissatisfaction, and ultimately, burnout—undermining the quality of care delivered [11].

The solution is not simply to add more features or interfaces, but to identify the underlying issues and fundamentally redesign the electronic medical record system with nurses at its center. A nurse-centered system should prioritize clinical relevance instead of administrative completeness, reduce cognitive burden rather than shift it, and empower nurses in their professional practice rather than constrain them.

Mind the IT Gap

Although the NHS has invested over £10 billion in EHR systems [5], nurses often lack sufficient IT training. The Health Foundation (2024) points out that over 90% of NHS trusts have deployed EHR systems [3], but many nurses are only able to use the basic functions, leading to frequent issues such as patient identification errors and blood sample labeling mistakes. Additionally, studies have found that nurses who lack training report higher cognitive load and work stress when using EHR systems [8]. EHR systems cannot just be deployed; they must be accompanied by ongoing training to truly support frontline clinical staff. Therefore, the training gap must also be addressed.

Transforming EHR Systems: The Art of Balancing Technology and Humanity

The core challenge for the next generation of EHR is not the addition of more features or interfaces, but whether the system can be fundamentally redesigned to be truly nurse-centric. A nurse-centric EHR should prioritize clinical relevance over administrative completeness, reduce—rather than shift—the cognitive burden, and empower rather than constrain nurses in their professional practice.

Who is Accountable?

If new technologies are introduced into EHR systems to reduce nurses' workload, who should be held accountable when clinical errors or information omissions occur? This is a critical yet often overlooked issue amid ongoing technological reforms. Nurses are expected to "follow the process" to mitigate risks, yet these processes are often designed by technical staff or administrators with little clinical experience. When system efficiency is prioritized over clinical judgment, nurses end up bearing the consequences of flawed system design.

Streamlining workflows must not become an excuse for shifting responsibility. A truly nurse-centric EHR reform must establish clear accountability mechanisms to ensure that when errors stem from system design flaws, nurses are not forced to take the blame. This is not only a matter of fairness, but also essential for driving system improvements and safeguarding patient safety.

Thinking in the Age of AI

With the rapid advancement of artificial intelligence, particularly the explosive growth of related technologies, EHR systems are undergoing profound transformation [13, 9]. As previously noted, numerous intelligent features—such as auto-suggestions, predictive analytics, and decision support—have been integrated into EHR platforms, effectively reducing clinicians' documentation burden and improving the accuracy and efficiency of medical and care-related decisions.

However, in the age of AI, the question of how to truly enhance EHR system efficiency and alleviate documentation pressure through the integration of AI agents remains unresolved and warrants serious investigation. From a practical standpoint, system developers need a deeper understanding of how hospitals operate, designing with the needs of doctors and nurses at the center, rather than focusing solely on technological advancements at the expense of real-world applicability.

In the UK, there is an urgent need to establish a unified national healthcare information system. Such a system would help eliminate redundant data collection, reduce repetitive tasks, and ultimately improve efficiency and consistency across services. At the same time, it is essential to develop accompanying policy frameworks and technical standards to address the

challenges posed by AI integration. Throughout this process, data security and patient safety must remain top priorities. For example, blockchain technology shows great promise in ensuring the secure storage and sharing of medical data. Similarly, training large-scale models to support clinical decision-making is becoming an irreversible trend, with some initiatives already underway. Nevertheless, this remains a complex and evolving challenge. Just as there is no perfect partner, there will never be a flawless EHR.

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Technostress in the Cooperative Use of Technology at a Danish Hospital

Raluca A. Stana
Roskilde University
raluca@ruc.dk

Morten Hertzum
Roskilde University
mhz@ruc.dk

Abstract. Digital technologies such as radiology information systems, scanners, and electronic health records are central to clinical cooperation in hospitals. While these systems enable efficiency, they also give rise to technostress—stressful or frustrating experiences with technology. Prior research has primarily examined technostress at the individual level. In this study, we investigate how technostress both shapes and is shaped by cooperative practices. Drawing on qualitative interviews and a pilot survey conducted in a nuclear medicine department at a Danish university hospital, we identify interruptions, performance monitoring, and uncertainty as strongest dimensions of technostress with cooperative consequences. Our findings show how technical breakdowns, system updates, and misaligned workflows disrupt temporal coordination, force ad hoc renegotiations of responsibilities, and weaken trust in shared digital infrastructure. This frames technostress as connected to a breakdown in cooperative and temporal alignment, and not just a personal and momentarily discomfort.

