

# Leaving the Walkman and ICD-9 Behind: Modernizing the Disease Classification System Used by Canadian Physicians

Abandonner le baladeur et la CIM-9 : modernisation  
du système de classification des maladies utilisé par les  
médecins canadiens



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## Abstract

The International Classification of Diseases, Ninth Revision (ICD-9) was released in the 1970s and adopted in Canada for physician billing claims in 1979 (CIHI n.d.b.; WHO & International Conference for the Ninth Revision of the International Classification of Diseases 1977). ICD-9 is no longer adequate for representing our modern healthcare environment and patient needs. We summarize the findings from a small survey of ICD-9 users across Canada – such as family physicians, researchers and decision makers – who describe the limitations of ICD-9 and the features that they would desire in a new or updated classification system.

## Résumé

La neuvième version de la Classification internationale des maladies, neuvième révision (CIM-9) a été publiée dans les années 1970 et adoptée au Canada, en 1979, pour les demandes de paiement faites par les médecins (CIHI n.d.b.; WHO & International Conference for the Ninth Revision of the International Classification of Diseases 1977). La CIM-9 ne correspond plus à l'environnement actuel des soins de santé ni aux besoins des patients. Nous résumons les résultats d'un bref sondage auprès d'utilisateurs de la CIM-9 au Canada, soit des médecins de famille, des chercheurs et des décideurs. Les répondants décrivent les limites de la CIM-9 et présentent les caractéristiques qu'ils souhaiteraient voir dans un système de classification renouvelé ou mis à jour.

## Overview

Physicians in Canada are required to use the International Classification of Diseases, Version 9 (ICD-9) for submitting billing claims to provincial/territorial governments to obtain reimbursement for medical services or for shadow billing (WHO & International Conference for the Ninth Revision of the International Classification of Diseases 1977). The coded claims are made available as an administrative database, which is widely used for secondary purposes, such as research, surveillance, costing and policy decision making (Quan et al. 2012). ICD-9 was implemented in Canada beginning in 1979 (CIHI n.d.b.), the same year the Sony Walkman was released, which, for the first time, allowed us to listen to cassette tapes while on the move (Sony Global 1999). The next version of ICD (International Classification of Diseases, Tenth Revision [ICD-10]) was implemented across Canada beginning in 2001 for reporting in hospitals and facility-based ambulatory care (Walker et al. 2012), but ICD-9 continues for physician billing. Similar to its now-defunct contemporary, ICD-9 is long outdated.

The latest version – International Classification of Diseases, 11th Revision (ICD-11) – was recently released by the World Health Organization (WHO) and is available for worldwide implementation (WHO 2019). Canada has begun preparations for the eventual adoption of ICD-11 in hospitals (CIHI n.d.a.), but the decision to replace ICD-9 for physician billing has yet to be made. While this choice and the subsequent implementation of a new classification is the responsibility of each provincial and territorial government as updates to their

diagnostic coding requirements for billing, other stakeholders are also critical to the process. The Canadian Institute for Health Information (CIHI) sets national recommendations for the adoption of new classification systems and ensures that they are evaluated for a Canadian context. Healthcare providers who submit billing claims and those who use or administer these codes in analyzing, managing and evaluating health systems should be consulted in order to select an appropriate system and support an efficient, well-informed transition to it. This is a timely opportunity to engage these stakeholders in the discussion around the importance and benefit of replacing ICD-9 with a modern, clinically relevant classification system.

Using a non-representative convenience sample of individuals across Canada with the knowledge and/or experience of the ICD-9 system, our team conducted a short online survey between October and December 2020 to obtain feedback on their use of and satisfaction with ICD-9 (approved by the University of Calgary Conjoint Health Research Ethics Board [REB20-1494]). In this paper, we use the findings from this survey to discuss why it is imperative to shift away from ICD-9 and outline future considerations for a new system.

