

CHAPTER

1

Medical Coding in History

The Black Death

Medical coding in its earliest form started as an attempt to avoid the Black Death. The bubonic plague, caused by the bacteria *Yersinia pestis*, arrived in Sicily via ship rats in 1347. It spread rapidly, reaching England in 1348. Almost half the city of London's population of 70,000 died of the disease over the next 2 years. Given that life expectancy at the time was about 26 years and about 35% of children died before the age of 6, the Black Death contributed to the increased demise of the already death-ridden populace.

Italian author Giovanni Bocaccio lived through the plague in Florence in 1348. In his book *The Decameron* (1921), he describes how the Black Death got its name:

In men and women alike it first betrayed itself by the emergency of certain tumors in the groin or the armpits, some of which grew as large as a common apple. . . . The form of the malady began to change, black spots or livid making their appearance in many cases on the arm or the thigh or

elsewhere, now few and large, then minute and numerous.
These spots were an infallible token of approaching death.

The plague was highly contagious. As soon as people realized that contact with the sick could mean death, they isolated themselves. As Bocaccio describes:

Citizen avoided citizen, how among neighbors was scarce
found any that showed fellow-feeling for another, how
kinsfolk held aloof and never met. Fathers and mothers
were found to abandon their own children, untended,
unvisited, to their fate, as if they had been strangers.

Once the initial scourge was over, isolated outbreaks of plague continued in Europe throughout the next 3 centuries. It became an increasingly urban disease due to poor sanitation and crowded living conditions. The Great Plague of 1665 killed 25% of London's population. **Figure 1-1** illustrates the garb worn by "plague doctors," who filled the beak area with herbs that were thought to ward off the Black Death.

The London Bills of Mortality, shown in **Figure 1-2**, were published weekly, and as of 1629 included the cause of death. Information was collected by parish clerks in various geographic areas. In order to determine which areas had the most cases of plague, Londoners purchased copies of the Bills and tracked the spread of the disease from one parish to another in order to avoid it. During one week in 1665, when the total number of London deaths was 8,297, bubonic plague accounted for 7,165 of those deaths.

Causes of death found in the Bills include diseases recognized today, such as jaundice, smallpox, rickets, spotted fever, and plague. Other conditions have creative descriptions, such as "gripping in the guts," "rising of the lights" (croup), "teeth," "king's evil" (tubercular infection), "bit with a mad dog," and "fall from the belfry."

John Graunt, a London merchant, published *Reflections on the Weekly Bills of Mortality* in 1665. Its central theme was that



FIGURE 1-1 Plague doctor. The beak was filled with herbs thought to ward off the Black Death.

Courtesy of Wellcome Library, London.

deaths from plague needed to be examined in the context of all the other causes of mortality in order to understand the effects of all diseases. The 60 disease categories in the Bills constituted the first systematic attempt to analyze the incidence of disease.

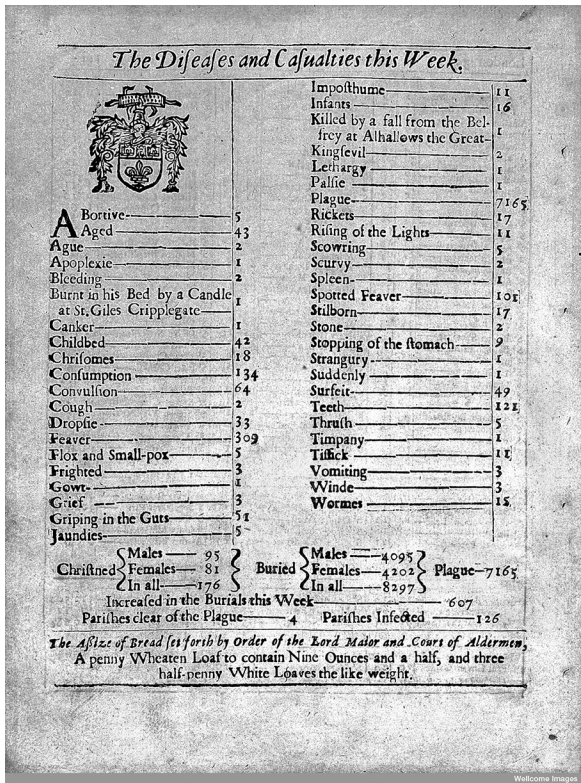


FIGURE 1-2 London Bills of Mortality, 1665.

