Some Thoughts on the Psychology of Integration of Informatics in Healthcare; and a Suggestion

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Foreword
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Abstract

The number of failed information technology (IT) systems in healthcare is legendary. And the volume of good intentions thrown behind bad money is even more astronomical. Apart from generating a plethora of definitions for medical/health informatics, with their attendant terminology changes, we are still embroiled in the coding / classification / terminology imbroglio regarding their effective adaptation in patient records. Perhaps as a result of these, many of us in the healthcare field have developed a subconscious defensive attitude towards implementation of IT in healthcare. Integration of informatics in healthcare is a complex issue, involving social, cultural, psychological, technological, commercial, political and economical factors. Straightforward mimicking other domains is not the answer. Keeping in view these points, this opinion paper focuses on some psychological aspects of informatics in healthcare and suggests a preliminary solution for capturing the patient anamnesis from a theoretical perspective, that which, it is hoped, will form a suitable test bed for practical validation through collaborative research, given the proper innovational motivation.

Key words:

Audiovisual, Anamnesis, Healthcare Informatics, Psychology

Introduction

Ever since Allan Levy proposed in 1977 that medical informatics be considered a basic science and Collen formally defined the term in MEDINFO 77 [1], it has undergone several modifications and revisions till its final characterization today as healthcare informatics [2]. Healthcare informatics, as we understand it today, is concerned with efficiently processing health-related information for the central purposes of reducing healthcare risks, improving outcomes and controlling costs of healthcare [3].

Current healthcare scenario

Healthcare sector in general, and in the developing world in particular, is characterized by the following constraints:

- Available resources are always several paces behind the demands on healthcare.
- Whenever national budgets need to be revamped, healthcare sector is usually among the first to receive the axe.
- When budgetary allocations are considered, healthcare sector is among the last in the dole list; other sectors like defence being considered higher in the list of priorities.
- Healthcare facilities are often understaffed and under-equipped; providers are generally over-worked.
- There is wide variation in the scope and depth of healthcare infrastructure from region to region and country to country.

Psychological implications

The banking and financial sector institutions (BFSI), airlines and hospitality industries have surpassed the health sector in the process of automating their respective spheres of activity. [4] Not that there are no stories of failed information technology (IT) implementation in general, [5,6] but the documented instances of their failure in healthcare in particular are as legendary as they are voluminous. [7-12] This has put us in a curious psychological quandary, or three to be precise. For most of us in the healthcare field, these psychological processes are occurring on a subconscious level, without us being aware of it, or willing to admit it.

First of all, deep down in our psyche is a feeling of being left behind by the world. This has served to make many of us go on the defensive regarding our position, even bordering on the diffidence. While discussing implementation of a healthcare information system in a UK hospital and reasons for failure of such systems in healthcare, one could not resist a rhetorical reference to '*computers enabling man to land on Mars*' while

we were unable to integrate them effectively in a hospital environment. [7]

Secondly, perhaps as a belated knee-jerk attempt to catch up with the Joneses, we are engaged in a rat race to implement informatics technology anyhow in healthcare, often without proper background study. A simple Medline database search revealing a plethora of healthcare informatics implementation, attempts really, bears this contention out. [13] The volume of good money thrown after bad is astronomical. [6-9,11]

Thirdly, perhaps smarting from this state of affairs, we are unconsciously trying to mimic other disciplines in our attempts to integrate informatics technology in the healthcare sector. Our attempts to codify and digitize the richness of the patient narrative (anamnesis) and capture them through XML (eXtensible Markup Language) tags / data entry masks is an example of this phenomenon. [14]

Figure 1 graphically highlights the complex psychological personae that are at play in the process of integration of informatics technology in healthcare. More often than not, it is a combination of several psychological factors that are at work. Given this psychological interplay, it is not unusual that we are experiencing such problems in integrating informatics effectively in healthcare practice. Therefore I have described a few 'should-nots', using some metaphorical allegorical figures of speech for emphasis, which we need to integrate in our collective psyche when we go about implementing IT in our respective healthcare domains.

Figure 1: Mixed psychological factors at play

Re-orienting our psychological personae

We should not flog a tired / dead horse: When a system is in its death throes, we should not throw good money after bad. We should have the wisdom to recognize it, have the humility to admit our faults, learn from our mistakes, cut our losses, consolidate our gains (if any, whatever), and plan again for the future, hopefully more rationally.

We should avoid being a "me too" chick: Implementation of a system should not be just so that we can say we also have a system in place. Instead we need to ask, is this what we want or need (?), is it benefiting our healthcare consumers (?), is it supporting our providers in their work (?).

We should not swallow more than we can digest, like the boa constrictor: Informatics plans should not be overambitious and grandiosely expensive; they should be just right for the point of care (POC). This requires possessing the right perspective of the magnitude of the problem.

We should not be a copy cat: We should not try to blindly mimic other healthcare or non-healthcare implementations. Each place has its own unique set of requirements and resources; system implementation should match these two.