### *ICD-9 is inadequate for today's healthcare system*

ICD was originally created in the late 1800s as a way to classify causes of death; subsequent versions evolved to incorporate morbidity coding designed for use in hospitals (WHO 2021). Hence, it is not surprising that ICD-9 lacks codes for early disease states, for disease complexity or severity and for many conditions that were not formally defined in earlier years (e.g., fibromyalgia, body dysmorphic disorder, metabolic syndrome, newly differentiated viruses). In addition, some of the terminology used in ICD-9 is archaic and unacceptable (e.g., mental retardation, impotence of organic origin, sexual deviations and disorders).

The legacy of ICD development disproportionately affects primary healthcare settings, where many encounters are symptom-based or undifferentiated and where preventive activities are common. Previous research has shown that neither do ICD-9 codes consistently capture the main problems addressed during a primary care encounter nor do they reflect the true complexity of a primary care visit (Katz et al. 2012; Ryan et al. 2019). This becomes a problem when physician claims databases are used to describe complex patients, assess family physician workloads or inform the reorganization of primary care (e.g., alternative remuneration models, value-based care, Patient's Medical Home models). To adequately serve these purposes, a comprehensive, robust and up-to-date classification system is essential.

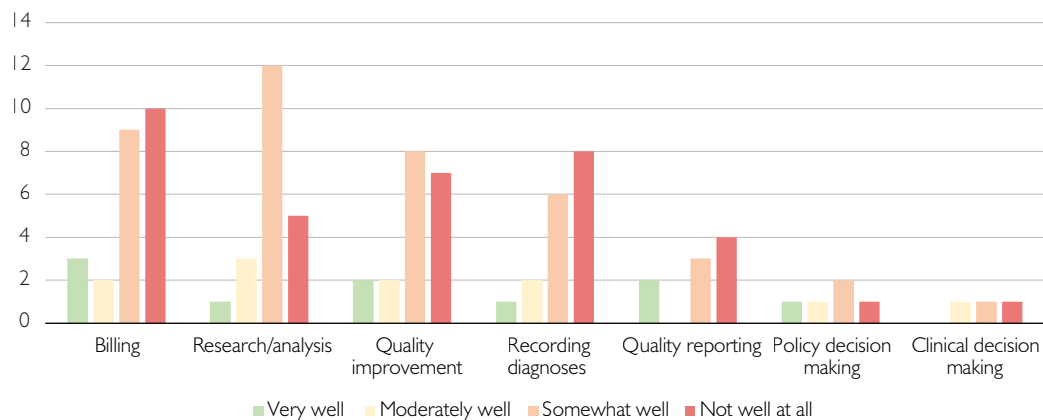
### *Users of ICD-9 report dissatisfaction and poor suitability for their purposes*

Our survey elicited responses from a variety of ICD-9 users ( $N = 40$  respondents; 57.5% female) in seven Canadian provinces and territories. Respondents reported working in clinical practice, academic institutions, government and regional health authorities in roles such as family physician, clinical support staff, researcher/analyst, project/program coordinator or lead and senior executive management. Most respondents indicated that they were moderately or extremely familiar with ICD-9 (85%). Few reported that ICD-9 was very suitable for their purpose (Figure 1).

