



Nordic Council
of Ministers

Supporting the healthcare professionals' work and data quality through e-Health standards

Contents

Abstract	3
1. Introduction: Nordic collaboration in e-Health standards	4
2. Challenges of electronic health record systems – professional and data quality viewpoints	6
3. Role of e-Health standards in the life cycle of specifications and data in healthcare	9
4. Supporting healthcare professionals' daily work and facilitating better data quality through e-Health standards	13
5. Roles of actors in development and use of e-Health standards	18
6. Recommendations and principles for use and development of e-Health standards	20
References	25
About this publication	27

This publication is also available online in a web-accessible version at: <https://pub.norden.org/temanord2024-514>

Abstract

The main background for this guideline is the Nordic e-Health Standardization group's mandate topic which deals with contributing and communicating the initiative of "Reducing clinician burden" (RCB) - initiative. It has become increasingly important to ascertain how one might support healthcare professionals' daily work and how to facilitate better data quality using e-Health standards. There are also small, nuanced differences between the American-born term RCB versus how to understand the theme in a Nordic context.

This guideline is the result of the collaboration among work group members of the Nordic e-Health Standardization group. The guideline is also anchored in the main group. The work group has also been consulting the Nordic eHealth Research Network's scientific experts regarding the RCB theme and has received valuable input to the guideline.

Even though a lot of thorough work is being done to globally reduce healthcare professionals' documentation burden, there are still some distinctive features and needs in the Nordic environments. Furthermore, data quality is increasingly considered important for both primary and secondary use of health data in Nordic countries. The Nordic work group has formulated some principles and recommendations all stakeholders involved in standardization work should follow. They are intended to apply to improving data quality, to support daily work and to contribute to reducing the overall burden of clinical work to healthcare professionals. Principles include general aspects which should be followed by different stakeholders, and which are applicable across many different activities related to the development and use of standards. They constitute the foundation for more detailed recommendations. The recommendations focus on more specific and actionable activities or stakeholder groups.

The work related to this report has received funding from the Nordic Council of Ministers eHealth group and the Sustainable Growth Programme for Finland (RRF) of the Next Generation EU instrument of the European Union.



Funded by the
European Union
NextGenerationEU



Nordic Council
of Ministers



1. Introduction: Nordic collaboration in e- Health standards

The Nordic Council of Ministers eHealth group has several subgroups which have different points of focus and mandates regarding common eHealth challenges in Nordic countries.

The Nordic Council of Ministers *eHealth Standardization group*'s focus is on standardization and one of the mandate topics for 2023–2025 is to contribute to and ensure that the Reducing Clinician Burden (RCB) initiative is considered in standardization work in Nordic countries. Another important topic for the Nordic e-health standards group is to share knowledge and best practices in e-health among the Nordic countries, for example around issues like digital health infrastructures in different Nordic countries, quality of data, interoperability at all levels of eHealth services, and to support the work of the professionals through digitalization. The participating organizations from Nordic countries are national competence centres who have also brought insights from their national strategies and initiatives to this work.

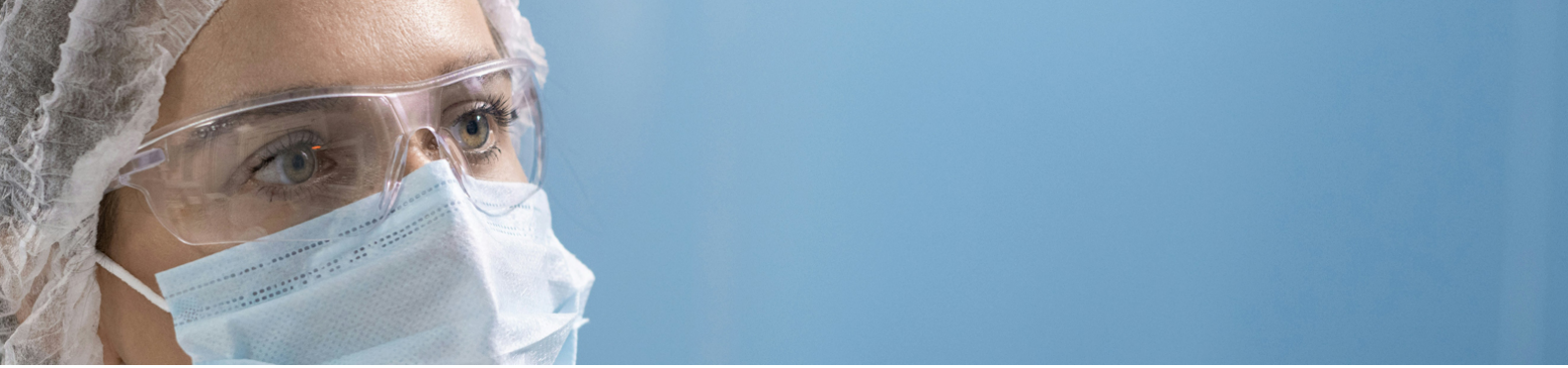
Nordic eHealth Research Network (NeRN) is another subgroup under the Nordic Council on Ministers, which pursues and develops common Nordic indicators for eHealth functionalities and services. Furthermore, NeRN applies and evaluates them to produce Nordic eHealth benchmark data for use by national and international policy makers and scientific communities to further support the development of Nordic welfare. The eHealth Standardization group has been consulting the NeRN's scientific experts regarding the RCB theme in general and has received valuable input to the guideline.