Courtesy of Wellcome Library, London.

It was at this point that the science of epidemiology, the study of epidemics, was born.

During the 18th century, additional classifications were authored by Linnaeus in Sweden (*Genera Morborum*, 1763), Bossier de Lacroix in France (*Nosologia Methodica*, 1785), and Cullen in Scotland (*Synopsis Nosologic Methodicae*, 1785). Nosology is the branch of medicine that deals with classification of diseases.

William Farr and the Cholera Studies

As the first medical statistician for the General Register Office of England, Dr. William Farr revamped the Cullen disease classification to standardize the terminology and utilize primary diseases

instead of complications. Farr incorporated additional data into his classification, enabling reporting and analysis of factors such as occupation and its effect on cause of death.

Farr's dedication to what he called "hygology," derived from hygiene, was evident in his analysis of the London cholera outbreak of 1849. More than 300 pages of tables, maps, and charts reviewed the possible influence of almost every conceivable death-related factor, including age, sex, rainfall, temperature, and geography. Even day of the week and property value were examined (Eyler, 2001).

The single association consistently present was the inverse relationship between cholera mortality and the elevation of the decedent's residence above the Thames River. Unfortunately, this led Farr to the erroneous conclusion that the air was more polluted lower by the river, causing the transmission of cholera. He later converted to the correct waterborne germ theory of the disease after conducting a study during a second epidemic in 1866, which included data about the source of drinking water for those who died.

International List of Causes of Death

The need for a uniform classification of causes of death was recognized at the International Statistical Congress convened in Brussels in 1853. The Congress requested that Farr prepare a classification for consideration at its next meeting in Paris in 1855. His classification was based primarily on anatomical site and consisted of 138 rubrics ("History of Development," n.d.). The list was adopted in 1864 and revised at four subsequent Congresses.

Farr died in 1883, and Jacques Bertillon, the chief statistician of the city of Paris, prepared a revised list that was adopted by the International Statistical Institute in 1893. Known as the Bertillon Classification, it was the first standard system implemented internationally. The American Public Health Association recommended its use in the United States, Canada, and Mexico by 1898. Delegates from 26 countries adopted the Bertillon Classification in 1900, and subsequent revisions occurred through 1920.

Beyond Death

After Bertillon's death in 1922, interest grew in using the classification to categorize not only causes of mortality, but also causes of morbidity. Morbidity is a diseased state or the incidence of disease in a population. As early as 1928, the Health Organization of the League of Nations published a study defining how the death classification scheme would need to be expanded to accommodate disease tabulation.

Finally, in 1949, at the Sixth Decennial Revision Conference in Paris, the World Health Organization (WHO) approved a comprehensive list for both mortality and morbidity and agreed on international rules for selecting the underlying cause of death. Known as the "Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death," it is generally referred to as ICD. From this point forward, the use of ICD was expanded for indexing and retrieval of records and for data concerning the planning and evaluation of health services.

Modern Times

The purpose of the ICD and of WHO sponsorship is to promote international comparability in the collection, classification, processing, and presentation of morbidity and mortality statistics. The United States implemented ICD-1 in 1900 and participated in every revision through ICD-7 until 1968. ICD was used for death classification until the sixth revision, when disease indexing began, and ICD was used for both purposes. With the eighth revision, the United States developed its own version, known as ICDA-8 or ICD-Adapted, due to disagreements over the circulatory section of the international version.