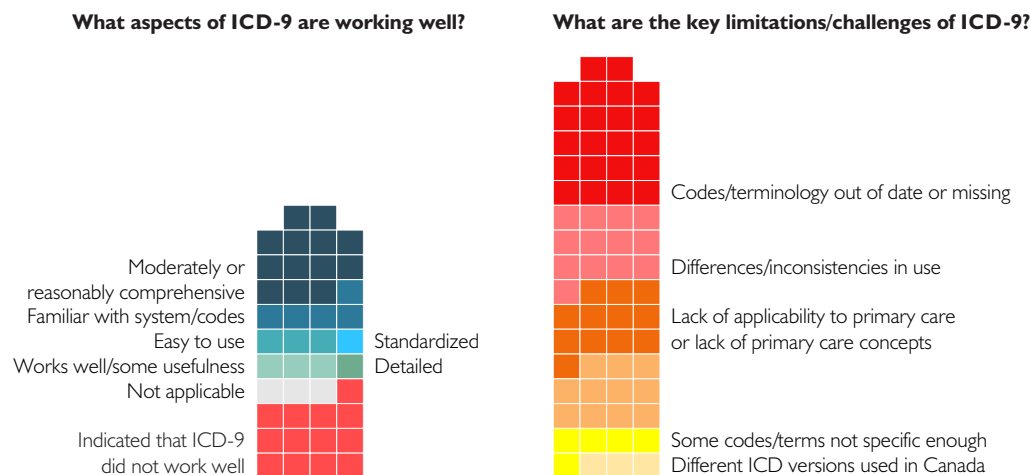
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**FIGURE 1.** Survey feedback on the suitability, advantages and limitations of ICD-9 for their specified purposes

**FIGURE 1a.**



**FIGURE 1b.**



Respondents were permitted to select more than one purpose of ICD-9 use or offer multiple open-ended responses.

When asked about the aspects of ICD-9 that work well, one-third of the respondents indicated that it is reasonably comprehensive, others reported that it was familiar, easy to use and standardized (Figure 1a). Interestingly, despite the question asking about the positive attributes, a third of the responses to this question included negative aspects of ICD-9. A separate question about key limitations identified many more, such as missing or out-of-date codes/terminology, inconsistencies in use, lack of applicability to primary care and codes that were either too specific or not specific enough (Figure 1b).

### *ICD-9 is not designed for technological innovation or advancements in medicine*

Electronic medical records (EMRs) are used by the majority of physicians across Canada (Collier 2015) and the rich data contained within have become valuable for quality

improvement, research, surveillance and health informatics (Birtwhistle and Williamson 2015; Kueper et al. 2020). However, ICD-9 was not designed to be compatible with electronic systems or support clinical documentation. This becomes problematic when physicians record details about patient visits in their EMR: open text, rather than a code, is often used to capture relevant information and observations, which is more difficult to search for or utilize for secondary uses. Furthermore, the development of advanced features within EMRs, such as predictive or automated coding, is not possible with ICD-9, given that many encounters, conditions and symptoms do not have a corresponding ICD-9 code that accurately reflects the primary care visit (Bhise et al. 2018; Katz et al. 2012; Ryan et al. 2019). Another limitation is that ICD-9 is not extensible, which means that new conditions (e.g., COVID-19) cannot be easily added; most of its disease categories are considered full.

Finally, when considering the key components needed to advance learning health systems in Canada, access to high-quality and easily analyzable health data that can quickly inform clinical decision making and quality improvement is paramount (Menear et al. 2019). While coded diagnostic data would be ideal, ICD-9 may not sufficiently capture the nuances of complex patient care. This means that the processing of other EMR data, such as text, is needed to supplement the information gaps, but this requires highly trained technical personnel and larger computational resources.

## Future Considerations

While our survey was small and not generalizable to all ICD-9 users in Canada, every respondent indicated that they would consider adopting a new system if it fully met their needs, and 90% reported that they would support a change even if the new system only *partially* met their needs. Despite this, implementing a new classification system for physician billing in Canada will be a monumental task with a number of important questions and issues that need to be addressed. First, a cost-benefit assessment will be important for decision makers that should account for implementation costs (including physician and staff training, revising billing fee schedules and requirements and updating EMR systems), as well as the wide-ranging impact on subsequent uses of codes and its impact on data quality.

