Technical Report

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Health informatics — Pathways for human-computer interaction in electronic health information record systems to reduce clinician burden

Informatique de santé — Voies d'interaction homme-machine dans les systèmes électroniques d'enregistrement des informations de santé afin de réduire la charge de travail des cliniciens

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Foreword

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Introduction

The implementation of electronic health information record systems (HIRS), defined in Clause 3, is one of the primary factors contributing both positive and negative impacts on clinical practice and patient experience. HIRS can be used to create complex hierarchical structures from basic primitive types. HIRS has substantially altered the norms of clinician-patient interaction, often unintentionally diminishing the most meaningful aspects of healthcare practice for the clinician and the patient.[1],[2],[3],[4],[5] Among the various segments of the healthcare industry, there is widespread agreement that the structure, capabilities and operations within HIRS are not working for clinicians, patients, health organizations, health technology vendors or the businesses who enable the provision of health insurance, equipment, biotechnology services, research, and pharmaceuticals. The healthcare industry faces a diverse range of challenges causing numerous serious issues for each of these groups. Challenges include rising numbers of preventable mistakes,[6] declining quality of care, sub-optimal health outcomes, out-of-control costs, financial pressure, resource constraints, clinician burnout, and problems integrating technology with artificial intelligence (AI) and telehealth. These ever-changing technical, regulatory, and environmental challenges, along with cybersecurity threats to patient data requiring robust security measures and constant vigilance, demand significant additional effort, planning and resources. These challenges impact operational efficiency and can lead to workforce shortages. There is a growing gap in the availability of skilled healthcare professionals and healthcare services relative to growing demand for healthcare services as populations age and the prevalence of chronic diseases rises.

The root causes of many of these challenges relate to deeper issues with HIRS, including:

— inadequate standards for data quality and insufficient auditing and enforcement of existing data quality standards;

— complex nonintuitive data structures and functionalities;

— lack of functionalities to mitigate cognitive overload;

— fragmented care, poor workflow integration, and lack of context and specialty specific support.[7]

While the problems are daunting, they appear to have motivated many healthcare and non-healthcare actors to start to identify solutions. This document reviews a large body of clinician opinion and research findings suggesting that the HIRS status quo cannot continue and that comprehensive HIRS reform is necessary, possibly leading to a completely new HIRS which would be termed the digital healthcare system (DHS). During the transition to a new HIRS, clinicians need to continue to treat patients with the available HIRS; the idea of moving to a more perfect DHS is an evolutionary process over a period of years. The goal now is to use the knowledge, principles, standards and experience gained from the first 15 years of wide scale HIRS implementation, and the advances made in several domains to support continuing efforts to improve HIRS and move toward that more perfect DHS.

While the burden of disease is a known epidemiologic concept, clinician burden is a less known and more recent term.[8] Clinician burden occurs when the clinician's environment and workload impose physical, cognitive, psychological, and time burdens on clinicians without sufficiently improving quality of care and clinician functioning.[2] Multiple factors can contribute to clinician burden, including

— time and productivity pressures,

— excessive bureaucratic tasks of low clinical value,

— limited capacities of human cognition versus high demands of information-intensive clinical practice,[9],[10], and

— limited clinician-centred design in health information record systems and clinical decision support tools, which contributes to ineffective functionality and increased burden on clinical workflows.

While contributing to improved healthcare, the volume and velocity of new patient-related healthcare information, patient-specific data, and underlying biomedical knowledge also unintentionally increase clinician burden.[11] A large and growing body of research suggests that poor HIRS usability and poor integration within clinician workflows are important factors preventing electronic health information