

# INTERNATIONAL CLASSIFICATION OF DISEASES (ICD)

Authored by  
**Mohammed looti**

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## Introduction to the International Classification of Diseases (ICD)

The International Classification of Diseases (ICD) stands as the foundational global standard for classifying, recording, and reporting health information, including diagnoses, diseases, injuries, and causes of death. Developed and maintained by the **World Health Organization (WHO)**, the ICD provides a precise, standardized nomenclature that transcends linguistic and national boundaries, enabling consistent tracking of health trends worldwide. This indispensable tool is utilized extensively not only by clinicians for diagnostic purposes but also by public health officials and researchers for epidemiological analysis, resource management, and understanding global disease burdens. The system's primary function is to transform verbal descriptions of health conditions into alphanumeric codes, thereby facilitating data storage, retrieval, and analysis on a massive scale. Its scope is comprehensive, covering physical illnesses, mental health disorders, and external causes of morbidity and mortality, making it central to modern global healthcare infrastructure.

The utility of the ICD extends far beyond simple record-keeping; it is integral to the functioning of modern healthcare systems, particularly in areas requiring systematic data aggregation. Policy makers rely on ICD data to allocate funding, plan healthcare services, and measure the effectiveness of interventions. For instance, determining the prevalence rates of major depressive disorder or schizophrenia, or calculating the mortality rate associated with specific infectious diseases, hinges entirely upon the standardized coding provided by the ICD framework. Furthermore, the classification system is critical for billing and reimbursement processes in many health systems globally, although specialized clinical modifications, such as the ICD-10-CM used in the United States, often adapt the core structure for specific administrative needs. Understanding the ICD is therefore paramount for anyone engaging in international health research, clinical practice, or health policy development, as it represents the universal language of medical statistics.

The current iteration of widespread use, the ICD-10, has served as the global standard for decades, but the recent introduction of the **ICD-11** represents a profound modernization effort, reflecting advancements in medical science, technological capabilities, and evolving understandings of mental and physical health conditions. This continuous revision process underscores the dynamic nature of the ICD system, ensuring its sustained relevance in the face of rapid biomedical discovery. While the initial impulse for classification derived primarily from tracking infectious disease and mortality in the 19th century, today the ICD encompasses a vast spectrum of human health and illness, including detailed classifications for behavioral health and mental disorders. This continuous adaptation ensures that the ICD remains the authoritative source for epidemiological surveillance and clinical documentation across diverse global settings.

## The Role of the World Health Organization (WHO)

The maintenance, revision, and dissemination of the International Classification of Diseases are entrusted entirely to the **World Health Organization (WHO)**, an agency of the United Nations responsible for international public health. The WHO's guardianship ensures that the ICD remains a non-proprietary, globally accessible tool designed to serve the collective health interests of member states. This responsibility involves coordinating extensive international collaboration among thousands of experts--clinicians, epidemiologists, statisticians, and coding specialists--to ensure that revisions are scientifically sound, clinically useful, and culturally sensitive. The WHO mandates that the ICD must be universally applicable, meaning it must function effectively across vastly different resource settings, from highly developed nations with sophisticated electronic health records to low-resource communities relying on basic paper documentation.

The process of revising the ICD is characterized by rigorous methodology and transparency, often spanning over a decade for major updates like the transition from ICD-10 to ICD-11. This extensive timeline is necessary to accommodate public consultations, field trials in various countries, and consensus-building among specialized advisory groups, such as the WHO's various scientific networks dealing with specific disease categories. The WHO is careful to balance the need for scientific precision with the practical requirements of data collection; therefore, the structure of the classification must be intuitive for clinicians while simultaneously providing the granularity required for statistical analysis. Furthermore, the WHO promotes the multilingual adoption of the ICD, translating the codes and descriptions into official working languages and supporting national translations, thereby maximizing its reach and effectiveness as a global communication standard.