Introduction

Hospital staff use a range of digital technologies, including electronic health records and department-specific systems such as scanners, radiology information

systems, and picture archiving and communications systems. These technologies enable specialized treatment and efficient information sharing, but they are also giving rise to stressful and frustrating incidents (e.g., Califf, 2022; Stana and Hertzum, 2024; Thunberg et al., 2023). Such technostress has been documented for newly implemented technology (Hertzum and Ellingsen, 2019) as well as for healthcare technology that has been in use for years (Lääveri et al., 2024).

In this study, we investigate *how stressful experiences with digital technology influence day-to-day cooperation among the staff at a hospital department in Denmark*. The study adds to existing studies about the changes and hassles required to sustain cooperation, quality, and wellbeing while adopting and using healthcare technology (e.g., Fitzpatrick and Ellingsen, 2012; Marcu et al., 2021; Pedersen and Bossen, 2021; Poon et al., 2021; Procter et al., 2024).

Technostress, an initially psychologically defined set of constructs associated with stressful or frustrating experiences (e.g., Ragu-Nathan et al., 2008; Tarafdar et al., 2007), has been defined in 1983 (Brod, 1984). While being a well-established research stream within IS, it is only peripherally discussed in CSCW (e.g., Ciolfi and Lockley, 2018; Nauwerck et al., 2018). By discussing it in the context of cooperation (Ciolfi et al., 2023) we hope to open the discussion and draw on cooperative work perspectives and thus contribute to both IS and CSCW research.

We investigate qualitatively and quantitatively the technostress experiences which the hospital staff have with technology post-implementation in a nuclear medicine department at a Danish hospital and the impact it has on cooperation practices.

Method

Following approval by the department's management, this study was conducted at the department of nuclear medicine at a university hospital in Denmark. The department performs a range of imaging tests that involve the use of specialized technology to reveal, for example, cancer. The department has about a hundred employees and sees approximately 30,000 patients a year. A chief physician at the department kindly facilitated the recruitment of employees for interviews and the dissemination of a survey to all employees.

We interviewed 15 employees (5 physicians, 2 physicists, 2 radiographers, 2 medical laboratory technologists, 2 researchers, and 2 medical secretaries) about whether the technology they used in their work gave rise to stressful situations. If it did, they were asked for concrete examples of such situations, including follow-up questions about their consequences and how they were resolved. The interviewees had worked in the department for an average of 8.5 years. They gave their written informed consent to take part in the study and were interviewed between October 2023 and January 2024.

In April 2025, we returned to the department to pilot test a survey about technostress. Respondents were initially asked to describe an example of a stressful incident with technology and to indicate whether it had consequences for their own work, their colleagues' work, and the patients. Then, respondents were asked to indicate how often they experienced technostress in general and how often they experienced each of 12 previously proposed technostress dimensions. Table 1 lists the dimensions and gives the wording of the questions. The five first dimensions (invasion, overload, complexity, insecurity, and uncertainty) were from Tarafdar et al. (2007); the seven other dimensions were proposed by Ayyagari et al. (2011), Day et al. (2012), Fischer and Riedl (2015), Galluch et al. (2015), Gimpel et al. (2024) and Vaziri et al. (2020). A total of 27 employees responded to the survey (11 physicians, 7 medical laboratory technologists, 3 medical secretaries, 1 physicist, 1 radiographer, and 4 others).