The Nordic healthcare providers faced an unprecedented burden during the global COVID-19 pandemic. Access to care and patient information was more

imperative than ever. To achieve better interoperability in the future, the needs for common data content e-Health standards, reference terminologies, data and information models and exchange e-Health standards should be worked with.

There is growing interest in standardization organizations all over the world on the topic of how to reduce healthcare professionals' documentation burden with the help of e-Health standards. Especially Health Level Seven (HL7) has been working with the RCB theme for several years. The RCB initiative is a formal activity in HL7 in a specific Electronic Health Record Work Group (EHR WG). This is one of the inputs for this document, but other aspects and initiatives have also been considered.

Even though much good work is being done to reduce healthcare professionals' documentation burden globally, there are also some distinctive features in the Nordic environments that the Nordic e-health standards group has looked at more closely. It is important to ensure that e-Health standards are not the *cause* of additional burden for health professionals, and that the use of e-Health standards promotes high quality of data for both primary and secondary use. This work is linked to national and international initiatives of the participating Nordic editors and organizations, including European Union Recovery and Resilience Facility.



2. Challenges of electronic health record systems – professional and data quality viewpoints

The intent behind the design of electronic health record (EHR) systems was to facilitate patient care and management but as time progressed, the EHR systems evolved to be used for many additional purposes. Among other things, EHR systems are used to enforce compliance with organizational directives or regulation, collect data for public health purposes, for research and as a source of billing documentation. All these other purposes and requirements on EHR systems have increased the clinicians' burden. Furthermore, there are partially competing needs from different services and stakeholders, sometimes concerning even the same data. All groups must be involved to ensure that these different needs are addressed in a balanced way.

The burden for healthcare professionals includes numerous challenges and stresses that they face in their daily work. The challenges are primarily cognitive in nature and involve cognitive processes, working and long-term memory, comprehension, problem-solving and decision-making, which are all essential and integral aspect of clinical practice. The challenges and stresses can be caused by different situations and include administrative tasks, electronic health records management, increased workload, complex medical cases, emotional toll, and lack of adequate support systems. These can further lead to burnout, reduced job satisfaction, and decreased quality of care for patients. Addressing these problems is important for promoting the well-being of healthcare professionals and ensuring the delivery of high-quality care to patients.

The many different purposes and requirements faced by EHR systems have

increased the healthcare professionals' burden by several mechanisms:

- Information overload
- Documentation burden
- Alert fatigue

Some challenges which create cognitive barrier to accessing and using patient information effectively can be summarised by:

- Lack of standardization
- Interoperability issues, including connectivity between systems
- Data entry errors.

(Patel V.L., Cognitive Challenges in the Use of EHRs. HL7 Working Group on Clinical Burden, Virtual Presentation April 24, 2023).

By focusing on a socio-technical approach on design and implementation of EHRs as to ensure that the user interface is intuitive and easy to navigate will reduce the stress felt by healthcare professionals. Strategies such as simplifying tasks and instructions, providing adequate training and feedback, and minimizing distractions will reduce the extraneous cognitive load. E-Health standards must be able to help with interoperability issues, filtering and showing only relevant information to the clinician and reduce the need for double documentation and data entry errors. (Patel V.L., Cognitive Challenges in the Use of EHRs. HL7 Working Group on Clinical Burden, Virtual Presentation April 24, 2023)

Data quality is increasingly considered as a critical success factor for primary and secondary use of health information^[1]. Data quality in healthcare refers to the completeness, accuracy, timeliness, consistency, and reliability of data collected, stored, and utilized within the healthcare system. High-quality data is crucial for effective healthcare delivery, decision-making, research, and patient safety. Challenges related to data quality are frequently interwoven with healthcare professionals' burden, and often share the same underlying issues - and therefore - often the same solution.

Completeness refers to capturing all relevant data and is essential for a

1. There are different definitions for primary and secondary use of health data. In EHR context, primary use has been defined mainly in relation to services and personnel involved in providing health care and secondary use considers organizational management, health research, innovation, education policymaking, regulatory purposes or supervision. In comparison, some sources such as GDPR regulation define primary use as any purpose for which data is originally gathered, including collection of data specifically for research or supervision.

comprehensive understanding of patient health. However, capturing all relevant data elements can be challenging or impossible due to variations in documentation practices, missing or omitted information, or incomplete data transmission between different healthcare systems. In addition, relevance cannot always be assessed for all possible needs in mind.

Maintaining accurate data is a primary challenge. Errors can occur during data entry, coding, or transcription, leading to incorrect or incomplete information. Inaccurate data can compromise patient safety, lead to inadequate clinical decisions, and impact research or management decision making outcomes.

Consistency refers to the standardization of data across various sources and systems. In healthcare, data consistency can be affected by variations in terminology, coding systems, data formats, or data entry practices. Inconsistencies can lead to difficulties in aggregating and comparing data, hindering accurate analysis, and reporting. Inconsistency also hinders utilization and integration of added-value tools such as clinical decision support.