The International Conference for the Ninth Revision was attended by delegations from 46 countries. The classification was being pushed in the direction of more detail by those who wanted to use it for evaluation of medical care or for payment purposes. However, users in less sophisticated areas did not need a high level of

detail in order to evaluate their healthcare activities. Steps were taken to ensure the usefulness of the new revision for all users, and the World Health Assembly adopted the ICD-9 revision in May 1976 for implementation effective January 1, 1979. As it did with ICD-8, the United States adopted a clinical modification of the international version, and ICD-9-CM (clinical modification) was used in the United States until October 1, 2015.

ICD-10 was endorsed by the WHO in 1990. Although ICD-10 has been used in the United States since 1999 to classify mortality data from death certificates, ICD-9 has been used for all other purposes, including billing and reimbursement.

ICD-10-CM is the diagnosis classification that will eventually be used in all healthcare settings by all types of providers. It was developed by the National Center for Health Statistics (NCHS) and the Centers for Disease Control and Prevention (CDC) as a clinical modification (CM) of the ICD-10 system used throughout the world. Other countries, such as Canada and Australia, have their own modifications of the international standard code set. The following table summarizes the differences between ICD-9-CM and ICD-10-CM and offers some of the benefits of specificity in the newer system.

ICD-9-CM Diagnosis Codes Versus ICD-10-CM Diagnosis Codes

ICD-9-CM Diagnosis Codes	ICD-10-CM Diagnosis Codes
Approximately 14,000 diagnosis codes	Approximately 69,000 diagnosis codes
Valid codes have three to five characters	Valid codes have three to seven characters
Decimal used after third character	Decimal used after third character
First character is alpha (E and V only) or numeric	First character is always alpha
Characters two through five are numeric	Second character is numeric Characters three through seven are alpha or numeric

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ICD-9-CM Diagnosis Codes	ICD-10-CM Diagnosis Codes
Laterality not addressed	Separate codes for laterality (left, right, bilateral) where appropriate
Initial versus subsequent encounters not addressed	Separate codes for initial and subsequent encounters in some chapters
Combination codes for commonly associated conditions are limited	Many combination codes available
Injuries grouped by type of injury	Injuries grouped by anatomic site
Some clinical concepts not represented, such as underdosing, blood alcohol level	Additional concepts available

Source: Modified from ICD-10 Implementation Guide for Large Practices, 2013. Centers for Medicare and Medicaid Services. Available at [https://www.cms.gov/Medicare/Coding/ICD10/Downloads/ICD10_LargePractice_Handbook_060413\[1\].pdf](https://www.cms.gov/Medicare/Coding/ICD10/Downloads/ICD10_LargePractice_Handbook_060413[1].pdf)

ICD-10-PCS is the classification system that will eventually be used by hospitals to code inpatient procedures. These procedure codes will be used only in the United States. They were developed by 3M under contract with the Centers for Medicare and Medicaid Services (CMS) as a replacement for the outdated ICD-9-CM Procedure Codes. Because ICD-9 procedure codes have only four digits, the system has been severely limited in its ability to accommodate new technology and advances in surgical techniques. ICD-10-PCS is dramatically different in structure and methodology, utilizing the “root operation” concept, which describes the objective of the procedure. Other differences between ICD-9 Procedure Codes and ICD-10-PCS are as follows.

ICD-9-CM Procedure Codes Versus ICD-10-PCS Procedure Codes

ICD-9-CM Procedure Codes	ICD-10-PCS Procedure Codes
Approximately 4,000 procedure codes	Approximately 72,000 procedure codes
Valid codes have four digits, all numeric	Valid codes all have seven alphanumeric characters (the letters O and I are not used, to avoid confusion with 0 and 1)
Decimal used after second digit	No decimals used