Findings

The survey respondents regularly had stressful experiences with technology; their median response to the overall question about technostress was at the midpoint between 'Never' and 'Always' (Table I). The 12 technostress dimensions were equally or somewhat less common. Notably, the three dimensions that most strongly explained overall technostress were interruptions, performance monitoring, and uncertainty. The frequency of overall technostress tended to increase and decrease in tandem with these three dimensions. In contrast, variation in dimensions such as overload and insecurity was almost unrelated to variation in overall technostress. Additionally, eight of the examples provided in the survey were rated by the respondents as having direct consequences for colleagues' work, showing how technostress not only affects individuals but also disrupts cooperation routines and task coordination.

Our data suggests that technostress, which is primarily induced by digital technology, can arise from and impact cooperative practices. For instance, staff described stress arising from poorly timed communication flows (e.g., emails outside working hours), misaligned workflows (e.g., patient check-in failures), and system issues like file deletions or data being saved incorrectly. These issues often forced staff to compensate manually, rely on others for workarounds, or renegotiate responsibilities—all of which strained workflows and coordination.
Below, we interpret some of the technostress dimensions that seem to be most predominantly experienced by the department staff.

Interruptions seem to manifest in the department in the form of IT related breakdowns in workflows that prompt the staff to shift their attention to perform other tasks, such as requesting help from their colleagues, find workarounds or troubleshoot the technology. For example, the patient check-in portal laks in usability and triggers many cooperation issues. In the quote below, a bioanalyst

Table I. Technostress and its dimensions, as experienced by the 27 survey respondents

Dimension	Question	Median[a]	Correlation[b]
Overall concept	Technostress are the stressful or frustrating experiences you have with digital technology. To what extent do you experience technostress in your daily work?	4	-
Invasion	Digital technology creates situations where I can potentially be reached anytime or feel a need to be constantly connected, which blurs the boundary between work and personal contexts	3	-0.103
Overload	Digital technology makes me work faster and longer than I otherwise would	4	0.059
Complexity	Digital technology is so complex that I feel inadequate as far as my skills are concerned and need to spend extra time and effort to learn and understand it	3	0.333
Insecurity	Digital technology makes me nervous about losing my job because it may replace me or because other people have a better understanding of it	2	0.064
Uncertainty	Continuous changes and upgrades in digital technology unsettles me and makes me uncertain	3	0.521*
Unreliability	Digital technology is often unstable, including system crashes and technical problems	4	0.351
Role ambiguity	Digital technology creates uncertainty as to whether I should expend my resources to perform my work or to acquire new skills in mastering the technology	3	0.374
Privacy invasion	I am concerned that my privacy could be invaded by digital technology	2	0.231
Interruptions	Digital technology causes interruptions that shift my attention away from my current tasks	4	0.756***
Performance monitoring	I feel that digital technology is used to monitor and assess my performance	2	0.577*
Nonavailability	Digital technology that could ease my work is often unavailable due to technological or organizational restrictions, safety, or monetary reasons	4	-0.201
Lacking sense of achievement	Due to digital technology, it is difficult for me to say what progress I have made in my work	2	0.468

[a] Rated on a scale from 1 ('Never') to 7 ('Always'). [b] Spearman correlation with overall technostress (i.e., with the question in the first row). * $p < 0.05$. *** $p < 0.001$.

describes such a situation, which led to disrupting not only the individual work, but also other interdependent workflows and cooperative routines:

> *The patient must self-check in at the kiosk by the entrance to the department. Many do not realize they have gone to the wrong place – despite the kiosk actually informing them that they are in the wrong waiting room. They sit down and wait – in good faith. In my system, the patient is not registered (since they weren't in the right place), so I think they have either missed their appointment or are delayed. If I have time, I walk around to the other waiting rooms to see if they are sitting there. […] Their scheduled time has passed, and I'm already with a new patient. Of course, I can't turn the patient away—they acted in good faith. But I get delayed, I have to interrupt a colleague preparing a new radiotracer, another colleague might need to be disturbed to perform the examination, and everything shifts so I can still have a lunch break. The patient gets delayed, and so do the following ones.* (Bioanalyst, Survey).

The issue begins with the patient registering in another waiting room, a usability issue, which at first might go unnoticed by the bioanalyst, but it cascades into breakdowns in coordonative practices.

