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DATA FOR HEALTH INITIATIVE

CRVS country report

Introduction of Iris Automated Mortality Coding System in the Philippines

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Acronyms and abbreviations

ABS	Australian Bureau of Statistics
CRVS	civil registration and vital statistics
D4H	Bloomberg Philanthropies Data for Health Initiative
DVSS	Disseminated Vital Statistics System
ICD-10	International Statistical Classification of Diseases and Related Health Problems – Version 10
IT	information technology
PSA	Philippine Statistics Authority
UoM	the University of Melbourne
WHO	World Health Organization

Introduction of Iris automated mortality coding system in the Philippines

Background

Strengthening the Philippines CRVS system

Reliable mortality statistics are crucial for public health, medical research, evaluating interventions and setting health priorities. To standardise production of mortality data and make them comparable, the International Statistical Classification of Diseases and Related Health Problems, Version 10 (ICD-10) was developed and has been adopted by all World Health Organization (WHO) member countries. The ICD contains very strict rules on how the collected cause of death data should be coded. Coding the data with ICD codes and correctly selecting the underlying cause of death is not trivial, coders have to be trained in ICD and in applying its coding rules.

To be useful for public health, all cause of death data has to be based on the underlying cause of death, which is the disease or injury that initiated the train of morbid events leading to death. In the Philippines, like in most countries the source of cause of death data is the medical death certificate used to register a death.

The Bloomberg Philanthropies Data for Health Initiative (D4H) aims to improve the quality of cause of death information in countries that would allow governments and public health officials to make informed decisions regarding policy and health programs. As partner of this initiative, the University of Melbourne (UoM) has assisted the Philippine Statistics Authority (PSA) to implement Iris[1], an automated coding software program which allows death records to be coded according to ICD-10 standards (**Box 1**). Prior to the introduction of automated coding in the Philippines in 2016, 30 coders in the Vital Statistics Unit at the PSA annually coded approximately 580,000 death certificates, routinely taking between two to three years to produce the cause of death statistics for the country.

Box 1: What is Iris?

Iris is a software for automatic coding of multiple causes of death and for the selection of the underlying cause of death. The Iris system, managed by the German Institute of Medical Documentation and Information (DIMDI), is free to download and provides a consistent application of ICD coding rules and improves international comparability. Iris is language independent provided the included dictionary is translated and populated with local diagnostic expressions. All entries on the death certificate are assigned an ICD-10 code and the selection of the underlying cause of death is guided by a set of overarching principles developed by the WHO and outlined in Volume 2 of the ICD-10.

Although the selection of the underlying cause of death and the corresponding ICD code is mostly done automatically by Iris, there will always be a certain number of death certificates that cannot be solved and coded by Iris and hence, are rejected. This can be due to spelling or other simple errors on certificates that can easily be corrected and re-fed into Iris. A certificate can also be rejected when there is no term in the Iris dictionary that corresponds to the data entered (for instance, "snake bite"). In this case only by going into the dictionary and adding the term can this record be coded by Iris. In other cases, it is simply not possible for Iris to arrive at a conclusion about the underlying cause from the multiple causes entered. In these instances, an experienced coder must manually attribute a code according the ICD rules. In general, the first-time certificates are processed through Iris, rejections may be as high as 40%. This can be progressively reduced by fixing simple errors and re-entering the data.

The ICD-10 classification and coding rules for selection of an underlying cause of death are reviewed regularly by the WHO Mortality Reference Group (MRG) with updates implemented annually. These ICD updates are rapidly implemented into Iris and therefore the cause of death coding practices with Iris, are up to date.