Timely data capture is crucial for real-time decision-making and patient care. However, delays in data entry, transmission or retrieval can impact the timeliness of information. Outdated or delayed data can result in suboptimal clinical decisions and hinder public health surveillance efforts.

Healthcare organizations often use disparate EHR systems, medical devices and databases that may not seamlessly communicate or exchange data. Lack of interoperability can hinder data sharing, integration, and continuity of care, leading to fragmented and incomplete patient records in healthcare systems.

In addition to exchange of data, semantic interoperability must be considered. Bottlenecks in semantic interoperability are often related to unclear terminology, missing definitions of central concepts or local or organization-specific variations in code systems, for example. The slow adoption of e-Health standards and specifications in (legacy) systems further hinders achieving interoperability on many levels.

Establishing effective data governance frameworks, policies and procedures is crucial for maintaining data quality. Healthcare organizations must define various aspects of standards for data, enforce data quality control measures, provide training, and promote data stewardship to ensure consistent and reliable data across the healthcare system. Addressing these challenges requires a multifaceted approach involving technological advancements, standardized data models, improved documentation practices, enhanced data governance, and collaboration among healthcare stakeholders. It is an ongoing process that requires continuous monitoring, quality assurance, and improvement efforts to ensure reliable and high-quality healthcare data.



3. Role of e-Health standards in the life cycle of specifications and data in healthcare

Standards are specifications for repeated use which are used for setting requirements and providing existing models for products, systems, or services. e-Health standards are used in many different phases of solution development for health and social care information systems (see Figure 1). These systems and solutions are acquired, deployed, and used in various health care settings for clinical and administrative purposes. Systems and solutions are also used for further data collection and many different secondary use purposes such as population health management, organizational management, and research. Testing conformance to specifications may be performed before acquisitions.

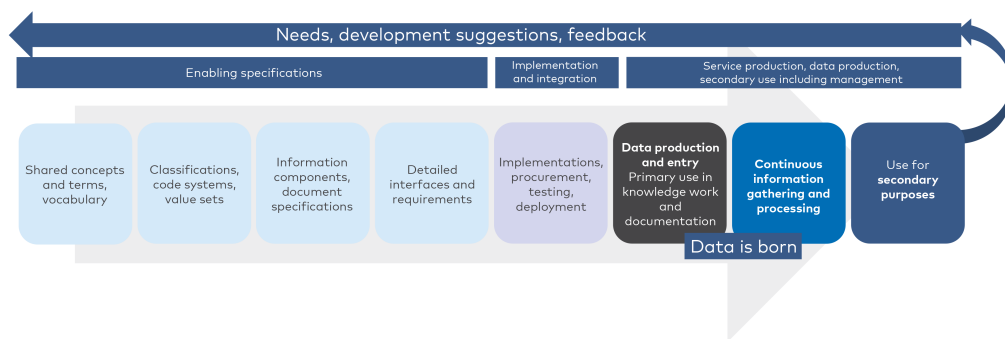


Figure 1. Specifications are the basis for implementation of ICT and EHR systems used in production of health services, as well as data entry, information gathering and data reuse.

It must be noted that the life cycle of *data* begins from use of systems which have already been built and acquired. e-Health standards and specifications are

used in an earlier phase for enabling systems implementation and creation of data. Creation of data or data entry takes place in documentation of health care work or for specific information gathering purposes. Thus, enabling specifications such as e-Health standards have an effect to the features of systems and solutions, as well as data quality.

There are various aspects of ICT solutions in healthcare which are supported by e-Health standards.

e-Health standards that support semantic interoperability include information models and conceptual models, code systems and terminologies, as well as supporting data types. These are utilised in interfaces, structured documents, and systems to give structure and context to data. Standards are implemented in systems which are used to create, process and transfer data. Many e-Health standards for electronic health records deal with these aspects of interoperability. Semantic e-Health standards for terminology, classifications and code systems can be an enabler for shared understanding of concepts as well as content in information which is to be exchanged and reused. A shared understanding between different users has traditionally been perceived as crucial. However, computable semantic interoperability which supports automation and artificial intelligence has been increasingly proposed in recent years.

The emphasis on more and more structured information has been partially driven by classification and automation needs or documentation responsibilities which are not always directly related to immediate needs of health professionals at the point of care. A risk of over-structuring of non-relevant information or requiring information which is perceived to bring little value to the immediate work of professionals has been identified.

In addition to information standards, e-Health standards are available for functional requirements of systems. Use of these standards gives standardized vocabulary and common preconditions for requirements specifications in systems acquisitions by health service provider organisations. Such standards can also be used to provide a clear division of work between subsystems or applications from different vendors. These standards can also be used to refine the scope of requirements to be harmonised across EHR systems in regulation.

Standards are also available for many security aspects of systems, identification of systems and actors, as well as reference e-Health standards for systems architectures and process modelling.

Open and web-based technologies such as XML and JSON are widely used for domain-specific e-Health standards in healthcare.

Many interoperability standards focus on information exchange between

systems and shared information models or terminologies. However, there are also user interface-oriented standards which aim to improve usability of systems, to support single sign-on and to ease navigation between distinct systems or modules, even without directly sharing or exchanging data.

