Intelligent Health Systems – From Technology to Data and Knowledge
E. Andrikopoulou et al. (Eds.)

doi:10.3233/SHTI250429

Preparing for ICD-11: Exploring the Current Use of ICD-10 in Dutch Hospital Mortality and Morbidity Coding

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Abstract. The healthcare sector uses the International Classification of Diseases (ICD) to record and analyze mortality and morbidity, as well as to monitor public health, reimbursement, quality measurement, and clinical decision support. This paper explores the use of ICD-10 in Dutch hospital care and discusses how this could inform the transition to ICD-11. The study conducts a rapid literature review along semi-structured interviews with key stakeholders. A model is created to visualize the current use of ICD-10 mortality and morbidity data streams in hospitals. The results indicate that ICD-10 serves an important function for clinical, financial, and epidemiological purposes in the Netherlands. To ensure a smooth transition to ICD-11, stakeholder collaboration, investment in AI-tools, training of users, technical integration with Electronic Health Record (EHR) systems, improved hospital registration, and alignment with SNOMED CT are important. This paper emphasizes the need for further research into the practical implementation of ICD-11 in the Netherlands and its impact on patient-related outcome measures.

Keywords. ICD-10, ICD-11, International Classification of Diseases, Dutch healthcare

1. Introduction

The International Classification of Diseases (ICD) is considered the primary source of mortality and morbidity statistics and is developed by the World Health Organization (WHO). It is used in the healthcare sector for coding and documentation of health information. The 10th revision, ICD-10, is currently used in the Netherlands. It is essential for many aspects of healthcare, such as clinical records, processing insurance claims, epidemiological research, and the creation of health policies [1].

However, the global health community is moving towards the use of ICD-11, which offers more detailed and extensive coding options compared to its predecessor [2]. ICD-11 must be adequately translated and examined before being adopted in the Netherlands; therefore, the existing use of ICD-10 in the Netherlands must be addressed [3]. This

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paper aims to describe the current role of ICD-10 in Dutch hospital care and how this informs the implementation of ICD-11.

2. Methods

To identify the current use of ICD-10 in hospital care, a rapid literature review has been conducted. In the literature review, academic studies (n=1), articles (n=8), and policy documents (n=1) that describe the integration of ICD-10 into aspects of the Dutch healthcare system were included. The literature served as basis for expert interviews with Dutch ICD-10 stakeholders.

In collaboration with the Ministry of Health, Welfare, and Sports, key stakeholders were identified. The stakeholders were identified based on their involvement with ICD-10 across various segments of the healthcare system, ranging from clinical settings to insurance, public health and policy making. As a result of the collaboration, a variety of information was collected from both technical and operational aspects of the use of ICD-10 in Dutch hospital care.

A total amount of 8 interviews were conducted. This included 1 medical coder from the Amsterdam UMC, and 7 people (p) from 4 stakeholder organizations, divided as follows:

- CBS – Statistics Netherlands (p=1)
- RIVM – National Institute of Public Health and the Environment (p=3)
- DHD – Dutch Hospital Data (p=1)
- NZa – Dutch Health Authority (p=2)

The interviews were semi-structured and conducted online. Three main questions were asked: “For what and how does your organization use ICD-10?” (1), “ICD-11 will (eventually) come to the Netherlands, what impact does this have on your organization’s data and work?” (2), and “Is your organization taking preparatory measures?” (3). The duration of the interviews varied according to the topics discussed, ranging from 30 minutes to an hour. The interview results were anonymized and used to model ICD-10 data streams in Dutch hospital care. The resulting model was validated in collaboration with the stakeholders.

3. Results

3.1. Literature Review

The literature highlights that healthcare providers such as hospitals and physicians rely on ICD-10 for clinical documentation. One article from the Federation of Medical Specialists (FMS) [4], one article and one policy document from the Dutch Healthcare authority (NZa) [5,6] discuss the obligation of recording diagnoses and treatments. This information should be registered through Diagnosis Treatment Combinations (DTCs). Hospitals are required to deliver DTCs to NZa.

Furthermore, a diagnosis thesaurus is available in a tool called T-REX [7], which is owned by Dutch Hospital Data (DHD). Through the diagnosis thesaurus it is possible to

map clinical terms to ICD-10, DTC and SNOMED CT. When a medical professional enters terms from the diagnosis thesaurus in the Electronic Health Record (EHR), the corresponding DTC and ICD-10 diagnosis require only confirmation [4]. DHD also provides the National Basic Registration for Hospital Care (LBZ) [8]. The LBZ consists of a medical and a financial stream. The medical stream records data on the care provided to the patient, per care moment. The financial stream is used to deliver DTCs to NZa. These streams are limited to specialized medical care.