The example shows how interruptions in socio-technical systems extend beyond the immediate user. In a tightly coupled clinical setting, a workflow interruption can ripple through the department, straining coordination. These incidents introduce ad hoc renegotiations of responsibility, delays and added stress from re-synchronizing efforts, as the medical staff cannot '*turn the patient away – they acted in good faith*'. Our interview data is also rich of such examples of interruptions in cooperative practices which lead to delayed tasks.

Performance monitoring correlates highly with technostress, but the median level is quite low in our data and that matches with that we do not have any concrete examples from neither the interviews nor the survey.

Uncertainty, another dimension to explain technostress highly in our survey data, seems to be triggered in the medical staff due to upgrades scheduled during working hours or sudden updates that erase the cooperative customization work done by the medical staff, as seen in the representative example below:

> *There are some built-in shortcut keys—to avoid too many clicks and mouse movements and such. But you can also make your own. […] So, we made some templates that could serve as a starting point. But then there was just some update. And then everything we had saved disappeared. The things we had gotten used to. And I have to say, after that, I kind of started to give up on it. Because it's satisfying to spend time preparing something—setting it up—if you know you'll be able to use it for a while and it makes sense. But when it can just disappear suddenly and no longer make sense, then it feels like a waste of time to sit and work on it. And I'd also say that the way it affected us was in terms of mental energy. We didn't have any during those periods—especially in the beginning when everything was being changed. And it wasn't just because it was new. It was also because it wasn't good.'* (Physician, Interview)

The quote illustrates how continuous updates and unstable customization processes leads to uncertainty and discouragement amongst hospital staff, whose customization work (such as templates and custom shortcuts created together) is

erased by sudden updates. This leads not only to a loss of effort but also undermines stability and continuity in shared tools. The uncertainty about whether their modifications would persist discouraged further investments. These breakdowns in the customized infrastructure reflect how uncertainty not only unsettles individuals, but also leads to weakened alignment between tools, people, and organizational routines, while the staff experience that the system no longer supports, but rather destabilize the collective.

Concluding Discussion

Our data – derived from both survey and interviews, indicates that hospital staff experience technostress at some frequency, with some interviewees describing daily occurrences. Among the twelve surveyed dimensions, interruptions, performance monitoring and uncertainty seem to correlate high with overall technostress. While we find various examples of interruptions and uncertainty in our interview data, our respondents do not discuss performance monitoring.

The consequences of interruptions in healthcare work are well studied (e.g., Hall et al., 2010, Westbrook et al., 2025). These disruptions may be linked to the staff making more errors and challenged in task resumption due to high switching costs. Similarly, uncertainty, as an unintended consequence of health IT implementation (e.g., Eikey et al., 2025), might affect not only the mental workload of staff, but also the quality and timeliness of patient care. It is important to note that hese technostressors have consequences for both patients and healthcare providers.

Our research contributes to technostress literature by emphasizing the cooperation aspects that both lead to and are impacted by technostress. In that sense, technostress moves from being understood as individual or related to isolated incidents, triggered by technology directly or indirectly, to bring forth the relational and systemic breakdown, particularly in coordination and task interdependence.

Adding to previous research which emphasizes that group-specific user interfaces cause teamwork problems in EHR (e.g., Sand et al., 2025), in our mixed method investigation, we look at the broader technological landscape and cross-group cooperation (from secretaries, to bioanalysts, radiographers, physicians and researchers), contributing with a broader scope to existing literature that either focuses on a specific system or staff group.

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Small and unimportant?

Kjersti Zakariassen FOSSE
Norwegian University of Science and Technology, Norway
Kjersti.z.fosse@ntnu.no

Abstract. This outlines a planned comparative study on two mental healthcare units for Children and Adolescent where a new Electronic Health Record (EHR) has been implemented. The units where the EHR has been implemented are located in rural areas, offering unique challenges in how the use of the system will affect these health care workers. The aim of the study is to explore how the healthcare workers experience the EHR to fit their use and compare the two units.

