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Knowledge from data - as it should and could be

>> For a modern society with knowledge as one of the few raw materials, Germany has shown an astonishing degree of irrationality in dealing with the pandemic over the last three years - as one could hardly expect. In order to be able to classify this, a look at the development of science and gaining knowledge from data is helpful. Ever since the Bible, a shift from faith-based to knowledge-based medicine can be observed, which has intensified enormously, especially in the last two to three centuries. The episodes with leaps in progress were mostly marked by names of outstanding thinkers. One of them was the ship's doctor James Lind, who proved the life-saving effect of vitamin C against scurvy in a comparative study in 1747 [1], thus laying early methodological foundations for proof of efficacy.

The modern era began in the 1920s in Great Britain with R. A. Fisher's work on randomisation. This beginning for experimental studies was followed in the 1940s by A. B. Hill with observational studies, which led to the publication of the Bradford-Hill criteria in 1965: nine requirements for the effects of an intervention to be interpreted as causal, at a scientific level that has no need to hide from today. The next phase was the systematisation of empirical testing of the effects of drugs and ultimately of any intervention. This development, as the name Evidence-based Medicine (EBM) suggests, actually began in medicine, but then had significance in many other scientific fields. However, the term did not exist until 1991: after the development began in 1968 at McMaster University in Hamilton (Canada) under the leadership of Dave Sackett and in Great Britain through Cochrane's book Effectiveness and Efficiency: Random Reflections on Health Services (1972).

On the one hand, these beginnings stemmed from the realisation that the existing knowledge did not reach the doctor and thus the patient. In parallel, the methodology of Systematic Reviews with the collection of global study results was developed by Iain Chalmers and his circle. Thus the Cochrane Collaboration became the methodological cornerstone of EBM, after the founding of the UK Cochrane Centre in 1991 the following year as an international organisation with further centres (Germany in 1998), today spanning the world in over 50 countries.

This phase was a decisive step towards clinical guidelines based on systematic reviews as a basis for decision-making and action. The process was similar with Health Technology Assessment (HTA) for reimbursability by health insurance funds and patient information in layman's terms. The totality of studies relevant to a question provided the answer - with a highly developed methodology for this purpose.

These arcs of tension were carried by intensive methodological development work, in which epochs were repeatedly concluded by the US Institute of Medicine (IoM) through books. The acceptance of an error culture (‚To err is human') through a book (IoM in 2000) was decisive for this, which meant a fundamental change in perspective. This development took decades, mainly driven by Anglo-Saxon and Scandinavian countries as well as the USA. The result was steady, major methodological advances that had as a constant the quality of health care as their goal.

This movement stalled somewhat when, after the initial euphoria around evidence as a magic buzzword, the promises and expectations of Big Data and artificial intelligence gained more space. Central importance was given to a rather unassuming article in the journal Wireless in 2008, entitled ‚The End of Theory: The Data Deluge Makes the Scientific Method Obsolete', which made bold suggestions about the future of scientific methodology.

The efforts and advances described above were declared obsolete: data in abundance would turn science on its head. In particular, the statement that correlations based on lots of data would lead to causality, and similar bizarre messages at odds with empirical science, actually led one to expect that the spook would quickly disappear. Far from it, the book ‚Big Data' by Mayer-Schönberger & Cukier became a bestseller translated into many languages. The promises drew their trail, but without showing convincing results in the applications.

And then came the pandemic. Actually, an Eldorado for knowledge seekers with vast amounts of unstructured data. But, surprise, surprise: there were no attempts, let alone successes, to get to grips with these data volumes using Big Data techniques or artificial intelligence. The disillusionment was extensive, but not limited to this approach. The disregard for the rigorous methodological apparatus described above was evident from the beginning of the pandemic at an early stage without much effort. Time pressure and helplessness with regard to the use of existing knowledge may be accepted as an argument at the beginning, but it remains to be seen that even after three years the same mistakes are being communicated on essential points: no high-quality assessment of the measures with, in some cases, completely exaggerated estimates of their benefits while at the same time neglecting the non-virological medical damage; scientifically inadequate assessment of excess mortality; completely unreliable assessment of the immune status of the population with a large, unknown number of unreported cases and thus lack of a basis for measures; robust recording of side effects of the vaccinations.

The scientific level of the discussions was largely below the beginner's level of modern textbooks [2]. The circle closes with the Bundestag's rejection of a qualified review of the pandemic response in April 2023. <<

1: The James Lind Library, https://www.jameslindlibrary.org
2: Systematic Reviews in Health Research: Meta-Analysis in Context, 3rd Edition, John Wiley & Sons, Inc. ISBN: 978-1-405-16050-6