1 Iris can be downloaded from: https://www.dimdi.de/dynamic/.downloads/iris-institute/manuals/iris-user-reference-manual-v4-5-3s1.pdf

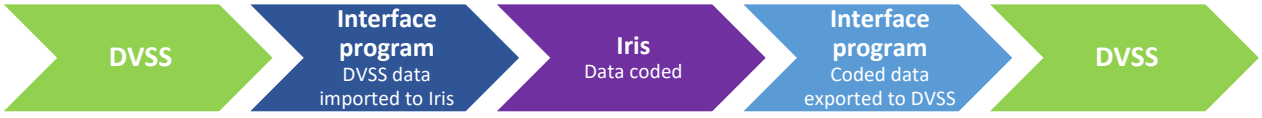
Activities involved in the introduction of Iris in the Philippines

Activity 1: Evaluation of requirements for the potential integration of the Iris software into the existing PSA system

In September 2016, UoM together with the Australian Bureau of Statistics (ABS), who also use the Iris software, visited the Vital Statistics Unit at PSA to first develop a road-map towards Iris implementation and to verify that the basic ICD and information technology (IT) pre-conditions[2] for Iris were in place. A clear understanding of the registration and data collection process was established through the development of business process maps. Based on these, a number of key changes were implemented to the civil registration and vital statistics (CRVS) system, most significantly that PSA's Regional Offices became responsible for encoding all the information on the death certificates so that these could be entered straight into the primary, central database - the Disseminated Vital Statistics System (DVSS). Some internal processes in the Vital Statistics Unit were also clarified and changed, and coders were trained in the ICD rules for selecting the underlying cause of death, including how to use the ICD decision tables. Together with the IT team, the Iris process was mapped **(Figure 1)**, and changes made to the DVSS to enable the database to store the data in a different format, compatible with Iris. A PSA programmer wrote an interface program to allow the import of data into Iris from DVSS and export of Iris coded data back to DVSS for storage.

Once this was all operational, a full pre-testing of Iris and the work processes, including those of the interface program was completed in April 2017 by UoM, with a number of issues resolved to reduce the number of Iris rejects.

Figure 1: Iris implementation process map



Activity 2: Training and capacity building

After the pre-test, a formal five-day training on Iris automated coding software was conducted in June 2017 by UoM, covering (i) the Iris module; (ii) the DVSS – Iris – DVSS interface program module; (iii) the administrative module, and; (iv) the ICD module. Following training, participants were able to:

a. Understand the different operations of Iris;

b. Use Iris in both text and code entry modes;

c. Use DVSS-Iris interface program to transfer death certificate data into Iris and back, and;

d. Attend successfully to the different types of Iris rejects.

Activity 3: Evaluations of Iris output

The UoM and ABS team worked closely with the PSA to evaluate the implementation and output of Iris in the Philippines at several stages, ensuring that the use of the automated coding software produced high-quality mortality statistics and PSA benefited from this investment into technology. Evaluations were also helpful in identifying any operational problems in the use of Iris that could be improved. To fully evaluate the quality of the Iris coded data and to be able to detect differences from the manually coded data, it was necessary to code a certain number of certificates both ways. In the Philippines, 215,000 death certificates were double-coded, representing almost 40% of the data from 2017. This constituted a very robust sample compared to the recommended 20% for double-coding. Regarding potential efficiency gains derived from automated coding, it was observed that despite the Iris procedures being new to the coders, they were able to process 40% more records per day compared to manual coding.

2 These include: use of the ICD standard death certificate, a sufficiently large number of death certificates for coding, appropriately advanced IT facilities, a good ICD knowledge base and electronically available data.

For the evaluation, the data were compiled at three- and four-digit levels of ICD-10 codes, but most of the analyses of the two datasets were done only at the three-digit level ICD codes as at four digits the differences were minor, and PSA does not publish data below three-digits. The UoM and ABS evaluation team concluded that at the three-digit level, the underlying cause of death was matched for 76% of the records, mismatched for 19%, and for 5% there was no record to compare to. The largest differences were between ischaemic heart disease and hypertensive heart disease, gun deaths by unspecified gun and handgun type, pneumonia and sepsis, and unspecified deaths (ICD-10 code R99) and deaths due to old age. These changes, however, once investigated, all represented an improvement over manual coding. Moreover, when compiled at the same level that PSA uses for statistical outputs, the top 10 leading diseases, apart from one, did not change. Given these positive results, PSA stopped the manual coding and the remaining data for 2017 was Iris coded only.