Crucially, the WHO oversees the creation of derived classifications and specialized adaptations. While the core ICD provides the standard reference for morbidity and mortality statistics, the WHO acknowledges the need for specific versions tailored for particular clinical or administrative uses. Examples include the ICD-O (Oncology), which provides detailed morphology and topography codes for tumors, and specialized versions for primary care. By maintaining control over the master reference volume, the WHO ensures that all derived classifications remain consistent and interoperable, guaranteeing that data collected using different specialized versions can still be aggregated and compared at the international level. This centralized oversight is vital for maintaining the integrity of global health statistics and facilitating coordinated global responses to health crises.

## Defining the Structure and Purpose of ICD

The International Classification of Diseases is fundamentally a statistical classification system designed to record, analyze, interpret, and compare mortality and morbidity data collected in different countries or at different times. Its primary structure is hierarchical, meaning that codes are

organized from broad categories down to highly specific clinical entities. This structure ensures that every health condition can be assigned a unique code, which serves as a concise, unambiguous representation of the diagnosis. For example, a code might start by identifying the major body system affected (e.g., diseases of the circulatory system) and progressively narrow down to the specific disease (e.g., essential primary hypertension) and even specific anatomical location or manifestation. This hierarchical organization is essential for statistical purposes, allowing researchers to study health outcomes at various levels of detail, from broad disease groups to specific subtypes of conditions.

The system is organized into major chapters, each addressing a specific domain of health conditions. In the ICD-10, these chapters typically range from infectious and parasitic diseases to mental and behavioral disorders, diseases of the circulatory system, external causes of morbidity, and factors influencing health status. The alphanumeric codes themselves are constructed to convey specific levels of information. The first character usually denotes the chapter, while subsequent characters provide greater diagnostic specificity. A key feature of the ICD structure, particularly in modern versions like ICD-11, is the use of post-coordination, which allows clinicians to combine codes to describe complex conditions, such as linking a diagnosis with its etiology, manifestation, or severity, thereby capturing a richer clinical picture than a single code could provide. This flexibility is particularly important for capturing the complexity inherent in chronic illnesses and co-morbid mental health conditions.

Beyond diagnosis, the ICD's purpose extends to classifying procedures, though this is often handled by related coding systems derived from or aligned with the ICD framework, such as the ICD-10 Procedure Coding System (ICD-10-PCS) used in the United States, or the international Classification of Health Interventions (ICHI) integrated into the ICD-11 architecture. The ultimate aim of defining this structure is to create a common language for health statistics that is utilized across three critical domains: **clinical practice** (for accurate documentation and reimbursement), **research and epidemiology** (for tracking patterns and determinants of health), and **public health administration** (for resource allocation and policy formulation). Without this standardized structure, international comparisons of disease prevalence, injury rates, or treatment outcomes would be unreliable or impossible, hindering global health cooperation and targeted interventions.

## Historical Evolution: From Bertillon to ICD-10

The history of the ICD traces its origins back to the late 19th century, driven by the need for comparable statistics on causes of death across nations. The foundational work was undertaken by **Jacques Bertillon**, who developed the Bertillon Classification of Causes of Death, which was adopted by the International Statistical Institute (ISI) in 1893 in Paris. This initial classification system focused almost exclusively on mortality and provided the rudimentary framework for subsequent revisions. Recognizing the necessity of periodic updates to keep pace with medical

progress, the ISI established a schedule for revision, ensuring the system remained current. Early revisions were simple, primarily focusing on updating lists of fatal diseases and injuries, reflecting the epidemiological priorities of the time, which were heavily centered on infectious diseases like tuberculosis and cholera.

Following the establishment of the World Health Organization (WHO) in 1948, the responsibility for maintaining and revising the classification system was transferred from the ISI to the WHO. The Sixth Revision (ICD-6), released shortly after this transition, marked a significant paradigm shift. It was the first revision to include classifications for morbidity (sickness) alongside mortality, vastly expanding the system's utility beyond death statistics. Crucially for psychology, ICD-6 also integrated a section dedicated to **Mental, Behavioral and Neurodevelopmental Disorders**, formally establishing the ICD as a classification system relevant to mental health professionals, though early iterations were relatively limited in scope compared to specialized systems like the DSM.

