Order of magnitude

In many fields, such as aeronautical or mechanical engineering, accurate measurements and precise execution are essential. This is also true in some fields of medicine, such as pathology. It is important, for example, to have an accurate description of the tissue structure of a tumour specimen when the choice of treatment depends on this accuracy. And the value of determining accurate blood potassium levels is clear.

However, in medicine in general and health care in particular, accurate measurements are not always available.

Do we know precisely how many people have died from covid-19 worldwide? Or exactly how many years of life are gained by using a blood pressure-lowering drug? Or the number of drug-induced sudden deaths that occurred in a given year? Or how many cases of appendicitis are correctly diagnosed with a particular clinical score? Or the number of cancers caused by exposure to pesticides? No. But we often have estimates based on epidemiological data, meta-analyses of clinical trials, diagnostic accuracy studies, and so on.

Some of these estimates are very approximate. This is indicated by a very wide range of values on either side of the reported mean. And estimates are sometimes put forward without specifying the margin of uncertainty.

However, although imprecise, many estimates often suffice by providing an order of magnitude of the value of interest. This order of magnitude is generally sufficient to gauge the harm-benefit balance of an intervention, and to make public health or routine healthcare decisions. Because a disease that kills about 1% to 10% of affected patients is a very different prospect from one that kills about 60% to 80% of patients. A treatment that prevents about one death for every 15 to 50 patients treated for one year is patently not equivalent to one that prevents one death for every 200 to 600 patients treated. And a clinical sign that multiplies the odds of correctly diagnosing a disease about 20- to 40-fold, is far more useful than one that doubles or quadruples the odds.

It is more useful to have imprecise data than no data at all. And considering figures more as orders of magnitude than definitive values, and taking the long view, can be helpful when making many decisions for health.

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