There are also standards initiatives to support uniform presentation of graphical symbols and visual user interface layouts for health information systems. Use of standard terms and glossaries also supports uniform representation in user interfaces which may improve efficiency and usability of systems use.

However, semantic, and technical interoperability between systems and organisations has been the main driver for eHealth standardization. These e-Health standards also support standardized guidelines and knowledge models for healthcare.

Many international standards need further refinement for more specific use cases. This refinement may take place in standards development organizations (on both an international and national level), national authorities, or it may be performed by vendors, just to name a few actors who refine or profile standards.

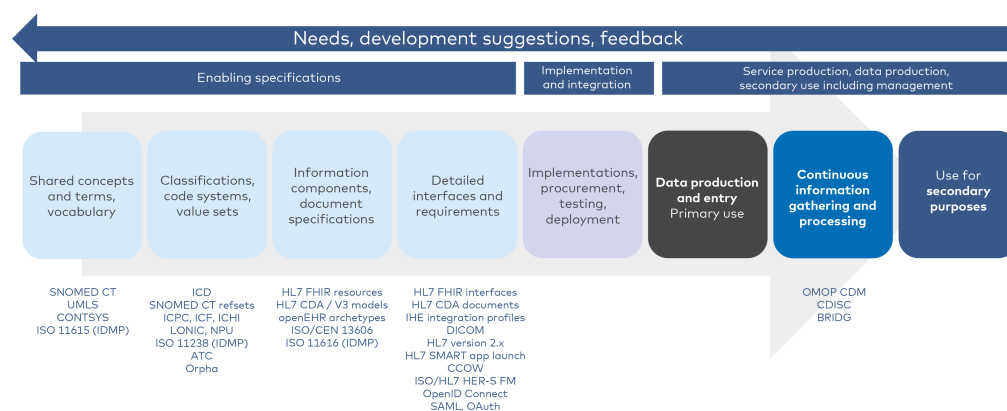


Figure 2. Examples of standards supporting different phases of the life cycle (this is not an exhaustive list of standards)

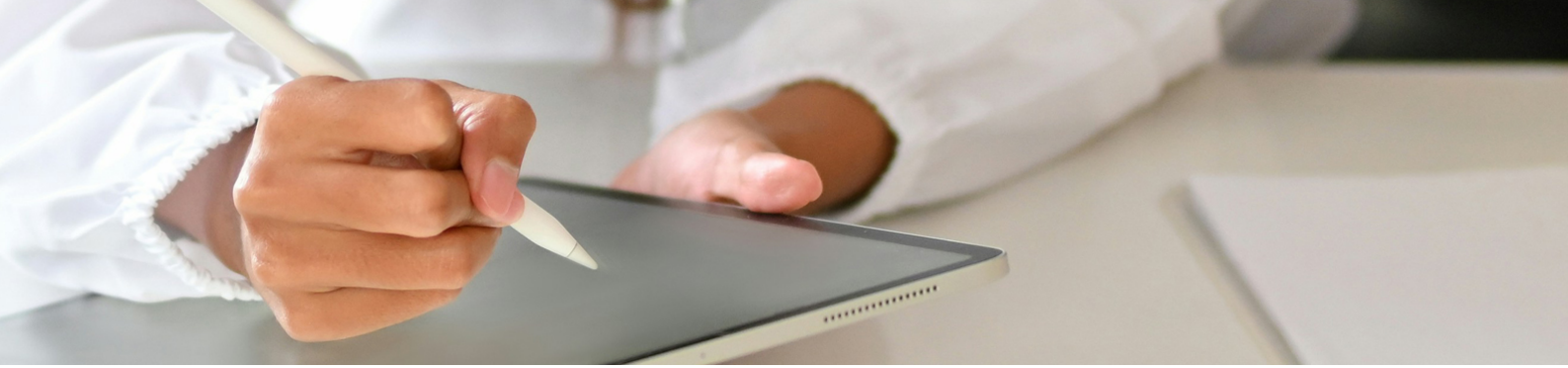
Standardization processes have built-in features for balancing and involving different and – sometimes – even competing interests and groups. The built-in openness and transparency in standardization processes promote trust between different stakeholders.

e-Health standards as enabling specifications, are often not directly visible to users of the systems or data. Despite their relative invisibility however, e-Health standards thoroughly influence many features of the systems and many aspects of data. At its best, a standard promotes high quality of information systems used by professionals and promotes high data quality. Features of the standard may support the daily work of professionals without the standard being visible

to the users of the system. Conversely, problems in the content or application of standards, or problems in some of the requirements of the standards may hinder usability, efficiency, or other aspects of systems. This may further be reflected as problems in data production and may adversely impact user satisfaction, data quality and the daily work of users.

The diligent use of standards in early phases of the overall life cycle of systems should reduce the need for data harmonization and correction in later phases of the life cycle. Knosp (2020) summarizes this well: "Effective data interoperability leads to improved efficiency of methods and processes, improved time from research project design, through trend identification to policy implementation".

In this guideline, we mainly focus on interoperability standards and exclude standards which deal with technical and security aspects, software development processes and generic quality systems.



