Expanding Scope of Information Technology in Clinical Care

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INTRODUCTION

Clinical medicine deals with data in many forms. Conceptually it is suited to gain from information technology (IT) in terms of gathering, analyzing and putting data to practical use. However there has been a chasm, with experts from the two fields often unable to find common ground. The system developed at the Endocrine and Diabetes Centre (EDC) had its origin nearly 30 years ago; it was an end-user initiative followed by features addition by an IT expert. This is different from most earlier attempts where experts from the two fields tried to understand the needs and possibilities of each other with attendant bottlenecks in implementation.

When the EDC was set up 30 years ago, documentation was among the first priorities. Without losing focus of the primary aim, viz, patient care, the kind and quality of data was slotted to be developed into EMR format. Where the knowledge of the clinician was not sufficient to go ahead, collaboration with a software professional was sought; the latter could take over without glitches, because the product, developed until then, was geared in logic and technology to be taken over to the next stage. Importantly the evolution of the IT infrastructure was achieved without any interruption in patient care.

To our knowledge this is the first doctor-initiated EMR system, which was developed and evolved over nearly 30 years. The purpose of this chapter is to document its genesis and evolution and to point to future areas where it can be used. In its current iteration the project is being utilized at the point of care without disrupting the work flow, while retaining the advantages of data digitization and for allowing for addition of further features.

Clinical medicine aims to provide comprehensive care, which is personalized and predictive. As synergy between information technology and clinical encounters led to the electronic medical record (EMR) being the fulcrum of the health care system. What began as a 'electronic paper records' (Price M, Singer a &Kim J, 2013), has expanded to a much broader spectrum to be gathered, collated and utilized, adding digital images, sharing in real time, with the possibility in the near future to integrate other data including genomics and proteomics. In this chapter the evolution of EMR system at the Endocrine and Diabetes Centre is presented along with a blueprint of how it is planned to expand integrating future technologies and processes.

BACKGROUND

Conventionally, clinical medicine deals with data, obtained as non-linear, non-digital form. Paper medical records formed the bedrock for much of initial clinical research and progress. Despite their advantages re-use of data is not practical (Sridhar GR, Rao AA, 2009).

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However in the management of non-communicable diseases such as diabetes mellitus, obesity, hypertension and coronary artery disease, a collaboration between the health care team and the patient is essential, with the patient sharing responsibility in self-care, outside of the physician's office. The rapid applicability of IT allows a practical means to do so. In addition newer digital technologies result in generation of large amount of data, which must be analyzed and used appropriately (Cahn A Akirov A& Raz I. 2017). EMR system has the many advantages of storing nearly unlimited data, with the ability to access, analyze and present it in a format that is easy to interpret, along with providing accurate and legible notes which can track the individual's lifetime of health status, medicine use, laboratory results, images from many sources, transferable across locations. They also provide clinical guidelines, flag abnormal results, remind tests to be done, and reduce medication errors (Sridhar GR, Rao AA et al 2009). In addition newer technologies allow remote consultation with physicians, electronic prescription and drug delivery along with feedback about medicine use (Poon EG et al 2006).

The initial hesitation of using EMR in the clinic, where, in the early stages, the physician seems to pay more attention to the computer or tablet screen than to the person sitting in front of her, is overcome with the many advantages of digital data (Doyle RJ, Wang N et al 2012). Integrating with older paper version of medical records is another major barrier for conversion into EMR, along with software issues in coding, customization, hardware maintenance, security and confidentiality (Pradeepa R, Prabu AV et al 2011). Newer skills are required to not lose emotional and eye contact with the patient. Essentially the EMR system must take into account the workflow so that it aids rather than hamper patient care. The bottom line is often the reluctance of physicians to use the newer systems. Despite all these, barriers not only from the end-users, but other stakeholders also, Serrano et al have concluded recently that health information systems could be beneficial in improving patients" quality of life and of care (Serrano A, Guzman JG et al 2018).

The EMR is ultimately integrated into a health information technology which includes decision-support systems which leads to cost saving at the system level (Ali MK, Shah S& Tandon N 2011).

The aim is to employ digital tools for individualized and upgraded delivery of medical care. Digital medicine has the potential to improve patient satisfaction, lower the cost of care, and enable clinical research not confined to merely academic centres (Stenholm SR & Topol EJ 2017). While information technology is ubiquitous, medical field has been untouched, except in isolated centres (Sridhar GR. Murali G 2011, Pradeepa R, Prabhu V et al 2011). Riddle et al (Riddle MC, Bakris G et al 2018) summarized the limitations of IT in the clinical practice: a general a lack of harmony in the way data is collected and managed.

FOCUS OF THE ARTICLE

Evolution of the EMR system at Endocrine and Diabetes Centre (EDC)

When the EDC was established in 1988, patient records were maintained as text using paper files. With the aim of future digitized entry, the data was categorized into Identification (unique number for each new subject), Name, family name, gender, age, address, city and zip code. A second section related to the history of the patient, followed by the following sections on physical examination, investigations, treatment and follow up.

After two more years, the kind of (endocrine) diseases with which the patients presented was reviewed as well as the symptoms and signs for each. Data was separated into categories (eg in diabetes: duration