Aim for workshop and outcomes

Joining this workshop will be particularly useful for me as a young researcher, still in the midst of finding my way in the world of research. The planned research project outlined in this paper will be the second full journal article I do as a PhD candidate. By being able to present this project to a group of other researchers I hope to get feedback and inspiration on how to conduct the study. Discussing various aspects of it will offer the opportunity to explore my horizon on what is possible and broaden my understanding of my own project through the knowledge of others. This includes discussing aspects such as data collection and informant groups, particular considerations to take when working within the mental health field, aspects of work practice to consider, and other useful input on doing qualitative research in healthcare settings.

When creating a new interview guide for this project finding good and useful questions will be important. Getting some input on how to do this when wanting to collect data from two different settings will be useful. Which considerations to take and prompts that can be made to ensure high quality data with a comparative aspect is essential.

Introduction

When new electronic health records (EHR) are implemented, it is a large resettlement for the healthcare workers who will be using them as they are adapting to changes in work practices and with having the healthcare workers being trained sufficiently to use the new EHR (Ahrendt et al., 2025; Fosse et al., 2025). Some of the challenges that arise when the users do not feel safe in using the EHR also manifest as resistance to the system itself (Berg, 2001). Resistance may lead to healthcare workers finding their own ways of using the system, such as workarounds (Andersen, 2020; Ser et al., 2014), limiting the impact of the implementation. One reason this may happen can be due to how well they receive the system. This has been the case of the Health Platform where the system has received massive attention by the media (the Health Platform has had its own tag in the local newspaper Adressa since before the implementation happened (*Adressa*, 2025)). By no doubt, this has impacted the healthcare users. How well healthcare workers adapt will also be impacted by the training they receive pre-implementation (Ahrendt et al., 2025).

Background

In the case of the Health Platform, the implementation has happened in several phases where different hospitals have gone live at different times (Helseplattformen, 2025), offering chances for health workers to learn from each other. The implementation of the EHR, the Health Platform, in Central Norway has over the past 3 years spread to three health trusts , including three psychiatric facilities (Helseplattformen, 2024). In the case of the mental health hospital where the Health Platform was first implemented, a large resettlement came due to the fact that the records had not been done digitally before the new EHR (Fosse et al., 2025). Previous implementations in places such as Denmark had similar findings when it came to how much of an impact changes in work practices became for the mental health care users (Andersen, 2020).

Herein are the one in the largest city, Trondheim, and two smaller hospitals in Levanger and in Ålesund. This paper presents a planned comparative study between the two smaller hospitals, focusing on the mental health unit for Children and Adolescent Psychiatry. Mental health units have had little focus (Zurynski et al., 2021), and exploring various aspects of how the healthcare workers in these units experience the implementation of a new EHR is important to gain an understanding of what is important in these situations. As these hospitals are situated in more rural areas, challenges of keeping the functions of the system updated and continued follow-up of user-registered feedback will be interesting to

explore. This in light of how the implementation at the Trondheim unit have found their collaboration with the vendor and health trust in regards to system adoptions (Fosse et al., 2025). The following research questions will therefore be explored:

RQ1: How do healthcare workers experience the fit of an electronic health record after the implementation in a rural mental health unit?

RQ2: Which changes in work practice caused by the implementation differs between the two units?

Method

This study will use in-depth semi-structured interviews with various healthcare professionals who are using different interfaces of the EHR, such as doctors, psychiatrists, psychologists, nurses, social workers etc. This to ensure an understanding of the various uses of the EHR in the mental health setting, and to find the unique challenges that these healthcare workers face when working with children and adolescent. The aim is to collect 10 interviews at each hospital, 20 in total to help cover the various roles they have. To ensure a high information power, substantial and covering information on the analysed data, the authors will be using the theory by Malterud (2021). By applying this theory, interview guides and data collection will be developed to gain as high information power as possible.

The interviews will be analysed using thematic analysis (Braun V. & Clarke, 2006). An inductive approach will be used in the analysis to ensure closeness to the data and to develop a thorough understanding of the experiences the healthcare workers have of the use of the EHR. This is also particularly important as the mental healthcare setting has been little researched.