4. Supporting healthcare professionals' daily work and facilitating better data quality through e-Health standards

e-Health standards are - and should be used - as a solid foundation in patient-centred healthcare. The standards should be used in a way which reduces healthcare professionals' burden in the daily documentation work. There are several other benefits regarding the use of e-Health standards in documentation of patient care. e-Health standards can reduce administrative data entry given that administrative reports may be generated automatically or with reduced re-entry of data using e-Health standards. Healthcare professionals can save time by having the ability to access more complete and comprehensive information in one place. The standards can contribute to less duplication in documentation (semantic interaction ability), more user-friendly designs (for example rules regarding universal design), more automated workflow and in addition simplify quality assurance work and research work (for example, standards can make it easier to retrieve variables).

Interoperability in general can improve communication between care teams across the health systems, improve confidence in decision making and increase the amount of time available spent on direct patient care.

Healthcare professionals' needs

e-Health standards in health care should be developed and used based on healthcare professionals' needs. That means meeting the need for high quality

data for primary and secondary use and supporting healthcare professionals' daily documentation work. However, it is challenging to understand healthcare professionals' needs correctly. In addition, different needs exist for different purposes in both primary and secondary use, and high-quality data for one purpose is not automatically usable or high-quality for other purposes. Healthcare professionals do not necessarily have sufficient knowledge of design or IT technology either.

The teams who are working with usability and user interfaces should be composed of a multiprofessional working group incorporating healthcare professionals, designers, and technologists. One of the most important milestones for working with system usability is to prepare common requirements for system usability.

There are, however, some challenges like high dependencies on contexts, different roles and user preferences. Those require a thorough understanding of the task that should be supported. In addition, the usability features and the user interface are often system specific. Therefore, it is important that teams who will work with system usability and user interface spend adequate time together to create supportive collaboration between all participants in the initial phase of the work. The team should also spend time on a good system design that combines clinical, cognitive, and clinical workflow needs.

e-Health standards' effects on usability

As mentioned earlier, it is challenging if data entry must be duplicated or repeated. It is frustrating for healthcare professionals in an already busy work situation. Valuable patient time is wasted if same information elements must be re-entered in different data systems. It can also have a negative effect on patient treatment. E-Health standards aim to ensure data exchange between systems and reduce duplicate data entry. The national infrastructures are also helpful in ensuring data is retrievable and accessible using common e-health standards. The repeated collection of data for secondary use should (as far as possible) be incorporated as a part of primary data entry, instead of being an act of separate data collection.

One of the challenges is that the code systems are reflected in user interfaces with poor usability for data entry. The solution can be to use "smart search", based on commonly agreed metadata (e.g., automatically performing keyword searches for related word and synonyms of the original query), supported by standard terminologies, synonyms, and standardized use of terminology services.

Rigid information structures with many mandatory elements are also challenging for usability. One solution can be to separate mandatory information elements from optional ones in specifications, including in

implementation guidelines of e-Health standards. It is also possible to design flexible user interfaces and mappings between vocabularies which may improve usability and flexibility in data entry, instead of forcing the user to use only one coding system.

e-Health standards' effect on user know-how and motivation

The challenge is that there are varying levels of professional documentation and data entry, misunderstandings, and use of abbreviations in data entry.

Healthcare professionals' needs and requirements should always be viewed as a starting point in the specifications and implementation guides of e-Health standards. The guidelines for professionals for data entry are needed. A common professional education, with a focus on increasing the knowledge about benefits of e-Health standards, of everyone who participates in the work. In addition, collaboration with healthcare professionals by arranging network meetings and e-forums may be considered. Economic rewards for high-quality data entry can also be considered as a part of healthcare professionals' salaries.

Increasing the knowledge about e-Health standards can contribute to increased motivation among healthcare professionals.

e-Health standards' effect in information systems and applications

User interfaces are unfortunately sometimes perceived as clumsy and counterintuitive. Good user interfaces and high-quality data are a competitive advantage for systems. Features of systems should be developed to encourage high-quality data entry. An example would be in-built reminders or proposing the right codes based on synonyms. Systems can access data and vocabularies through standards-based interfaces. It is advantageous if the features of systems reward immediately for high-quality data entry (decision support, comparison with similar patient cases). These features can be considered in addition to speech recognition or natural language processing. As an example, the identification of SNOMED CT terms from transcribed text or mapping to codes for symptoms and diagnoses could be helpful.

Data quality

Technical and conceptual quality of data contributes to the practical quality and usefulness of data. E-Health standards contribute to data capture, storage and sharing, as well as data quality across the entire life cycle of data.

E-Health standards' effect on data quality

Interoperability e-Health standards are a key prerequisite to the *availability* of data from multiple sources, across systems and organizations. This is a prerequisite for both primary and secondary use of information. It also enables data quality properties such as completeness, accuracy, timeliness, consistency, and reliability.

Completeness:

- In-care activities and service provision (primary use), availability of patient-level data through interoperability e-Health standards are an enabler for improved completeness of patient data for clinical decision making. E-Health standards must be used to relieve challenges related to unavailable or incomplete data.
- In secondary use such as health services management, public health surveillance and research, availability of data through interoperability e-Health standards promote completeness across populations, organizations, and systems.