We should not get into a rat race: Just because non-healthcare domains are way ahead of us in implementing IT in their spheres of influence, or other healthcare facilities have expensively computerized their activities; that alone should not be the deciding factor in our decision to do the same with our POC.

Constraints in healthcare sector

'Granular' perspective

The reason other sectors have been computerized while we are experiencing difficulties is getting computers to work in hospitals is just that; because they are hospitals. Considering a 'granular' perspective, there are three sets of constraints that hospitals have to labour under.

Firstly, hospitals have a diverse workflow, which are classified as clinical management, clinical administration, clinical services, and general management, each incorporating several subdivisions.

Secondly, the staffing patterns in hospital are equally myriad, with numerous clinical specialties for doctors, nursing, scientific, therapeutic and administrative specializations.

Thirdly, hospital staffs work in many places; in-patient wards, out-patients, private consulting offices, laboratories and libraries, often spanning more than one hospital. Thus hospital medicine has complex workflow, job specialization, job localization and division of labour, each with its unique pattern of information usage. [15,16]

'Atomic' perspective

Now let us consider a more 'atomic' perspective, namely data and information handling. From an informatics viewpoint, the BFSI for example, has matured earlier than the health sector [4] primarily because the former deals with only one type of data – almost exclusively figures. Therefore integration on a regional, national and even global scale is relatively simple.

The health sector on the other hand, is constrained to deal with information as diverse as text (consultation notes, patient

anamnesis, operation notes), images, bio-signals (ECG etc), and laboratory values. We are compelled to try to integrate them in an EPR (electronic patient record) environment, utilizing for example, DICOM (Digital Imaging and Communication in Medicine) standard for images, SCP (Secure Copy Protocol) standard for ECG interchange and communication, and HL 7 (Health Level 7) for laboratory values, and share them over diverse stakeholders, while maintaining their privacy and security at the same time. [17,18] To complicate matters, even for ECG there are at present several standardization proposals on the market, e.g. the DICOM supplement 30 waveform specification, the European File Exchange Format (FEF) standard, and the American FDA (Food and Drug Administration) XML standardization proposal for ECG waveform interchange. [19] We are devising complicated HISS (Health Information Support Systems) to achieve these. [14,20] Tough as it is to create such a multi-media patient record (MPR), [16] arguably the most formidable challenge lies in dealing with the patient anamnesis.

Communication and anamnesis in healthcare

Communication

Communication is the central issue in any healthcare organization. [21] Two of the aforementioned purposes of healthcare informatics (reducing healthcare risks and improving patient care) depend on it. Likewise, improper or miscommunication leads to increased medical errors [22] and consequent degradation in quality of care. Communication starts right from the time of arrival, and cutting across the continuum of care, does not stop even after the patient is discharged from the hospital. Figure 2 gives a Venn-diagrammatic representation of the communication between different (healthcare) providers (P_1 through P_x) and with the patient / relatives. The overlapping circles emphasize the importance of communication between every level of provider, both within themselves as well as with the patient.

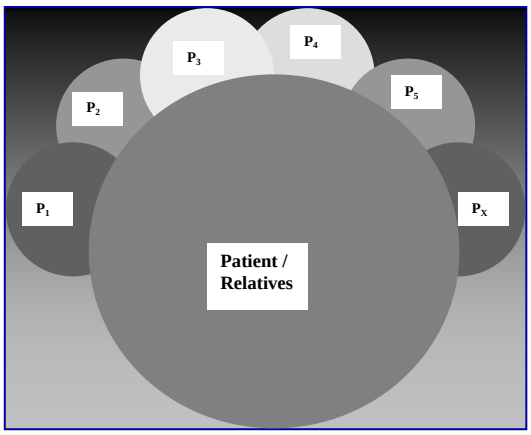

Figure 2: Overlapping spheres of communication in healthcare

Anamnesis

This is where patient anamnesis comes in. Derived from the late 16th century Greek word '*anamimneskein*', meaning "remembrance" or literally "to call back to mind," which in turn has been derived from '*mimneskein*' meaning "to call to mind", the term has several levels of perceptual meanings. In psychology it technically refers to **recollection;** a recollection of past events. In medicine it refers to **case history;** the medical history of a patient, especially in the patient's own words. [23] 'Anamnesis' also means "inability to forget", as opposed to 'amnesia' which means "inability to remember". [24] All these shades of meaning are relevant to our context.
MeSH (Medical Subject Heading) database search of this term gives a rather restricted meaning of the term anamnesis only pertaining to recalling immunological memory. [25] For the purpose of our discussion we shall disregard this.

