

Guide to Presenting and Using ICD-10 Mortality Data

Center for Health Statistics, Washington State Department of Health, January 20, 2004

Beginning with deaths occurring in January 1999, the United States began using the International Classification of Diseases, Tenth Revision (ICD-10) to classify causes of death reported on death certificates. This is the first change in twenty years; ICD-9 codes have been in effect from 1979-1998. Implementation of ICD-10 will have an important impact on the presentation and interpretation of mortality statistics by cause-of-death. The change to ICD-10 will create a discontinuity in trends that must be accounted for when comparing current mortality to years prior to 1999. To put it another way, ***current cause-of-death data are not comparable to years prior to 1999***, unless adjustments are made for the coding and classification changes. Without adjustment, it is impossible to know whether an observed increase or decrease in deaths due to a particular cause is “real” or merely the result of the changes in classification and coding.

To enable comparisons across the ICD-9 to ICD-10 transition, a preliminary comparability study was carried out by the National Center for Health Statistics (NCHS). NCHS double-coded a large sample of the 1996 national mortality file, once by ICD-9, and again by ICD-10. A **comparability ratio** was then calculated by dividing the number of deaths for a selected cause of death classified by ICD-10 by the number of deaths classified to the most nearly comparable cause of death by ICD-9. The resulting ratio can be used to **adjust** mortality statistics (counts and rates) for a given cause of death classified by ICD-9 so they are comparable to those for the same cause classified by ICD-10. The ratio will also allow users to estimate the extent of the discontinuity of the change to ICD-10 by showing the net effect of coding changes.¹ A comparability ratio of 0.70 for pneumonia indicates that 30% fewer deaths were coded to pneumonia using ICD-9 than would have been coded using ICD-10. The preliminary comparability study will be followed by a comparability study based on the complete national mortality file in 2004.

How are comparability ratios applied?

The comparability ratio is multiplied by counts or rates calculated for time periods that are classified by ICD-9. For example, there were 1,717 deaths due to pneumonia and influenza (ICD-9 480-487) to residents of Washington State residents in 1998. Applying the comparability ratio of 0.70 to the 1998 number of deaths (1,717) will give the adjusted number of 1,202 deaths due to pneumonia and influenza. This modified count can be compared to the 1,258 deaths due to pneumonia and influenza (ICD-10 J10-J18) that occurred in 1999. Thus, after adjusting for the effects of the ICD revision change, there was only an increase of 56 deaths in 1999 (instead of a large decrease when comparing unadjusted counts).

Can I apply the comparability ratios to all years that used ICD-9 (1979-1998)?

Comparability ratios may not be constant over long periods of time. Preferences in reporting of certain conditions by physicians, coroners, and medical examiners may

¹ NCHS has prepared “A Guide to State Implementation of ICD-10 for Mortality Part II. Applying Comparability Ratios” that can be downloaded from the NCHS web site listed at the end of this document.

change over time. In addition, DOH/Center for Health Statistics (CHS) querying of physicians to obtain more information about causes of death change over time. The combined affect of these different changes may mean that a comparability ratio determined from a single year may not be applicable to other time periods. Finally, and importantly, NCHS has recommended that the comparability ratios should only be applied to years 1994-1998 because the comparability study used 1996 death certificates.

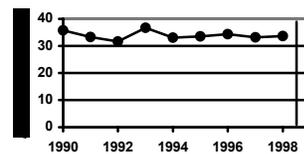
Wouldn't it be easier to adjust current rates?

ICD-10 values can also be *divided* by the comparability ratio and then compared to ICD-9 for previous years. This method would make values in 1999 comparable to prior years and might make presentations clearer for presentation of 1999 data. However, after several more years of data are collected using ICD-10, this method will not be optimal. It may be confusing to readers to see the scales change from reports that are published in different years. Since it is expected that ICD-10 will be in use for a long time in the future, we do not advise applying inverse comparability ratios to 1999 counts or rates. In other words, the comparability ratios should be used to adjust 1998 (and earlier) data to ICD-10, rather than adjusting 1999 data back to ICD-9. There is one exception to this recommendation that is described in the CHARS section at the end of this guide.

How should I present figures for time periods that cross ICD revisions?

For figures, we recommend that trend lines do **not** connect across time periods with changes in ICD revisions. Vertical bars between the time periods with the ICD change will alert readers that a classification change has taken place. See first example for pneumonia.

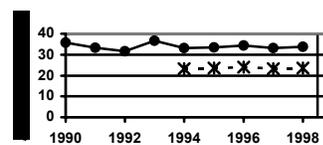
Example 1. Pneumonia Mortality, Washington State



What if I prefer to plot comparability modified rates?

When comparing long periods of time classified by ICD-9, it is preferable to compare values in an unmodified form. However, you could *also* plot a few years of points using the comparability modified rates using a different symbol, but continue to leave the break in the figures. See second example for pneumonia.

Example 2. Pneumonia Mortality, Washington State



How should I present tables for time periods that cross ICD revisions?

For data in tables, we suggest presenting un-modified rates (or counts) for all years of interest and comparability modified rates for 1998 (or for the most current group of years if combining more than one year). See Table 1 for an example with pneumonia.

