Carl von Linné, Thomas McKeown, and the inadequacy of disease classifications

JOHAN P. MACKENBACH *

Carl von Linné (also known as Carolus Linnaeus, 1707–1778) was a Swedish botanist and physician whose work laid the foundations of modern biological nomenclature. He saw the world of nature as God’s collection, and took upon himself the task of listing and arranging it all. He developed a coherent world of nature as God’s collection, and took upon himself the foundations of modern biological nomenclature. He saw the flower. 1

It is less well known that he also applied his encyclopaedic ambitions to developing a disease classification, published as Genera Morborum (1763). On the basis of their symptoms and whatever was known about their causes, all diseases were classified in 11 large families, such as ‘morbi exanthematici’ (febrile diseases with spotted skin), ‘morbi dolorosi’ (non-febrile diseases with pain), and ‘morbi evacuatorii’ (non-febrile diseases with evacuation of fluids). Each family was further subdivided into groups and subgroups on the basis of similarities in appearance or known causation. The index counts 325 diseases, from ‘abortus’ and ‘abscessus’ to ‘vomitus’ and ‘vulnus’, all neatly ordered in a system of unquestionable beauty. 2

With increases in medical knowledge, disease classifications that were largely based on symptomatology, like Linné’s Genera morborum, became less satisfactory. William Farr (1807–1883) developed a classification of causes of death based on the body-site at which the disease manifested itself. Jacques Bertillon (1851–1922) further refined Farr’s classification and his Bertillon classification of causes of death laid the basis for the International Classification of Diseases that is currently in its 10th edition. 3

Modern disease classifications have increasingly incorporated knowledge about disease mechanisms (pathophysiology) or causes of disease (etiology). They are essentially compromises between different classification principles, as is illustrated by the fact that some ‘chapters’ have been defined on an etiological basis (infectious diseases, external causes), others on a pathophysiological basis (neoplasms, endocrine disorders) and still others on an anatomical basis (cardiovascular diseases, respiratory diseases).

Can this be improved? From a public health point of view, it would be attractive to dispose of a disease classification that is ruthlessly etiologically oriented. After all, it is only through their origins that we can truly control diseases. The quest for such a disease classification is hampered by our lack of knowledge about the causes of disease, and by the fact that where these causes are known many diseases appear to have multiple causes. Nevertheless, at least one rigorous classification of diseases by their ‘origins’ has been published, by the British historian of population health and professor of social medicine Thomas McKeown (1911–1988).

McKeown has become rightly famous for his analyses of the causes of mortality decline in England and Wales, in which he showed that most of the mortality decline antedated the introduction of effective medical remedies, and therefore were likely to be due to improvements in the environment, such as better nutrition. 4 In the year of his death he published ‘The origins of human disease’, in which he proposed a simple classification of physical diseases in three groups: ‘prenatal diseases’ (all diseases manifested before birth), ‘diseases of poverty’ (diseases manifested after birth which are due to deficiencies or hazards related to lack of the essentials for life), and ‘diseases of affluence’ (diseases manifested after birth which are due to maladaptation or hazards related to industrialization). ‘Prenatal diseases’ include chromosomal aberrations, single-gene defects, and congenital malformations; ‘diseases of poverty’ include malnutrition and infectious diseases; ‘diseases of affluence’ include cardiovascular diseases, most cancers, and other so-called ‘western’ diseases. 5

This is a far from perfect classification, as McKeown himself pointed out. For example, it groups the effects of maternal smoking on the fetus with other, less tractable prenatal conditions, and it has difficulty dealing with the higher incidence of many ‘diseases of affluence’ in lower socioeconomic groups. It is also highly dependent on one etiological factor, the economic environment – McKeown’s favourite ultimate cause of disease. But in all its simplicity it illustrates that sometime in the future a rigorously etiological classification of diseases may be possible, perhaps in a multidimensional format.

Above all, it provides a basis for optimism about the future of human health. As McKeown writes: “The most fundamental conclusion is that except when determined at or soon after fertilization disease is not an inescapable attribute of the human condition. (…) Health depends primarily on removal of the long-standing deficiencies and hazards which led to the predominance of infectious diseases, without incurring the risks from non-communicable diseases that have appeared in the last few centuries as a result of the maladaptation and hazards associated with industrialization”. 5

REFERENCES