The evolution continued through subsequent revisions, with ICD-9 being adopted globally in 1975, further refining the categories and improving specificity. However, the most widespread and long-lasting iteration prior to the current era was the **Tenth Revision (ICD-10)**, adopted by the WHO in 1990 and implemented in many countries throughout the 1990s and early 2000s. ICD-10 represented a major structural overhaul, switching from a purely numeric system to an alphanumeric coding system, allowing for a far greater number of categories and enhanced specificity. For instance, the chapter on Mental and Behavioral Disorders was significantly expanded, providing more detailed classifications for conditions like mood disorders, substance use disorders, and childhood-onset disorders. The structure of ICD-10, characterized by three-character categories and optional fourth, fifth, and sixth character sub-classifications, defined the standard for medical coding for over three decades.

## The Transition to ICD-11: Major Changes and Features

The latest major revision, the **International Classification of Diseases, Eleventh Revision (ICD-11)**, was adopted by the World Health Assembly in 2019 and officially came into effect in January 2022, though implementation timelines vary globally. ICD-11 is not merely an incremental update; it represents a complete modernization designed for the digital age, integrating seamlessly with electronic health records (EHRs) and featuring a fully electronic platform, unlike the print-centric focus of earlier versions. A core driving factor for the revision was the need to reflect massive scientific and medical advancements made since the 1990s, particularly in areas like genomics, oncology, and, significantly for the field of psychology, neurodevelopmental disorders and pain classification.

One of the most profound changes in ICD-11 is its approach to **Mental, Behavioral and**

**Neurodevelopmental Disorders.** The classification structure for these disorders has been thoroughly revised to align better with contemporary scientific understanding and to improve clinical utility. Notable changes include the restructuring of personality disorders, the consolidation of trauma-related conditions (introducing Complex Post-Traumatic Stress Disorder), and a refined approach to diagnostic guidelines for conditions like Autism Spectrum Disorder (ASD). Furthermore, ICD-11 introduces the concept of "post-coordination," allowing clinicians to combine foundational codes with extension codes to describe multiple aspects of a single health event--such as etiology, clinical manifestation, and severity--offering unprecedented detail and flexibility in describing complex psychological and physical health states.

Other key characteristics of ICD-11 include expanded content related to sexual health, gaming disorder (classified under addictive behaviors), and traditional medicine conditions, reflecting a broader, more inclusive approach to global health practices. The development process emphasized user accessibility, incorporating features like a user-friendly browser and application programming interfaces (APIs) to ensure that the system is easily integrated into diverse national health IT systems. This digital-first strategy ensures that the ICD-11 can be updated dynamically and maintained more efficiently than previous revisions, ensuring that the classification remains agile and responsive to emerging global health threats and evolving scientific consensus. The transition to ICD-11 signifies the WHO's commitment to providing a sophisticated, flexible tool capable of handling the complexities of 21st-century health data.

## Core Characteristics and Hierarchical Coding

The fundamental operational characteristic of the ICD system is its adherence to a robust **hierarchical coding structure**. This structure means that classifications are organized in levels of increasing detail. At the highest level, the classification is divided into broad chapters (e.g., Chapter 6: Mental, Behavioral or Neurodevelopmental Disorders). Within each chapter, there are three-character categories that define a group of related conditions. Below the three-character category, four, five, or sometimes more characters are added to provide the necessary level of clinical specificity required for accurate diagnosis and statistical reporting. This systematic organization ensures that while the system is highly detailed, it remains manageable and easy to navigate for users across different specialties.

In the ICD-10 system, codes are alphanumeric, typically consisting of three to seven characters. For example, the first character is usually a letter representing the chapter. Subsequent characters are numbers or letters that define the subcategory. The use of seven characters, particularly in specialized adaptations like ICD-10-CM, often includes placeholders or characters to define laterality (left vs. right), episode of care (initial encounter vs. subsequent), or sequelae. This level of granularity is essential for researchers and insurers who require precise data regarding the nature and context of a condition. The hierarchical nature also allows for straightforward aggregation; if

detailed data is not available, a broader, less specific code can still be used, ensuring that data collection is possible even in resource-limited settings.