ICD-9-CM Procedure Codes	ICD-10-PCS Procedure Codes
Procedure codes often contained diagnostic concepts	Procedure codes are descriptive of the body system, body part, root operation, approach, device, and certain additional qualifying characters No diagnostic information is included
Eponymic (named after a person) terms were common	No eponyms
Coding process involved finding procedure in the index and verifying it in the tabular lists	Coding process is directly from body system/root operation tables Each row in a table defines valid combinations of code values

Source: Modified from ICD-10 Implementation Guide for Large Practices, 2013. Centers for Medicare and Medicaid Services. Available at [https://www.cms.gov/Medicare/Coding/ICD10/Downloads/ICD10_LargePractice_Handbook_060413\[1\].pdf](https://www.cms.gov/Medicare/Coding/ICD10/Downloads/ICD10_LargePractice_Handbook_060413[1].pdf).

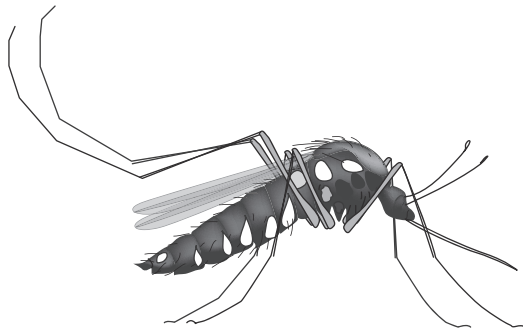
Reflection of Society

Changes to ICD-9-CM over the years mirrored events in American society. The ICD-9-CM Coordination and Maintenance Committee, a joint effort of the National Center for Health Statistics (NCHS) and the CMS, considered code changes yearly. Although it was possible to code any disease using ICD-9-CM, newly identified or newly concerning conditions often fell into an “other” category, and the assignment of new specific codes was necessary to identify and count those disease entities.

- 1986 New codes assigned for HIV and AIDS. These were previously coded to the “deficiency of cell-mediated immunity” category. By 1986, over 15,000 deaths due to AIDS-related conditions had occurred in the United States, and the need for codes was evident.
- 1989 Lyme disease hit the news and was assigned an individual code. Although first observed in the United States in 1977 near Lyme, Connecticut, its identification as a tick-borne illness caused growing concern throughout the rest of the country.

- 1991 Kaposi's sarcoma was previously coded in the "other malignant neoplasm" category. Its incidence in AIDS patients made the need to separately identify it more important.
- 1992 As the popularity of contact lenses grew among Americans, so did the problems associated with them. A new code for corneal disease due to contact lenses was implemented.
- 1992 What do cooking oil in Spain and L-tryptophan in New Mexico have in common? More than 300 people died in Spain in 1981 due to "toxic oil syndrome," reportedly due to use of contaminated cooking oil. A similar situation occurred in New Mexico in 1989, and on that occasion L-tryptophan was blamed. It was subsequently banned in the United States by the Food and Drug Administration (FDA). Both events involved eosinophilia myalgia syndrome, which got a new code in 1992. The Spanish epidemic is now thought to have been caused by organophosphate poisoning from insecticides (Woffinden, 2001).
- 1993 A newly understood connection between some types of HPV (human papillomavirus) and cervical cancer resulted in the assignment of a separate code for HPV. Investigators have found evidence of HPV in more than 90% of cervical cancers (CDC, n.d.).
- 1993 With the increasing use of potent antibiotics and other drugs to combat infection, the crafty bugs have developed resistance to those drugs. A series of codes to identify infection with drug-resistant microorganisms was created.
- 1995 As "couch potatoes" got fatter, the condition of "morbid obesity" got a separate code to distinguish it from other obesity. Morbid obesity is defined as greater than 125% over normal body weight.
- 1995 Sensational news reports about a "flesh-eating disease" described the effects of Group A streptococcus manifested as necrotizing fasciitis, a severe soft-tissue infection that can result in gangrene. A new code was assigned.