Example Table 1. Pneumonia and Influenza (ICD-9 480-487; ICD-10 J10-J18) Age-adjusted Mortality Rates (adjusted to U.S. 2000 population) for Washington State Residents, 1990-1999

	Comparability Un-modified									Comparability Modified	ICD-10
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1998	1999
Pneumonia & Influenza	35.8	33.3	31.6	36.7	33.1	33.5	34.4	33.2	33.7	23.6	23.9

Note: Modified by comparability ratio of 0.70.

What if I want to use averages of more than 1 year because of small numbers?

Before combining years that cross ICD revisions, all years coded by ICD-9 should be adjusted (multiplied) by the comparability ratio.

Do rates have to be re-calculated for time periods when ICD-9 was used?

NCHS has provided new tabulation lists to define the groups of ICD-10 codes that are used to determine leading causes of death. To compare leading causes of death in 1999 with prior years, then rates for earlier time periods will have to be re-calculated using re-defined groups of ICD-9 codes that correspond to the new ICD-10 groups. The new tabulation lists include more causes of death. For example, accidents and adverse effects are now split into two separate groups. Another example of change is the new ICD-10 tabulation list for Cerebrovascular Disease (ICD-10 I60-I69). The most comparable ICD-9 codes for this group are 430-434 and 436-438. Prior tabulation lists used 430-438 which include transient ischemic attacks or TIAs.

How do I calculate confidence intervals?

The NCHS guideline referred to above provides formulas for calculating confidence intervals that incorporate the standard error of the comparability ratios. Since the comparability ratios are based on large numbers of national deaths, the confidence intervals are very small. Hence, it would be expected that the effect of incorporating these standard errors with rates based on much smaller statewide or county death rates (that would have large standard errors) might be negligible. The office of Non-Infectious Conditions Epidemiology, Washington State Department of Health, recently compared confidence intervals that were calculated with and without using the standard errors of the comparability ratios. The recommendation from this study (*Calculating Confidence Intervals With ICD-10 Comparability Ratios*) is that the comparability ratio can be treated as a constant and that the standard error of the comparability ratio does not need to be incorporated into the calculation of confidence intervals. Confidence intervals for adjusted mortality rates can be calculated in the manner described in *Guidelines for Using and Developing Rates for Public Health Assessment*, produced by the Assessment Operations Group (AOG) of Washington State Department of Health, and is available at <http://www.doh.wa.gov/Data/guidelines/guidelines.htm> .

How do I measure trends over time?

It is recommended that long term trends be evaluated separately using only years coded with ICD-9 and ICD-10 and determine if the rates after 1998 continued or diverged the trend that was observed before 1998. In addition, the NCHS guide presents a formula for using a z-test to compare 1998 with 1999.

What should I do if the group of codes I am using does not have a comparability ratio?

The tables with preliminary comparability ratios include ICD-9 and ICD-10 codes. The comparability ratios can only be applied to counts and rates tabulated using these exact codes. In addition, some causes of death do not have comparability ratios because NCHS standards for reliability or precision could not be met in the preliminary study. Be very cautious about interpreting changes before and after the ICD revision change for these groups. Even if very little change is observed between the time periods, you cannot assume that there were no differences in mortality. If the comparability for the ICD revision is large or small, then actual mortality could have changed. For some cases (but not all), examining the number of cases with the ICD codes appearing in the multiple cause fields may provide additional information to assist in interpreting observed changes. When the final comparability study using all national deaths is released, there will be fewer groups with missing comparability ratios. In addition, when the final study is completed, NCHS will provide the Center for Health Statistics with a CD-ROM with comparability data for Washington state which can be used to calculate comparability ratios for more groups of ICD codes.

What about age-specific, race-specific, and state-specific comparability?

At the present time, NCHS has provided U.S. comparability ratios for the total population. During the next year, NCHS will evaluate age-specific, race-specific, and state-specific comparability ratios to determine if there are differences in comparability by race, age and state. Until this evaluation is completed, the comparability ratios that are currently available should be applied to all ages and races.

CHARS (Comprehensive Hospital Abstract Reporting System) is still using ICD-9CM. How should I combine the use of ICD-9CM hospitalization codes and ICD-10 mortality codes?

Comparability ratios are calculated for underlying causes of death and **cannot** be used to bridge ICD-9CM to ICD-10CM or any other use of ICD. If you want to examine hospitalization and mortality data for the same diseases, we recommended that you use NCHS tabulation lists to identify which groups of ICD-9 and ICD-10 codes are most comparable. Tabulation lists can be obtained from the two sources listed below. Until ICD-10CM is implemented, you may choose to divide mortality rates for years after 1998 by the comparability ratio to make mortality and hospitalization rates more consistent.

For more information about ICD-10:

Washington State Vital Statistics ICD-10 Supplement, 1990-1999; Center for Health Statistics, Washington State Department of Health, PO Box 47814, Olympia, WA 98504-7814. This report will be completed as soon as NCHS releases preliminary comparability ratios. When the report is finalized, it will also be available on Center's web site: <http://www.doh.wa.gov/EHSPHL/CHS/default.htm#Birth>

National Center for Health Statistics web site: <http://www.cdc.gov/nchswww/about/major/dvs/icd10des.htm>