A further critical characteristic of the ICD is the provision for **modifiers and supplementary classifications**. These allow for the description of circumstances that influence health status but are not diseases themselves. For example, in ICD-10, the V and Y codes cover External Causes of Morbidity and Mortality (e.g., transport accidents, exposure to environmental factors), while the Z codes cover Factors influencing Health Status and Contact with Health Services (e.g., personal history of malignant neoplasm, screening for specific diseases). The inclusion of these supplementary codes ensures that the health data collected provides a comprehensive picture, not just of the illness itself, but also of the environmental, social, and circumstantial factors that contribute to or modify the health status of an individual. This comprehensive approach underscores the ICD's utility as a tool for public health analysis beyond mere diagnostic enumeration.

## ICD vs. DSM: Classification Systems in Mental Health

While the ICD is the global standard for classifying all diseases, including mental health conditions, the field of psychiatry and psychology often references the **Diagnostic and Statistical Manual of Mental Disorders (DSM)**, published by the American Psychiatric Association (APA). Understanding the relationship and differences between these two systems is crucial for mental health professionals. Historically, the ICD has been used internationally for epidemiological purposes and mortality statistics, whereas the DSM has predominantly served as the authoritative clinical and research standard in North America. Both systems aim to provide reliable diagnostic criteria, but their primary mandates and organizational structures differ significantly.

The key distinction lies in their scope and primary purpose. The ICD is comprehensive, covering every known disease and injury, ensuring global consistency for public health reporting. Conversely, the DSM is specialized, focusing exclusively on mental, behavioral, and neurodevelopmental disorders. Historically, the DSM has often provided more operationalized and detailed diagnostic criteria, particularly useful for clinical trials and research protocols, while the ICD focused on providing definitions suitable for statistical aggregation. However, in recent revisions, the WHO and APA have worked diligently to harmonize the two systems. For example, the diagnostic structure for many core disorders in ICD-11 shows strong congruence with the DSM-5, aiming to minimize discrepancies and facilitate easy cross-mapping between the two classifications, particularly regarding conditions like Schizophrenia Spectrum Disorders and Bipolar Disorder.

Despite the harmonization efforts, fundamental differences persist, particularly in structure and philosophical approach. The ICD, especially ICD-11, is increasingly designed to be integrated into

primary care settings globally and often emphasizes clinical utility and global applicability over the intricate multi-axial system sometimes preferred in the DSM. Moreover, the ICD-11 utilizes dimensional approaches for certain diagnoses, such as personality disorders, where severity and trait domains are coded alongside the diagnosis, moving away from the rigid categorical approach of earlier systems. Ultimately, while the DSM holds significant sway in psychiatric practice and research, the **ICD remains the mandatory legal standard** for reporting morbidity and mortality data to public health authorities and for use in most global health studies. Professionals must be proficient in both systems, recognizing the ICD as the official global health classification instrument.

## Clinical and Research Applications of ICD

In clinical settings, the ICD serves as the essential tool for recording patient encounters in a standardized, quantifiable manner. Clinicians utilize ICD codes immediately following a diagnostic assessment to document the patient's condition in their medical record. This documentation is critical for several reasons: it ensures clear communication among healthcare providers, facilitates seamless continuity of care, and provides the necessary data for internal quality assurance programs. Furthermore, in many national health systems (e.g., the U.S. using ICD-10-CM), accurate ICD coding is the foundation upon which claims for **reimbursement and payment** are built. Incorrect or non-specific coding can lead to denied claims, highlighting the direct financial and administrative importance of mastering the classification system.

The application of the ICD in research is equally fundamental. Epidemiologists rely heavily on ICD data--both morbidity (hospitalization and outpatient data) and mortality data--to track the prevalence, incidence, and geographical distribution of diseases. By using globally standardized codes, researchers can conduct massive cross-national studies on disease burden, identify risk factors, and monitor the spread of epidemics. For instance, classifying mental health disorders using standardized ICD codes allows researchers to compare the rates of major depression in various populations, leading to more targeted public health interventions and informing the etiology of these conditions. The reliability of global health research findings hinges directly on the validity and consistency of the ICD codes used to define the studied populations.