- 1996 As more premature infants survived due to better medical care, the incidence of RSV bronchiolitis increased. This was due to the respiratory syncytial virus. A new code was developed for identification purposes.
- 1996 A sign of the times was the addition of a new code for adult sexual abuse.
- 1997 Cryptosporidiosis and cyclosporiasis got their own codes. These previously rare parasites began showing up more often. An outbreak in Wisconsin where 403,000 people were affected by their drinking water, and additional outbreaks a few years later thought to be caused by imported raspberries, pointed to the need for separate codes.
- 2002 Although toxic shock syndrome was identified in 1980, it did not receive its own code until 2002. Originally diagnosed in women using high-absorbancy tampons, toxic shock syndrome is now identified in other patients, both male and female, who are infected with *Staphylococcus aureus*.
- 2002 Newly arrived in the United States, the mosquito-borne West Nile Virus was assigned its own code.



- 2002 Codes for the external causes of injury are also part of ICD. A new code was needed to identify injuries from paintball guns.
- 2002 Codes for coronary atherosclerosis had been around for years, but a new code was implemented to identify coronary atherosclerosis in a transplanted heart.

- 2002 An entire series of codes was added to classify the external causes of injury and death due to terrorism. Among them were codes for terrorism involving biological weapons and terrorism involving destruction of aircraft, including aircraft used as a weapon.
- 2003 The evening news showed international air travelers wearing surgical masks. The reason—fear of contracting SARS, severe acute respiratory syndrome. This viral illness appeared in southern China in November 2002. Within 8 months, more than 8,000 people had contracted SARS, with almost 800 dying of the disease. SARS was assigned a new diagnosis code in 2003.
- 2004 “Dermatitis due to other radiation” was added. It includes tanning beds as radiation sources.
- 2005 The ever-popular “postnasal drip” got a separate code.
- 2006 Societal interest in combatting obesity resulted in new codes for pediatric body mass index (BMI) and personal history of bariatric surgery.
- 2006 A more specific code for altered mental status allowed tracking of this condition that often requires medical care.
- 2007 Changes in code terminology were needed to reflect current usage. “Sexually transmitted disease” replaced “venereal disease.”
- 2008 Recognition of environmental causes of illness included exposure to mold, which got its own code.
- 2009 Quality improvement programs requested and received new codes to categorize operative errors, such as wrong procedure, wrong patient, or wrong body part.
- 2009 Ongoing U.S. military involvement overseas required implementation of a new code for “family disruption due to family member on military deployment.”
- 2010 A code added for crack cocaine poisoning.
- 2011 The last regular, annual updates were made to ICD-9-CM.
- 2012 The Coordination and Maintenance Committee implemented a partial freeze to both ICD-9-CM and ICD-10-CM/PCS, in effect until October 1, 2015. The purpose of the freeze was to facilitate the planned implementation

- of ICD-10 in 2014, without the need to deal with major last-minute changes.
- 2013 Limited updates were allowed to capture new technologies and diseases.
 - 2014 On March 27, 2014, the U.S. House of Representatives passed by voice vote H.R. 4302, a bill “to amend the Social Security Act to extend Medicare payments to physicians and other provisions of the Medicare and Medicaid programs, and for other purposes.” The intent of this bill was to “patch” the sustainable growth rate (SGR) formula for physician payment that was set to expire on March 31, 2014. The U.S. Senate passed the bill on March 31 and it was signed into law by the president on April 1, 2014. The bill contained a clause prohibiting the Secretary of Health and Human Services from requiring implementation of ICD-10-CM and ICD-10-PCS until October 1, 2015. This additional delay will give unprepared providers more time to ready their practices for ICD-10.

Preparation for Coding Success

Because of the greatly increased level of detail in ICD-10-CM and ICD-10-PCS, it is even more important that individuals involved in coding and billing be prepared to use the new systems correctly. In addition to studying medical terminology, anatomy and physiology, and disease processes, exposure to real or sample provider documentation is very important. Being able to read a discharge summary or an operative report and visualize what was done is key to assigning correct codes.

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