Discussion

By presenting data from two different mental healthcare settings the aim is to gain an understanding of which aspects the EHR implementation has had on the healthcare workers work practice. These healthcare workers have undergone training offered by the vendor, but also seen how the implementation was received by the other hospitals. In the case of the implementation at the mental health hospital in Trondheim, healthcare users found that the system was not well adapted to their use (Fosse et al., 2025). This was also the case for similar

implementations done in other countries such as the UK (Ser et al., 2014) and Denmark (Andersen, 2020), which also implemented Epic systems.

As the user group has had little focus in other research (Zurynski et al., 2021), finding the unique aspects affecting the two different settings will be important to ensure that the voices of the healthcare workers are heard. Looking at the two research questions the hope is to uncover both unique challenges that affect these smaller hospitals and how they have worked on implementing the new EHR, how it has affected their work practice, challenges that have risen, changes in dynamics among the healthcare workers, and differences that can be found between the two units. Uncovering these aspects will enable us to see mental healthcare in a broader light of unique challenges they face. Gaining this knowledge may also offer the possibility to inform other implementations later on.

Limitations

Finding healthcare workers to interview may be limited by the availability of informants, giving a smaller than optimal selection.

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The holy collaboration trinity of health and client information system development: end users, IT departments, and the software developers –research project plan

Tinja Lääveri, MD, PhD
Aalto University, Department of Computer Science, School of Science, Espoo, Finland
Infectious Diseases, Inflammation Center, University of Helsinki and Helsinki University Hospital, Helsinki, Finland
tinja.laaveri@aalto.fi

Susanna Martikainen, PhD
University of Eastern Finland, Department of Health and Social Management, Faculty of Social Sciences and Business Studies, Kuopio, Finland

Johanna Viitanen, D.Sc. (Tech.), assistant professor
Aalto University, Department of Computer Science, School of Science, Espoo, Finland

Abstract. The development and optimization of health and client information systems (HISs and CISs, respectively) requires contribution from and collaboration between the three main stakeholders: the health and social care professionals, IT department personnel, and developers in vendor organizations. The health and social care professionals are the domain experts and end users of these systems, whereas the end-

user organizations' IT department personnel responsibility is to ensure the enterprise-wide suitability, as well as coordinate and prioritize the needs of the health and social care provider organizations' end users and leaders. The software developers in HIS and CIS vendor organizations are responsible for designing and developing these information systems and ensuring the fit to the system architecture. Our earlier studies show that physicians, registered nurses, and social welfare professionals are willing to participate in HIS and CIS development, but they experience that vendors and developers are not interested in their feedback and that fixing problems or delivering improvements takes too long a time. The developers, by contrast, report being interested in end users' needs, but struggle finding participants for development groups, moreover, suitable methods appear to be lacking. We set out to study where this collaboration breaks down by investigating the viewpoints and experiences of end users of HISs and CISs, as well as IT department personnel and developers. This paper presents earlier study findings and the research plan. The workshop discusses participants' experiences of this collaboration.

Introduction

In the era of ageing populations, financial constraints, and workforce shortages, the development and optimization of health and client information systems (HISs and CISs, respectively) is a critical component in modernizing health and social care services. User satisfaction and usability are central to the efficiency and safety of these systems (Yan et al. 2021, Kushniruk et al. 2005). Several studies conducted among Finnish physicians, registered nurses (RNs), and social welfare professionals (SWPs) reveal not only end-user dissatisfaction with the usability of and collaboration support provided by HISs and CISs (Viitanen et al. 2011, Viitanen et al. 2022, Lääveri et al. 2025), but also with how their ideas are incorporated into development (Martikainen et al. 2012, Martikainen et al. 2020, Martikainen et al. 2022, Martikainen et al. 2025 REFS). On the other hand, the developers of these systems assert their interest in end users' views (Martikainen et al. 2014). As the end users cannot master all possible administrative and health or social care activities within their organisations, most service provider organisations have established their own or outsourced IT departments to coordinate the prioritisation of ideas and to ensure that the end users' development requests do not conflict with each other or organisational administrative guidelines and strategic goals. However, not all end-users' wishes fit the HIS and CIS system architecture, nor the limited vendor resources (financial constraints imposed by their paying customers i.e. health and social care organisations). This situation leads back to a cyclical process in this "holy trinity" requiring the IT departments and end-user representatives to further prioritize and refine requests.