Accuracy:

- Structured data as well as well-defined code systems and terminologies are used for accurate representation of semantic meaning of data. This contributes to correct interpretation of data in clinical care decisions by professionals and reliable automated decision support, including artificial intelligence.
- Coherent semantic e-Health standards used across different organizations and populations provide accuracy which supports comparability and consistency for decision making or research.
- Interoperability e-Health standards promote validation of data and testing of solutions in relation to desired quality level of data and gradual improvement of key elements.

Timeliness:

- e-Health standards for interoperability are utilized to support timely availability of relevant data for care decisions. Timely availability of patient-specific historical and status data promotes high-quality care and patient safety.
- Availability of timely information for secondary use, e.g., management of

health services makes it possible to make decisions based on up-to-date understanding of current situation regarding needs of patients and situation in service provision.

Consistency:

- Consistency of data enforced by e-Health standards for interoperability across individuals and systems enables clinical decision support and population-level recommendations in care of individual patients.
- In secondary use, consistency of data through e-Health standards enable comparability of data across time and across organizations. This is crucial in understanding the trends in population health and service provision which are needed for policy and resource decisions.

Reliability:

- E-Health standards promote uniform and accurate data capture which together with timely availability provide basis for reliable information which directly affects the quality and safety of patient care. E-Health standards also support traceability of data across its life cycle which is needed for assessment of reliability of data.
- In health care management and research, reliable information about patient needs, resource utilization and operational performance supports effective resource allocation, development of appropriate policies and procedures, identification of areas for improvement, and development of effective interventions and treatments.



5. Roles of actors in development and use of e-Health standards

There are various actors related to the development and use of e-Health standards. Many of these actors are key stakeholders in the development and use of standards and solutions or products based on e-Health standards.

Actor type	Examples	Tasks related to e-Health standards
E-Health standards development organizations (SDOs)	ISO, CEN, HL7, SNOMED International, DICOM, WHO FIC, IHE, etc.	Development of e-Health standards Standardization of health information requires a combination of technical and health care expertise.
System developers and vendors	DIPS, Visma, Cambio, UNA, Esko Systems, Mediconconsult, CGI, TietoEVERY, Cerner, Epic, etc.	Data experts offer critical subject matter expertise and support to development of systems and products. Use of e-Health standards in products Participation in e-Health standards and implementation guide development

Health professionals and health professional organizations	Doctors, nurses, midwives, physical therapists, pharmacists etc.	Use of systems Participation in requirements specifications for systems Participation in e-Health standards development.
Health service provider organizations	Hospital management, health region management, health region ICT management	Funding of acquisitions Integration of systems Use of systems which utilise e-Health standards
Patients and patient organizations	Patients, clients, users, inhabitants	User needs must be captured Use of systems
National authorities	Swedish eHealth agency (E-hälsomyndigheten), Finnish Institute for Health and Welfare (THL), Norwegian Directorate of Health (Helsedirektoratet), Directorate of Health (Embætti landlæknis), Danish Health Data Authority (Sundhedsdatastyrelsen)	Steering and legislation Research partnership? Define and publish standardized data models, terminologies, code systems and respective values sets for each defined data set. Adopt or adapt international e-Health standards for use in Nordic countries. Promote Nordic requirements to be reflected in these international e-Health standards. Development or steering of implementation guides. Cooperation with each other. Engage with and learn from other countries that have a proven track record of advancing e-Health standards.



6. Recommendations and principles for use and development of e-Health standards

Recommendations and principles, in this guideline, are limited to apply in improving the data quality and how to support the daily work and reduce burden of healthcare professionals. They are particularly aimed at actors mentioned in chapter 5.

Principles include general aspects which should be followed by many different stakeholders, and which are applicable across many different activities related to the development and use of standards. They are foundation for more detailed recommendations.

Recommendations focus on more specific activities or stakeholder groups, and they should be actionable.

Principles
e-Health standards should be developed and used based on healthcare professional's needs
Use-case driven development and profiling of standards, reusing standards across different standards organizations and countries to fulfil concrete needs of users
Once only principle – avoid repeated data entry whenever possible
There is no reuse without use – develop and utilise e-Health standards to reward good data entry immediately to the user, e-Health standards should support both documentation and efficient (re)use of information in healthcare professionals' daily work and effortless workflows

eHealth standards should be developed and used to foster better data quality
Promote common metadata which supports efficient search of information for users (findability, accessibility, interoperability, reuse - FAIR).
Reuse of data in primary and secondary use enabled by e-Health standards reveals quality improvement needs and provides incentives for quality improvement
High quality data for one purpose may be poor quality for another purpose – use features of e-Health standards to enforce quality level of specific sets of data
Identify the most relevant use cases for secondary use of e-Health standards and support them already in the development and selection of e-Health standards for primary use but acknowledge the primary use and usability risks: the secondary purposes should not “take over”

Recommendations for:

General recommendations for all actors

- Specify desired **outcomes** in the development and use of standards.
- Reduce healthcare professional data entry effort - **reuse** and **automation**.
- Use and integrate semantic standards to promote **understandability of data** (explanations of concepts, terms, code values etc.) and visual presentation-oriented standards for improving consistency in user interfaces of systems.
- Educate and train health professionals for **high quality data entry and reuse of information** enabled by standards instead of educating content of standards.
- Promote e-Health standards which are **clear in scope**, and which provide understandable content and **practical** path towards implementation.
- Collaborate and coordinate the development and re-use of e-Health standards across **different types of participants** with diverse know-how.