Second, a rigorous investigation is needed to determine the most suitable system to replace ICD-9 and assess its utility for a Canadian context. This process should incorporate the perspectives of all ICD users, such as clinicians, billing clerks, management, researchers, analysts and policy makers, which can also serve as a way to prepare users for a future transition. To address expected challenges, such as path dependency and operational issues, we can learn from previous coding system transitions and digital transformations in Canada and other countries (Castle-Clarke and Hutchings 2019; Monestime et al. 2019; Moskal 2004). For instance, training and education are emphasized as some of the most significant prerequisites, which should include adequate resources and ongoing support for physicians and clinical staff. A commitment from all levels of stakeholders is fundamental, as is having strong and consistent communication and engagement, including clearly articulating the

purpose and benefits of the new system. Technological readiness is also important, which will be eased by the digital compatibility of ICD-11 (and other newer classification systems) with clinical information systems.

Finally, it would be ideal to develop a map that links ICD-9 codes to the new system to support time-trend analyses or any future use that requires codes over a time period during the transition. However, this is likely to be a complex process due to the major differences between ICD-9 and newer systems, and the utility of this is uncertain.

When we asked the survey respondents about key features that they desired in a new or enhanced classification system, many responses were unsurprising, such as the need for codes to reflect new or updated diagnoses, better comprehensiveness and a system more suited to general practice by describing reasons for visits, symptom presentation, prevention and screening activities and capturing complex patient presentations (e.g., frailty). Other requests were more general to a well-functioning classification system, such as one that is flexible, extensible, easy to use and able to integrate with EMR systems. Some respondents indicated a preference for a system similar to ICD-9, likely due to users' familiarity with ICD-9, as well as a map between new and old systems. ICD-11 remains a highly relevant replacement for ICD-9 for physician billing and will eventually become the coding standard in Canadian hospitals. ICD-11 was designed for modern medicine, is compatible with EMRs, offers advanced search capabilities and the ability to cluster-code multiple diagnoses/symptoms and includes supplementary codes for functioning and future extensions (Harrison et al. 2021). The WHO's updated International Classification of Health Interventions (ICHI) was also recently released in 2021 and is intended to be used alongside ICD-11 for coding medical procedures (WHO 2022). ICHI may eventually replace or augment the current Canadian Classification of Health Intervention (CCI) system used in Canadian hospital settings (CIHI n.d.c.); however, CCI (or older versions) is generally not used outside of acute care. For the purposes of physician billing, each province and territory has determined their own coding structure used for procedures.

An alternative for family physicians, in particular, is the International Classification of Primary Care (ICPC), which released its third version (International Classification of Primary Care – 3rd Revision [ICPC-3]) in December 2020 (ICPC-3 Consortium 2019). ICPC was designed to reflect the workflow of general practice, where symptoms or complaints are initially recorded using "Reason for Encounter" codes, and these "reasons" can evolve over time as the diagnostic process develops or is clarified. Multiple visits can be linked to describe the episode of care over time, including procedures, diagnoses (if any) and treatment. ICPC contains a smaller number of codes than ICD but includes activities that are relevant to family medicine. This system would be appropriate for both clinical documentation and billing in primary care settings; however, its use in Canada is sporadic. Only a small number of practices have adopted ICPC for use in their EMR systems, thus requiring further exploration of its utility and desirability. ICPC can also map to ICD, ensuring that the two coding systems are able to work harmoniously across different care settings. This means

that it may not be necessary to implement the same classification system for all types of physician billing (e.g., primary care and specialists), although it may be more efficient to do so.

## Conclusion

Canada is long overdue for an updated disease classification system. As healthcare and patient-centric models continue to evolve here, it is crucial that they are supported by up-to-date systems for appropriate and accurate information capture. Adopting consistent, standardized terminology and coding for EMRs could improve data quality, interoperability, provider communication, clinical decision making and the validity of findings from research and surveillance. Given the recent releases of ICD-11 and ICPC-3 (Ten Napel et al. 2022), we have an ideal opportunity to prepare for a transition to physician billing requirements in Canada. The 1970s' era of medicine is as out of date as portable cassette tape players – it is time for our national disease classification system to reflect a modern understanding of health, diseases and patient care.

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