It is generally acknowledged in software development literature that involving end users results in various benefits, such as increased user commitment during

software implementation and improved usability (Bano and Zowghi, 2015). However, practices of this approach vary, making it important to understand how users and developers perceive the participation process, and the methods used. The development of HISs and CISs is not a one-time task, but a continuous optimization process intended to meet the needs of service provider organizations, care and service paths, medical guidelines, national policies, and technological improvement possibilities. Human-centered design, an approach for designing interactive systems with high usability, includes a process model and a variety of methods for involving users in different stages of development: requirements specification, design, and evaluation (Gulliksen et al. 2003). The range of methods is broad; thus, it is important to to select and apply methods appropriately to utilize them effectively (Lazar et al. 2017). The field of health and social care, and the context of use of CISs and HISs have special characteristics, which must be considered in system development, particularly regarding the collaborative development work between developers and end users.

Acknowledging the universal effort among stakeholders to enhance the user experience of health and social care professionals, as well as organisational leaders, we have initiated a research project to identify the factors that facilitate or impede this goal. The project consists of the following work packages (WP):

WP1: End-user experiences of collaboration with developers and IT department personnel

Data on end-user experiences of collaboration with developers and IT department personnel are gathered from previous and ongoing nationwide cross-sectional user experience surveys from 2010, 2014, 2017, 2021, and 2025 (ongoing) among physicians; 2017, 2020, and 2023 among RNs; and 2019 and 2021 among SWPs. The questionnaires include a section on experiences of collaboration with HIS and CIS vendors and participating in development. The introduction to the section was “What kind of experiences have you had about providing feedback on the health/client information systems you use and about development? Please assess the following statements based on your experiences”. The five-point Likert-scale response options were: Fully agree/somewhat agree/neither agree nor disagree/somewhat disagree/fully disagree. The statements are presented in Table 1 by professional group and study year.

The results of the 2010 physician survey (Martikainen et al. 2012); comparisons of 2017 physician and 2018 RN surveys (Martikainen et al. 2020); and 2020 RN and SWP, and 2021 physician surveys (Martikainen et al. 2025) have already been published. The main findings have been: 1) over 80% of respondents are willing to participate in HIS and CIS development; 2) physicians were least aware of feedback processes and least satisfied with vendors' interest in

end-user feedback and the manner and speed of HIS development; 3) Those who had dedicated working time for HIS or CIS development were less critical of vendors' interest and responsiveness to development ideas than those who had not participated at all. 4) In all three professional groups, the youngest were most dissatisfied with HIS and CIS vendor collaboration. Moreover, the end users would like to see developers on site to show and explain development needs and report development ideas to a physician/RN/SWP responsible for HIS and CIS development in their organization. By contrast, submitting development ideas to websites are not considered very useful, mostly because of lack of feedback processes i.e. the end user does not know what has happened to their ideas and when, if ever, changes will be delivered. The collection of data for the 2025 physician survey is ongoing, and new surveys for RNs and SWPs are being planned. The end-user surveys are coordinated by the Finnish Medical Association (physicians), Finnish Institute for Health and Welfare (THL) together with University of Eastern Finland (RNs) and Finnish Institute for Health and Welfare together with University of Lapland (SWPs). Aalto university has participated in the design and analyses of all three surveys.