Statistics Netherlands (CBS) and the National Institute of Public Health and the Environment (RIVM) use ICD-10 for mortality coding and epidemiological surveillance [9]. Certain cases of infectious diseases need to be reported via the Municipal Health Services (GGD) and RIVM to European Centre for Disease Prevention and Control (ECDC) and WHO [11].

3.2. Stakeholder Interviews

The interviews resulted in in-depth information on the current use of ICD-10 in the Netherlands and perceived challenges regarding ICD-11 implementation.

At CBS the focus is on using ICD-10 for mortality statistics. Since 2013, a program called IRIS has been automatically coding causes of death in ICD-10. With the transition to ICD-11, which consists of more codes, the challenge is the limited automation rate (60%) and the potentially high workload for manual coding. For the implementation of ICD-11 automated tools such as IRIS are essential, as well as accurate translation and alignment with ICD-10, led by RIVM. The biggest risks are the complexity of the extensive coding and the required adjustments in ICT and training. This requires temporary duplication of administration, and a phased approach is important.

RIVM uses ICD-10 to develop information products that support policy and education. The management of ICD is intensive due to translations, and alignment with SNOMED CT will be important when transitioning to ICD-11. The challenges are the translation and validation process, but clear phasing and communication with other stakeholders can mitigate these risks.

At DHD ICD-10 plays an important role in information products such as the LBZ, Hospital Standardized Mortality Ratio (HSMR), as well as reference sets such as the diagnosis thesaurus. AI-based automatic coding tools and better integration with SNOMED CT are required for the transition to ICD-11. The risk lies in dependence on AI quality and user training, but this can be reduced through close collaboration with stakeholders and improving hospital registration.

The role ICD plays at the NZa is limited. Main admission diagnoses are used for linkage to DTC systems. Key desires for ICD-11 are better hospital registration and integration with SNOMED CT. Risks lie in the complexity of care pathway registration and privacy issues. Mitigating measures include close collaboration with other parties such as RIVM and DHD and leveraging AI-tools to derive diagnoses.

The interviews resulted in six general necessities for successful ICD-11 implementation: stakeholder collaboration, investment in AI-tools, user training, technical integration with EHR systems, improved hospital registration, and alignment with SNOMED CT. Stakeholder collaboration was mentioned by all organizations. Investment in AI-tools and alignment with SNOMED CT was mentioned by three organizations, and user training, technical EHR integration, and improved hospital registration were mentioned by two organizations each.

3.3. ICD-10 Data Streams in Dutch Hospital Care

A model is created to visualize the ICD-10 data streams in Dutch hospital care. The model shows the mortality and morbidity data streams, based on the EHR in a hospital.

Physicians register diagnoses and DTCs via terms from the diagnosis thesaurus and register causes of death via discharge letter. Via the diagnosis thesaurus, terms can be mapped to ICD-10 and SNOMED CT. In case of certain infectious diseases, these need to be reported via GGD and RIVM to ECDC and WHO. The DTCs need to be provided to the DTC Information System (DIS) of NZa though the LBZ financial stream [5].

Data about hospitalizations must be registered in LBZ medical. Medical coders record the main and subsidiary diagnoses of hospitalizations in ICD-10. Hospitals submit this coded data monthly to DHD. CBS uses LBZ for CBS hospitalization statistics in national and international statistics, as well as to calculate the HSMR.

ICD-10 is also used for mortality statistics. CBS uses ICD-10 coding to classify causes of death [9]. Physicians are involved in this process to certify deaths with detailed diagnoses by discharge letter if the patient is deceased during hospitalization. In this situation, the medical coder registers the ICD-10 diagnosis that led to death from the discharge letter. The coroner fills in a cause of death form, which is digital or via the municipality send to CBS. CBS codes these data and derives the underlying cause of death in ICD-10. The resulting data are used for national and international statistics that contribute to public health efforts and reports to organizations such as WHO, Organization for Economic Co-operation and Development (OECD) and Eurostat [9,10]. To achieve uniformity, international organizations also share and compare data among each other. Figure 1 shows the high-level ICD-10 mortality and morbidity data streams in Dutch hospital care.