Moreover, the ICD structure supports health services research. By classifying procedures (using related systems like ICD-10-PCS or ICHI) and linking them to diagnoses (using ICD codes), researchers can evaluate the effectiveness and efficiency of different treatments and care pathways. Health economists use this coded data to analyze healthcare expenditures, understand the costs associated with specific chronic conditions, and model future resource needs. The increasing detail and specificity offered by ICD-11, particularly its capacity for post-coordination and dimensional assessment, promise even greater utility in research, allowing for more nuanced studies into the complexity of co-morbidities and the impact of environmental and psychological

factors on physical health outcomes. Thus, the ICD functions as the primary data infrastructure underpinning evidence-based medicine and health policy formulation worldwide.

## Impact on Global Morbidity and Mortality Data

The most critical public health function of the ICD is its role in generating reliable and comparable global statistics on morbidity (illness) and mortality (death). Every country affiliated with the WHO is mandated to use the ICD for reporting causes of death, ensuring that vital statistics are aggregated using a consistent methodology. This standardization allows health organizations, such as the WHO and the World Bank, to produce accurate global burden of disease reports, which identify the leading causes of death and disability worldwide. Without the ICD, comparing health outcomes between, for example, high-income nations and low-income nations would be methodologically unsound due to disparate definitions and terminology.

For mortality data, the ICD provides the rules for selecting the **underlying cause of death** from the information recorded on the death certificate. This consistency is essential for accurately tracking shifts in epidemiological profiles. For example, if a patient dies from pneumonia (immediate cause) following a prolonged battle with lung cancer (antecedent cause), the ICD rules ensure that the lung cancer is correctly identified as the underlying cause for statistical reporting. This ability to capture the ultimate etiological factor driving the death is paramount for effective public health planning, such as implementing tobacco control measures if lung cancer rates are rising, rather than simply treating pneumonia as the primary issue.

Similarly, the coding of morbidity data, derived from hospital discharge records and outpatient visits, allows public health authorities to monitor disease incidence and resource utilization. The ICD provides the necessary granularity to track non-fatal outcomes that severely impact quality of life, such as mental health disorders, chronic pain conditions, and injuries. By quantifying these issues using standardized codes, governments can better understand the societal cost of specific illnesses and design targeted preventative campaigns or resource allocation models. The rigorous implementation and adherence to ICD standards worldwide are thus foundational to measuring global health progress and achieving international health targets, such as those defined by the Sustainable Development Goals (SDGs).

## Conclusion and Future Directions

The International Classification of Diseases (ICD) is far more than a simple list of diseases; it is a critical, evolving infrastructure that supports global health management, clinical care, and research. Maintained by the **World Health Organization (WHO)**, the system provides the universal language necessary to classify health conditions, translating complex medical realities into standardized alphanumeric codes. Since its inception in the late 19th century, the ICD has

undergone continuous refinement, culminating in the comprehensive, digital-first ICD-11, which reflects the latest scientific understanding and technological capabilities, particularly in fields relevant to psychology, such as neurodevelopment and behavioral health.

The future direction of the ICD is intrinsically linked to the continued growth of digital health and interoperability. The ICD-11 is designed to be highly adaptable and responsive, allowing for quicker updates and seamless integration into electronic health records and artificial intelligence applications. Future revisions are expected to continue emphasizing clinical utility, enhanced specificity through post-coordination, and deeper integration with related health information standards, such as classifications for functioning and disability. As global health challenges become increasingly complex--involving multi-morbidity, climate change impacts, and widespread psychological distress--the precision offered by the ICD will be indispensable for data-driven policy responses.

In summary, the ICD remains the authoritative global reference for health classification. Its hierarchical structure, rigorous international development process, and capacity to standardize both morbidity and mortality data underscore its irreplaceable role in public health. For healthcare professionals, researchers, and policymakers, proficiency in utilizing the ICD is essential for contributing to accurate health statistics, ensuring quality patient care, and ultimately, advancing the global understanding and management of disease and psychological well-being. The continuous evolution of the ICD ensures its lasting relevance as the bedrock of international health information systems.

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