Table 1. Respondents' experiences of HIS and CIS developers, organizations' IT department personnel and participation in development. Phys= physicians; RNs= registered nurses; SWPs= social welfare professionals; x=statement included in survey

Statement	2025 Phys	2021 Phys	2017 Phys	2014 Phys	2010 Phys	2023 RNs	2020 RNs	2018 RNs	2020 SWPs	2019 SWPs
I know how and to whom I can send feedback about the system if I wish to do so.		x	x	x	x	x	x	x	x	x
The system vendor is interested in feedback about the system provided by the end users.	x	x	x	x	x	x	x	x	x	x
The system vendor implements corrections and change requests according to the suggestions of the end users.		x	x	x	x	x	x	x	x	x
Corrections and change requests are implemented within a reasonable time frame.	x	x	x	x	x	x	x	x	x	x
Collaboration in HIS development with my organisation's IT department is smooth (e.g. concerning enhancement requests)	x									
In which ways would you be interested in participating in system's development work in the future? (5 options+"not interested" +open-ended response)				x	.x		x	x	x	x
Have you participated in information systems development work? (not at all-a little-a lot	x	x	x		x	x	x	x	x	x
Please specify how you have participated in systems development work (open-ended response)	x								x	

WP2: Developers' experiences of end-user involvement in software development

Following the first physician survey in 2010 suggesting dissatisfaction not only with the usability of HISs (Viitanen et al. 2011) but also- with the collaboration with HIS vendors and developers (Martikainen et al. 2012), in 2012, the personnel of a large Finnish HIS vendor were invited to participate in a survey about their experiences of end-user participation in system development (Martikainen et al. 2015). The respondents identified the lack of feedback channels to end users regarding development requests and ideas as one of the main challenges. Moreover, developers reported collaborating with customer representatives who were not end users of the systems.

To broaden the approach to mirror the Finnish health and social care reform and introduction of welfare counties in 2023, a new survey was conducted in 2024. This survey included developers from the five largest HIS and CIS vendors in Finland; CIS developers were also covered. Vendor-specific results have been delivered, but the scientific analysis of responses is still ongoing. The aim is to identify reasons behind end-user dissatisfaction with both the usability and the development processes of these systems. Analysis will include quantitative (questionnaire statements) and qualitative (open-ended questions) results. The usefulness of AI tools will be tested in qualitative analyses. The questionnaire covered background data, statements about used means of end-user involvement, and respondents' perceptions of the usefulness and importance of participation. Two open-ended questions addressed reasons for end-user dissatisfaction to HISs and CISs in general, and specifically, reasons behind end users feeling they are not being listened to. The HIS and CIS developer study was coordinated by Aalto University in collaboration with the University of Eastern Finland.

WP3: The experiences of IT department personnel on collaboration with end-user representatives in CIS and HIS development

The perspectives of the third main stakeholder group, service provider organizations' IT department personnel, will first be collected with thematic interviews. Subsequently, a questionnaire will be developed and distributed among the IT departments of Wellbeing Counties, HUS Helsinki University Hospital, and the City of Helsinki as well as the major outsourced IT departments.

The private sector and the outsourced social care services will not be included in the survey. The study aims to investigate the experiences the representatives from the IT departments of customer organisations involved in the development of HISs and CISs, with a focus on the end-user involvement and collaboration during the development process. It will study their perspectives of the most useful and efficient means of participation. We also plan to interview physicians/nurses/social care professionals responsible for HIS and CIS development in their organizations about their collaboration experiences not only with vendors and IT departments but also among different professional groups and specialties. The usefulness of AI tools will be tested in the qualitative analyses. The IT department personnel study is coordinated by Aalto University in collaboration with the University of Eastern Finland and the University of Oulu.

Impact of the research project

In addition to scientific articles, the results of the three research packages will be presented and discussed in a workshop organised for HIS and CIS vendors, IT department personnel, and end-user representatives. Given that the National Institute for Health and Welfare (THL) is responsible for the national HIS and CIS requirements for the Kanta health information exchange services, the Ministry of Health and Social affairs for legislation, and National Social Insurance Institution (Kela) for the provision and maintenance of national Kanta services, representatives from these organisations will also be invited to the workshop. The resulting recommendations will be distributed among the stakeholders and published.

Suggestion for the workshop

The participants' experiences and future ideas of end-user involvement in HIS and CIS development will be discussed from the three stakeholder group perspectives.

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