The mid-project review had not only been an opportunity to compare the manual and automated coded data, but also helped to enhance functionality and clarify some business rules. Once all the 2017 data had been coded, a final evaluation of the output was undertaken by comparing the Iris coded data to time series from 2013, 2014, 2015 and 2016. The focus of this evaluation was to closely compare and document the changes that resulted from the Iris implementation. Apart from a confirmation of the specific changes reported earlier from the mid-year review, there were some general areas of change which demonstrated the higher level of quality of the statistical output. For instance, there was a notable decrease in the direct causes of death such as cardiac arrest and respiratory failure, which should never be reported as underlying causes of death and which Iris was able to code to underlying, more specific diseases found on the death certificate. Another area of change resulted from the ability of Iris to identify secondary cancers and code them accordingly. This meant that a lot of the specific primary cancers decreased. None of these changes, however, changed the leading diseases which remained the same as previous years, just resulted in increases and decreases in some of these.

To communicate these changes to the primary data users, PSA issued a technical note explaining the key changes resulting from the introduction of automated coding. Such technical notes are essential to assist users to distinguish between legitimate changes in the disease trends and those brought on by improved coding through the implementation of interventions such as Iris.

Limitations of Iris

Iris strictly adheres to the ICD coding rules for mortality and uses multiple cause coding to arrive at the underlying cause of death. Sometimes Iris will fail to find a solution and reject a record. A typology of rejected records for the Philippines showed that the big majority of rejects were either due to spelling errors or because the specific code was not available in the dictionary for a diagnosis written on the death certificate. This may be due to the use of different names for a diagnosis, or simply that a rare disease/incidence does not exist in the dictionary. In the Philippines, for instance, it was necessary to further update the dictionary with some maternal and external causes. Occasionally, Iris may miscode some records due to poor certification, for example, during the evaluation we found that when oesophageal varices were reported only as 'varices' without specification of site, Iris coded these to varicose veins. Similarly, cerebral herniations just written 'herniation' were coded to 'inguinal hernia'. These types of errors are, however, infrequent, and are usually only discoverable during a review of the statistics.

Moving forward

The PSA is committed to maximising relevance and useability of the mortality data it collects. Since the evaluation of the 2017 data, a number of data and business processes have been implemented in the Vital Statistics Unit, which would impact the coding results. With the assistance of UoM, PSA therefore decided to carry out another data evaluation of the 2018 data and compare these to 2017 to assess change and consistency. The analysis showed a good consistency for the first 10 leading causes and showed continuing trends for some of the major coding changes that Iris had brought, e.g. a decrease in the group of "other heart diseases" towards more specific ones like ischaemic heart disease. Similarly, the new business rules of how to code the intent of some external causes (i.e. whether a death was due to an accident, suicide or homicide) has meant some significant changes in certain categories such as that of assault. Overall, however, the evaluation showed that the 2018 statistics were consistent with expectations. It is also worthwhile mentioning that this evaluation took place in August 2019 and hence that PSA now is able to produce cause of death statistics within one year of collection, which is more than half of the time it took previously when the death certificates were manually coded.

Conclusion

ICD mortality coding is complex and demands properly trained staff. The Iris software is free of charge and easy to install and run on any computer. Countries with a large numbers of death certificates to code each year, that have computerised data and IT facilities, can benefit enormously from switching to automated coding in terms of both better data quality and coder efficiency. However, while some gains are likely in the reduction of the number of coders needed, it is necessary to maintain experienced coders in order to appropriately manage rejected records. Because of this requirement for experienced coders, national data should be coded centrally so that the same rules and standards are applied throughout. Iris applies the ICD coding rules consistently to all data and will produce better quality and more timely data if implemented successfully. Careful comparison of the manually and automatically coded data is essential to understand the impact of the new tool on disease trends.

The Philippines met all requirements for installing Iris, with sufficiently established IT facilities, ICD knowledge and electronically available data. Through good leadership and the commitment of staff, the PSA was able to effectively leverage the technical assistance provided by the UoM and ABS team to successful transition to a new system of automated coding. To date there are few experts in Iris that can provide training to institutions interested in applying automated coding. Fortunately, this is likely to change as an increasing number of countries adopt Iris. In Asia, the Philippines is the first country to have implemented automated ICD coding, with others undoubtedly soon to follow.

Bloomberg Philanthropies DATA FOR HEALTH INITIATIVE

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