WHO-FAMILY OF INTERNATIONAL CLASSIFICATIONS NETWORK MEETING 2005
16-22 October
Tokyo Japan

A resource- and context-based evaluation of ICD implementation worldwide

P1-1

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Abstract The implementation of ICD is a critical step toward establishing robust and effective vital registration systems in all WHO member states. ICD implementation was evaluated based on the availability of ICD resources; the contexts in which ICD resources have been used; and a mechanism for comparing socioeconomic development (SED) and quality-adjusted completeness of mortality data. The results revealed a complex network of factors which can lead to the development of a more sensitive framework for offering assistance and resources to member states.

Introduction

The implementation of ICD-10 in WHO member states is a critical step toward improved health measurement. Without accurate, non-biased information about the deployment of resources and the implementation of ICD in critical health measurement systems in WHO member states, it is difficult to assess the specific needs of each state in terms of improving the quality of reporting to WHO and of evaluating the state of health and progress of health interventions within a member state. Thus, understanding the state of implementation and its impacts on health measurement systems and other infrastructures is important for developing more effective frameworks for improving health metrics and realigning resource deployment to all member states.

A review of worldwide implementation of ICD and an evaluation of the preliminary results of implementation were conducted using a number of methods. Specifically, observations were made into the availability of ICD-related resources, the known and novel contexts in which ICD resources have been used, and the correlations between socioeconomic development (SED) and the quality of mortality data collected using ICD in reporting member states. Here we report the findings of the evaluation and suggest lines of inquiry for further study.

Methods & Materials

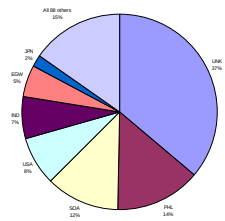
Sales and licensing. Data of all ICD-related licensing during 1994-2004 and of all sales of the English version of ICD-10, 2nd edition, during 1993-2004 were requested and collected from the WHO Press. Only the data related to ICD-10 for global use or for limited country-specific use was allowed (n = 43). For sales data, only the figures on fulfilled orders for ICD-10 to agents (stock and special) and non-agents/WHO were incorporated (n = 30,917).

Context of use. To determine the contexts of use of ICD information, a Web-based search strategy was employed. Using online search engines, the first fifty results relevant to ICD-related information use were noted. The data recorded consisted of the title of the product or use, the online address (URL) of the webpage, the latest date of revision, the author or organization maintaining authorship of the information, and the general context of the use.

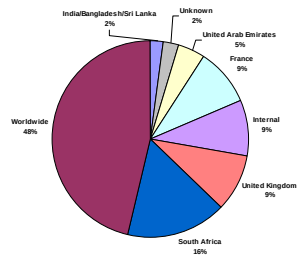
Socioeconomic development. Using World Bank definitions and rankings, the socioeconomic development (SED) of WHO member states was classified according to gross domestic product (GDP) per capita and then sub-classified based on absolute conditions of GDP. Member states with GDP < $5,000 (in U.S. Dollars) were defined as "low-income" (LI); states with GDP < $10,000 but > $5,000 were defined as "middle-income" (MI); states with GDP > $10,000 were defined as "high-income" (HI).

Quality-adjusted completeness. Previously reported information on the quality and completeness of mortality data in WHO member states, where available, was used. In order to compare SED with mortality data taking into account completeness, an adjustment of the completeness was made based on quality. Completeness was reduced by 25% for medium-quality data and by 60% for low-quality data as previously determined [2]; no reduction was made for high-quality data. After comparison for each country, there were 106 member states for which data pairs could be made. Based on QAC figures, three tiers were determined and applied. QAC < 50 was defined as "low"; QAC < 80 but > 50 was defined as "moderate"; and QAC > 80 was defined as "good."

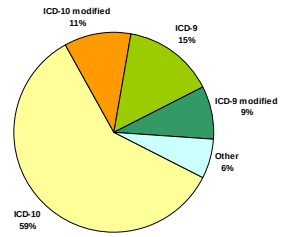
Population size. Four tiers of population size were applied: small (pop. < 1 million, n = 26), medium (pop. < 10 million, n = 39), large (pop. < 100 million, n = 36), and very large (pop. > 100 million, n = 5).



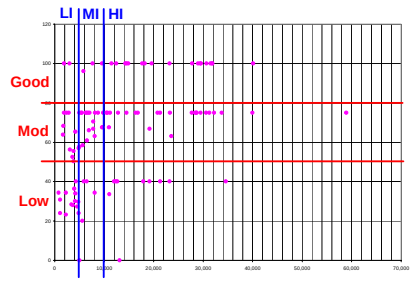
ICD-10 sales, 1993-2004



ICD licences, 1994-2004



ICD versions used in products online



SED vs. QAC (n = 106)

Conclusions

The results of this study show that the implementation of ICD in WHO member states varies greatly, not only by socioeconomic development, but also based on what ICD resources are available, how those resources are distributed and used, and who or what forces are guiding effective implementation and data collection. It is important to consider that there are far more exceptions to what rules may be applied in regards to implementation than previously thought. The development of a framework that considers and is sensitive to the collection of conditions each country faces in making decision about vital registration systems is crucial for greater outcome efficacy in resource deployment and assistance in implementation. Future studies should identify and address these conditions given each country's needs.

Results

During the years surveyed, 37 percent of all sales of ICD-10 were to agents or private parties in the United Kingdom, the largest purchaser by volume. The third largest purchaser was the Philippines, a low-income country accounting for 14 percent of all sales. Surprisingly, no middle-income countries are in seven largest purchasers, which may indicate a shift of political priorities to issues other than health measurement.

Of the ICD licences sold during 1994-2004, nearly half (48%) were worldwide licences to large, multinational firms that sell software or other medical or technical products that are required to include ICD codes. For country-specific licences, the countries with the largest number of licences are South Africa (16%), the United Kingdom (9%), France (9%), and the United Arab Emirates (5%). Missing from this list are the United States and the Philippines. An additional nine percent of licences were "internal" licences; the significant number of third-party developers parallels an equally significant demand for products incorporating ICD codes.

Based on the findings of the Web-based search, over a hundred (n = 117) unique results were collected. Ninety percent of these results grouped into one of five general contexts of use: medical practice management software, productivity software for alternative computing platforms, searchable databases in non-standard languages, information for the general public, and classroom-based or online education programmes.

Socioeconomic development (SED) was plotted against quality-adjusted completeness (QAC) for each member state for which data was available. The three tiers for SED (LI, MI, HI) and for QAC (low, moderate, good) were applied by boundary lines separating each group of data points, thus creating nine SED-QAC sectors.

Low or medium income/Good completeness. This sector presents some cases where developing countries have established highly effective mortality registration systems. Not only is the data collected complete, but the quality of the data is also excellent. Examples: Moldova, Cuba, Venezuela, and Mexico.

High income/Low completeness. This sector includes cases where high GDP has not led to effective implementation and thus poor data quality or completeness, or has not been invested in health measurement systems. Examples: South Africa, Poland, Argentina, Portugal, Greece, and Qatar.

Low income/Low completeness. Low SED is likely impeding the establishment of registration systems, especially when what health dollars are available are spent toward interventions with immediate outcomes, e.g. vaccinations. Mortality registration is critical so that crises can be identified and managed effectively. Examples: Nicaragua, Syria, Ecuador, and Egypt.