Health professionals and health professional organisations

- Define system usability and user interface requirements in terms of **user goals** in system acquisitions and projects and make use of e-Health standards which support these goals such as data availability and usability.
 - o Capturing user needs as well as feedback from systems, and understanding workflow of health professionals may require more than

surveys: observation of real world data, complemented by interactive discussion of practical goals of users.

- Propose and define clear **requirements in terms of desired outcomes** to system developers and standards developers for improving the systems and e-health standards.
 - Desired outcomes should be defined for example in terms of health outcomes, effectiveness of workflows, and data quality
- Participate in the development of semantic e-Health standards to promote **understandability** of data
 - For example, definitions and explanations of terms, concepts, and classifications

Health service provider organisations

- Involve healthcare professionals and patients in **requirements process** for procurements.
- Acquire systems which **demonstrably use e-Health standards**, for example
 - supporting clear semantic understanding by users and provide usability benefits
 - supporting reuse of data instead of repeated data entry
 - supporting fluent workflow for users
 - supporting flexible systems which may reuse modules from different vendors in an ecosystem of applications to support responsiveness to change and incremental innovation
- Set gradual improvement goals for data quality and utilise e-Health standards for interoperability to **assess data quality through key indicators**
- Consider **rewards for high data quality** (for users and solution providers)
 - For example, immediate feedback and decision support from good data entry, salary compensation

Patients and patient organizations

- **Participate** in SDO's and projects who are working with e-Health standards
- Give **feedback** about the usability of the digital services for patients and the systems used by professionals, who are using e-health standards.

System developers and vendors

- Build user interfaces and use standards for **reuse of data** to **minimise repeated data entry** and support **efficient retrieval and visualization of meaningful data** – limit the burden of professionals – aim at less data but more meaningful, enabling “drilling down” to details.
- Support use of **standardized terminologies and synonyms**, e.g., using terminology services and mappings which can also be standardized.
- **Make data available** and reusable in a standardized format and using open interfaces based on e-Health standards, to enable smart user interfaces including automation of repetitive tasks and decision support.
- Move from data entry and documentation **towards supporting the workflow** of the professionals (correct and minimized information at right point of time, reminders, possibility to find details only when necessary etc.).
- Build features in systems which help assessing data completeness, accuracy, timeliness, consistency, and reliability, by identifying key data from structured information standards and providing clear **quality indicators** for these data.

SDO's

- **Involve health professionals** to agree on scope, terminology and use cases or high-level business requirements of standards.
- Involve relevant stakeholders, especially professionals and vendors, in **balanced** way, **throughout** the standards development process.
- Consider how any standard development working item affects or supports the needs of the user and data quality, aiming for relevance and “good enough” instead of complete coverage of all possible variations.
- **Collaborate across SDOs**, utilising strength of each SDO – standards should be complementary across SDOs to support real life use cases in health care (availability / information exchange, semantics, processes, workflows, usability, quality).

National authorities / governments

- **Monitor, evaluate, recommend, and mandate** standards which support **fluent workflow** for professionals. Refine generic standards through user goals, use cases and scenarios.
- Utilize standards for guidelines and instructions to support **high-quality data entry** and consider how high-quality in data is rewarded (economic rewards to service providers or through improved feedback or functionality to users, etc.).
- Support **innovations in an open ecosystem** between different types of stakeholders (vendors, professionals) using e-Health standards as a cohesive factor.
- **Co-operate with other governments** on Nordic and European level to advance e-Health standards towards improved usability and data quality. Learn from other countries that have a proven track record of using e-Health standards to reduce clinician burden.
- Select shared, **international quality metrics** for both data capture and utilization, and make use of interoperability e-Health standards to achieve desired data quality.