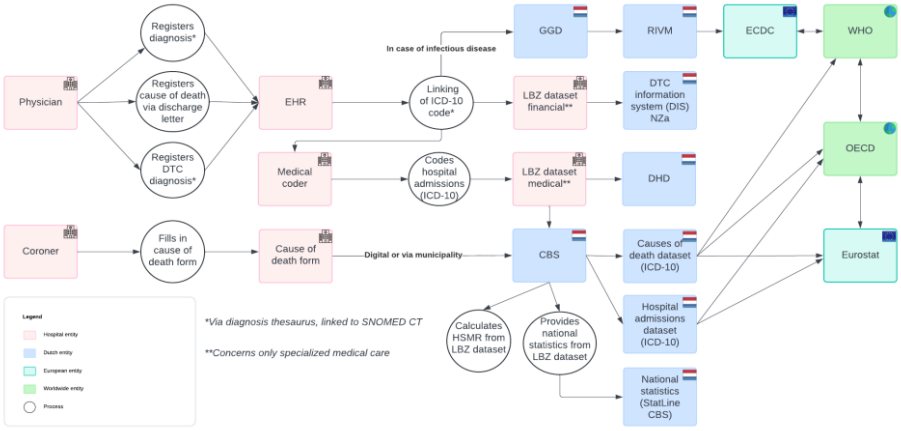

Figure 1. High-level ICD-10 data streams in Dutch hospital care

4. Discussion

This study explored ICD-10 data streams in Dutch hospital care. It demonstrated the importance of these dataflows for clinical recording, mortality coding, and billing. As indicated by the interview participants, the need for collaboration, as well as lack of alignment with SNOMED CT could hamper the transition to ICD-11. The same applies

for technical integration of ICD-11 in the existing EHR systems, limited automation tools, quality of data registration, need for training and a phased approach to ICD-11. These findings are in line with WHO transition guide [3].

The strength of the study is the qualitative approach, in which insights are derived from literature and interviews with different stakeholders. However, a limitation is the limited scope of stakeholders, which has left out the perspectives of other providers regarding the challenges of ICD-11 implementation in the Netherlands. The study offers unique and integrated insights into the Dutch hospital context. Unlike other studies focusing on clinical settings, it includes public health and financial perspectives.

The transition to ICD-11 will require investment, training and system integration, especially for alignment with SNOMED CT. Policymakers should focus on preparing healthcare workers and improving infrastructure to ease the transition.

Further research should focus on integration of ICD-11 with current systems, the perspectives of other organizations that have roles regarding ICD, and the long-term impact on healthcare outcomes. Proactive planning and stakeholder engagement are critical to ensuring that the transition improves clinical care, public health reporting, and operational efficiency across the Dutch healthcare system.

5. Conclusions

The study highlights the crucial role ICD-10 plays in Dutch hospital care for clinical, financial, and epidemiological purposes. A high-level model about Dutch ICD-10 hospital data streams is created to visualize the current role of ICD-10 in Dutch hospital care in the Netherlands. According to stakeholder interviews, stakeholder collaboration, investment in AI-tools, user training, integration with EHR systems, improved hospital registration, and ICD-11 alignment with SNOMED CT are all crucial to a successful transition to ICD-11. Further research is required to address these challenges and facilitate the adoption of ICD-11 in the Dutch healthcare systems.

References

[1] World Health Organization Collaborating Centre for the Family of International Classifications (FIC) in the Netherlands. ICD-10: International classification of diseases and related health problems. 2021. Available from: WHOFIC
[2] Harrison JE, Weber S, Jakob R et al. ICD-11: an international classification of diseases for the twenty-first century. BMC Med Inform Decis Mak 21 (Suppl 6):206;2021. doi: 10.1186/s12911-021-01534-6
[3] World Health Organization. ICD-11 implementation or transition guide. 2019. Available from: ICD-11 transition guide (PDF)
[4] Federatie Medisch Specialisten. Registratie ICD-10 verantwoordelijkheid medisch specialist. 2015. Available from: Registratie verantwoordelijkheid medisch specialist
[5] Informatieverplichting ICD-10 - CI/15/13c - Nederlandse Zorgautoriteit. Overheid.nl. 2015. Available from: Informatieverplichting
[6] NZa. Gegevens aanleveren. 2023. Available from: Gegevens aanleveren
[7] DHD. DHD - T-Rex. Trex.dhd.nl. 2024. Available from: T-REX
[8] DHD. Gebruikershandleiding Landelijke Basisregistratie Ziekenhuiszorg (LBZ). 2024 February. Available from: LBZ handleiding (PDF)
[9] CBS. Doodsoorzakenstatistiek. Centraal Bureau voor de Statistiek. 2018. Available from: Doodsoorzakenstatistiek
[10] CBS Statline. Opendata.cbs.nl. 2024. Available from: StatLine
[11] Meldingsplicht infectieziekten — RIVM. Rivm.nl. 2024. Available from: Infectieziekten