[Indian J Chest Dis Allied Sci 2019;61:117-118]

Editorial

Integrated Clinical Data into Clinical Practice

Data is the new bible in the 21st Century. Yuval Noah Harari[1] in his scintillating book *Homo Deus* describes dataism as a 'religion' which "promises to provide the scientific holy grail that has eluded us for centuries: a single overarching theory that unifies all the scientific disciplines…." Unification (or integration) makes the data as most valuable. In the practice of clinical medicine, physicians in the past relied on astute observations. Physicians, for example, from Hippocrates to William Osler recognised diseases and treated their patients based on their clinical findings. Now we know that all these observations must stand the critical scrutiny of others and test of analysis, more precisely the statistical tests. But observations cannot be processed to draw conclusions unless you convert them into numbers, *i.e*. the data. So it is important to have numbers, measurements, calculations, comparisons and analyses for clinical practice. Physicians of even up to the middle of the 20th Century would have laughed at the need for such numbers for their practice. It is no more so. In the modern era, it is extremely important, actually necessary to use and rely on statistical conclusions of the data – lest you make mistakes.

Data, a Latin word is always used in plural which implies a larger number than a single observation. Data which can be either quantitative or qualitative (or both) in nature emerges from gathered information.[2] 'Why has data become necessary for clinical practice' is not a difficult question to answer. The numbers of clinical practitioners and their observations have grown. The observations are frequently at variance, sometimes conflicting and contrary to each other. They also depend upon the experience of the practitioner, place of his/her practice and demographic variables of the patient. Data on the other hand relates to the sum of multiple observations on a larger number of patients and/or at multiple times. It is implied to be 'more true' than a mere clinical observation. Moreover, data can be stored, analysed, compared and retrieved as per the requirement. It has therefore become important to integrate clinical data into routine clinical practice. But the data have grown 'big' to handle. Gone are the days when figures related to a dozen of patients could be translated to make conclusions. The numbers now run in thousands for clinical trials which are mega in scale with multi-centre participation, frequently from multiple cities and different countries. Population and epidemiological data will frequently count in millions multiplied by a number of several different variables. At individual level, each practitioner uses comprehensive medical data of the patient in clinical practice. It has become equally important to use the larger data sets of multiple populations for this decision making. It is for this reason that integration is required for any meaningful interpretation as well as for treatment guidelines. Evidence based guidelines framed after critical analyses of available data sets and published papers have become popular for decision-making related to both diagnosis and management.

Clinical data of individual patients comprises of demographic and clinical details, laboratory investigations, radiological images and histo-pathological figures. Many of these details are observed and recorded serially at follow-up visits. Each individual data set becomes large which is unmanageable for any manual integration into treatment decisions. It is, therefore, collected in a digital format to constitute an Electronic Health Record (EHR) which makes it possible to integrate this information in clinical practice. EHR can be defined as the systematised collection of electronically-stored health information of a patient and population.[3] This health data (or information) becomes available for patient-care and health-care operations on the click of a button while sitting in the Out-Patient department, working in the wards or operating in the theatre.

Clinical practice becomes so much easy and efficient without any compromise on safety or accuracy. EHR technology now enables its interoperable applications that use health and other data to analyse and interpret complex health-care information in the practice of precision medicine and a learning health system.[4] Integrated EHR also offers its use beyond the primary purpose in patient care. EHR can be re-used repeatedly for secondary purposes or 'non-direct' patient-care through analysis and research for policy making. Secondary use of routine clinical data has become increasingly important in patient-care and health research. Pharmaceutical companies increasingly tend to integrate EHR in clinical trial settings to help speedy results of clinical trial for new drugs. EHR from health-care setting is directly merged with electronic data capture for clinical trials to improve efficiency and eliminate transcription errors. Therefore, integrated clinical data are important at all levels of medical practice — individual patient care, framing and validation of evidence based guidelines, clinical research and drug trials, policy framing and building of health-care infrastructure. Different nations use this information to frame standard treatment guidelines for their health-care programmes.[5,6]

There are multiple software programs available for the purposes of digitalisation and integration of clinical data. While some such programs are meant for specific issues, the others are meant for general use in the hospital. For example, the SPIRIT (Systematic Planning of Intelligent Reuse of Integrated Clinical Routine Data) framework allows a step-wise setup for intelligent secondary re-use of routine data.[7] There is a vast amount of Electronic

Medical Record data available with general practice (GP) in Australia which acts as the health-care gatekeeper.[8] Appropriate benefits are, however, available only when proper integration has been done. A recent study from Victoria, Australia on use of a digital health information system (MyHealthRecord) showed such integration as less than adequate.[9] Another recent example on integration of routinely collected data on patient-reported outcomes in cancers with other administrative health data can be cited from database initiative from Alberta, USA.[10] Initiative on step-wise approach for prevention of chronic diseases in the Danish primary care sector is another good example of the use of data on personal digital health profile.[11] Similarly, the integration of evidence based practices in clinical nursing in hospital wards has been tried and found to be useful at various levels.[12]

Incidentally, India lags behind many other developed countries in building EHR and integrated clinical data sets. Factually, recording and maintaining clinical data in most of the hospitals and other practice settings is poor. This hampers a good clinical follow-up of patients and retrieval of information later for reviews and analyses. Collecting information in electronic format makes it simple and informative. This will help in improving clinical service through an efficient clinical practice and management of patients. Further, there is need to building Registries on diseases and other health statistics. We can hardly provide authentic scientific data on epidemiology, morbidity and mortality from different diseases, necessary for policy framing and resource distribution. As of today, we have limited access to such statistic, mostly from National Sample Survey. These data are not useful for scientific analyses and comparison.

The limitations posed due to the bulk of data can be crossed if digitalisation is done at the time of initial recording itself. The trend is changing fast and many of the small hospitals especially in the private sector have already implemented such integration. Several of the large hospitals in the public and governmental sector are also trying to shift to digital formatting in phases. There is no dearth of expertise in computerisation of data in this country. But there is need for resource allocation and capacity-building to face the challenge.

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