References

- Cato K, Chen R, Collins Rossetti S, Lucas E, Moy A, Sadri S, Schwartz J, . Measurement of clinical documentation burden among physicians and nurses using electronic health records: a scoping review. *Journal of the American Medical Informatics Association*, Volume 28, Issue 5, May 2021, Pages 998–1008, <https://doi.org/10.1093/jamia/ocaa325>
- Chan A, Dillon E, Frosch D, Lee T, Li J, Meehan A, Nauenberg T, Nordgren R, Steinberg R, Tai-Seale M, Yang Y. Physicians' Well-Being Linked to In-Basket Messages Generated by Algorithms in Electronic Health Record. *Health Affairs* 38, NO. 7 (2019): 1073–1078, [10.1377/hlthaff.2018.05509](https://doi.org/10.1377/hlthaff.2018.05509) [Physicians' Well-Being Linked To In-Basket Messages Generated By Algorithms In Electronic Health Records | Health Affairs\[CJHJ1\]](https://doi.org/10.1377/hlthaff.2018.05509)
- Gartland A, Jenkins N, Khanna N, Merlo L, Nguyen O, Shah S, Turner K. A systematic review of contributing factors of and solutions to electronic health record–related impacts on physician well-being. *Journal of the American Medical Informatics Association*, Volume 28, Issue 5, May 2021, Pages 974–984, <https://doi.org/10.1093/jamia/ocaa339>
- HL7 Electronic Health Records Work Group. Reducing Clinician Burden (RCB). HL7 Electronic Health Record Confluence site. 2023. <https://confluence.hl7.org/display/EHR/Electronic+Health+Records+Work+Group> [CJHJ2] <https://confluence.hl7.org/download/attachments/104568480/VLPatel-HL7%20WG--Clinical%20Burden-April%2024-2023.pdf?version=1&modificationDate=1682442234316&api=v2> [CJHJ3]
- Knosp B, Chute CG, O'Keefe L, Madlock-Brown C, Volz A. Chapter 6: Understanding Data Harmonization. In: *Informatics playbook, a CD2H project*, 2023.
- Li C, Parpia C, Sriharan A, et al. Electronic medical record-related burnout in healthcare providers: a scoping review of outcomes and interventions. *BMJ Open* 2022;12:e060865. doi: 10.1136/bmjopen-2022-060865.
- Martikainen S, Kaipio J, Lääveri T. End-user participation in health information systems (HIS) development: Physicians' and nurses' experiences. *International Journal of Medical Informatics*, 137, 104-117. (2020).
- Patel V.L. Cognitive Challenges in the Use of EHRs. HL7 Working Group on Clinical Burden, Virtual Presentation April 24, 2023.

Patel, V.L., Arocha, J.F. & Kaufman, D.R. (1994) Diagnostic Reasoning and Expertise. *The Psychology of Learning and Motivation: Advances in Research and Theory*, 31, 137-252.

[Reducing Clinician Burden \(RCB\) - Electronic Health Records - Confluence \(hl7.org\)\[CJHJ4\]](#)

V.L. Patel, D. Kaufman & T. Cohen (Eds) (2014) *Cognitive Informatics in Health and Biomedicine: Case Studies on Critical Care, Complexity and Errors*. Springer (London, UK).

Ye J. The impact of electronic health record-integrated patient-generated health data on clinician burnout. *Journal of the American Medical Informatics Association*, Volume 28, Issue 5, May 2021, Pages 1051–1056, <https://doi.org/10.1093/jamia/ocab017>

Yan Q, Jiang Z, Harbin Z, Tolbert PH, Davies MG. Exploring the relationship between electronic health records and provider burnout: A systematic review. *Journal of the American Medical Informatics Association*, Volume 28, Issue 5, May 2021, Pages 1009–1021, <https://doi.org/10.1093/jamia/ocab009>

About this publication

Supporting the healthcare professionals' work and data quality through e-Health standards

Manne Andersson, Minna Maria Hernandez, Juha Mykkänen

TemaNord 2024:514

ISBN 978-92-893-7799-7 PDF

ISBN 978-92-893-7800-0 ONLINE

<http://dx.doi.org/10.6027/temanord2024-514>

© Nordic Council of Ministers 2024

Cover photo: iStockphoto

Published: 4.3.2024

Disclaimer

This publication was funded by the Nordic Council of Ministers. However, the content does not necessarily reflect the Nordic Council of Ministers' views, opinions, attitudes or recommendations.

Rights and permissions

This work is made available under the Creative Commons Attribution 4.0 International license (CC BY 4.0) <https://creativecommons.org/licenses/by/4.0>.

Translations: If you translate this work, please include the following disclaimer: This translation was not produced by the Nordic Council of Ministers and should not be construed as official. The Nordic Council of Ministers cannot be held responsible for the translation or any errors in it.

Adaptations: If you adapt this work, please include the following disclaimer along with the attribution: This is an adaptation of an original work by the Nordic Council of Ministers. Responsibility for the views and opinions expressed in the adaptation rests solely with its author(s). The views and opinions in this adaptation have not been approved by the Nordic Council of Ministers.

Third-party content: The Nordic Council of Ministers does not necessarily own every single part of this work. The Nordic Council of Ministers cannot, therefore, guarantee that the reuse of third-party content does not infringe the copyright of the third party. If you wish to reuse any third-party content, you bear the risks associated with any such rights violations. You are responsible for determining

whether there is a need to obtain permission for the use of third-party content, and if so, for obtaining the relevant permission from the copyright holder. Examples of third-party content may include, but are not limited to, tables, figures or images.

Photo rights (further permission required for reuse):

Any queries regarding rights and licences should be addressed to:
Nordic Council of Ministers/Publication Unit
Ved Stranden 18
DK-1061 Copenhagen
Denmark
pub@norden.org

Nordic co-operation

Nordic co-operation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and the Faroe Islands, Greenland and Åland.

Nordic co-operation has firm traditions in politics, economics and culture and plays an important role in European and international forums. The Nordic community strives for a strong Nordic Region in a strong Europe.

Nordic co-operation promotes regional interests and values in a global world. The values shared by the Nordic countries help make the region one of the most innovative and competitive in the world.

The Nordic Council of Ministers
Nordens Hus
Ved Stranden 18
DK-1061 Copenhagen
pub@norden.org

Read more Nordic publications on www.norden.org/publications