Anamnesis refers to communication with the patient in his/her own words. They should therefore be in a form that one cannot forget and be able to recollect (retrieve, in this case) later, even by another provider, without any degradation of meaning. In that respect it is a form of archive. The archive keeps one foot firmly in the past and another in the future, remembering in order to allow us to forget and forgetting in order to remember. [24]

Problems of anamnesis capture

The traditional form of anamnesis used to be textual format stored on paper. Now we are attempting to store them in coded form for computerized data entry, storage and retrieval. [16] Like the BFSI, for example, where most data is in a single format, we need to avoid the temptation of mimicking them in trying to convert the patient textual narratives in codes. Given the volume of communication that goes on in the course of a typical patient-care continuum, trying to capture the entire gamut of the communication / anamnesis in coded form for computer storage and retrieval gives rise to two problems:

1. It is virtually *impossible* to capture everything; every nuance and shades of meaning.
2. Whatever is captured in code is a pale shadow of the original, giving a poor representation of the actual meaning, especially when it has to be interpreted by another provider at a later stage.

Sometimes there is ambiguity and confusion between clinicians with regard to medical terminologies, as the 'superficial femoral vein thrombophlebitis' imbroglio demonstrates, [26] with potentially lethal consequences. Our classifications and terminologies (enumerative, compositional, lexical and hybrid) have become too complicated and convoluted for our own good. In an effort to solve the problems of one scheme we are creating new ones, which, instead of solving the existing problems, are creating new ones of their own! No wonder, in spite of years of time, money and effort spent in designing clinical coding systems, results are so unsatisfactory till date. [27]

Then there is the problem of data entry. After having laboriously elicited the patient history, the doctor, usually a

junior has to enter the data in some form of a coded system. [14] Moreover, it is universally agreed that no scheme can hope to match the semantic richness of the spoken word. [28] Furthermore, after narrative data has been captured in code, if at a much later date, several different clinicians are asked to re-interpret the coded data and translate them back to patient narrative, how much agreement will be there between them, and how close will they be to the original patient narrative? The case study involving six untrained coders at the Getty Museum using their Art and Architecture Thesaurus, albeit in a non-healthcare setting, illustrates this point. [29]

Potential solution – audio/audiovisual format

There are serious moves afoot in the arts and humanities disciplines, to convert archives from purely textual to include multimedia (digital video (DV), audio etc). This has been spurred, no doubt, by the progressive decrease in cost of DV and the relative technological ease of capturing in DV format, which last, hitherto in the hands of professionals, has now percolated down to the 'prosumer' and thence to the consumer. [30]

Communication in healthcare, of which patient anamnesis is an essential component, is akin to the social sciences, arts and humanities. So what is the constraint in capturing the patient anamnesis in audiovisual format, with suitable modifications for healthcare settings? It is an example of adaptation from a like-minded situation. Thus, instead of trying to artificially 'code' the patient narrative, and thus deprive it of its true value, we should try to capture the entire anamnesis in audio/audiovisual files, break them up into smaller manageable sections, with hyperlinked subheadings, and store as such. Whenever any provider wishes to study the patient record, (s)he can click on the relevant linked subheading to see / hear the appropriate patient history recording.

This can be achieved with a multimedia compiler that is compatible with most of the common operating systems in use in PCs, preferably a 4GL (4^{th} generation (programming) language). At least one such is in existence. [31]

Of course, audiovisual anamnesis will constitute just one part of the whole system. The box below gives an outline of audio, video, database and network inter-relationships that such a system can offer in terms of archiving patient data in real time, in true form, without modification, with relative ease, and at the same time making them easily accessible to the authorized care provider. The various components of the audiovisual features mentioned in the first set in the box would be supported by the network and control systems enumerated in the second set. [31]

In contrast to coded data which is disjointed, and traditional text, which is sequential (vertically cumulative), multimedia (audio/audiovisual data) is laterally associative, [30] i.e. it can be centrifugally connected, by means of links, to a central core in the tradition of a cybernetic network.

Audiovisual anamnesis (maybe with online still/video integration)
Audiovisual/video database systems
Audiovisual patient data banks
Audiovisual knowledge transfer / complex tables of all specialist areas
Audiovisual PC technology for video/screen titling, synchronization etc
Multimedia translation PCs / "speaking" question catalogs in different languages (digit interpreter)
Representation of logistic operational sequence, process animation and visualization

Information and control systems for hospitals
Multimedia information networks (modem, Intranet systems)
Network communication in hospitals, multimedia patient information
Radio data base access on central server
Global data base accesses by Internet / intelligent and associative term search
Internet video-phones
WWW full-duplex video conferencing

Adapted from PIXXOS (Pixel Enhanced Operating System), a 4GL multimedia compiler; © 2004 CMD - Computer Media Design.

Conclusion

In conclusion I would like to reiterate two points. Healthcare informatics, or more specifically its implementation, should be viewed in its own perspective, as a complex socio-cultural, psychological, techno-commercial and political entity, without any comparisons with other domains. Secondly, it is hoped that the theoretical perspective of capturing the patient anamnesis in audio/audiovisual form described above will form a suitable test bed for practical validation through collaborative research, given the proper innovational motivation. It is also anticipated that this approach will not only work out more economical in the long term, but also obviate many of the constraints in healthcare delivery mentioned earlier.

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