A New Approach to the Transition from Paper to Electronic Medical Records

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Abstract: Electronic medical records (EMR) offer much potential. However, various problems have made the widespread use of EMR an unachieved reality (West and Blake, 2009). The problems reached such levels that in some countries, the transition from paper to electronic version has slowed down, if not stopped. For example, the U.K. NHS abandoned some of its ambitious plans for full transition from paper to electronic medical records (Daily Mail, 2011 Aug 03). In other countries, like Saudi Arabia, some started questioning the wisdom of electronic systems, and seek new methods of implementations, that do away from the previous mistakes. To address these issues, one needs to discover what went wrong. The myriads of issues involved, is proving rather complex, needing a sophisticated approach to expose them. Ahmad (2012) has explored an approach called Down-To-Earth (DTE) which provides a rich picture of information systems (IS) use. This paper adopts Ahmad approach to gain a richer picture of medical records. The DTE approach is based on what is called Dooyeweerd's aspects, which is a set of distinct ways in which things like medical records function and are meaningful. The main aim of this paper is to explore the potential of the Down To Earth approach with Dooyeweerd's aspects as a way to better understanding health-care giver behaviour with medical records, as a prelude to discussing how to effect more appropriate transition to EMR. By health-care giver we include: physician, nurse, technician and administration.

1 INTRODUCTION

Electronic medical records (EMR) offer much potential, over paper ones, but they have problems, which made their widespread use an unachieved reality (West and Blake, 2009), and reached such levels that in some countries, the transition from paper to electronic version has slowed down, if not stopped. For example, in the U.K. the NHS has abandoned its ambitious transition plans, (Daily Mail, 2011 Aug 03). In Saudi Arabia, some started questioning the wisdom of electronic systems, and are seeking new methods of implementation.

There are myriads of issues involved, needing a sophisticated approach to expose them. Ahmad (2012) has explored an approach called Down-To-Earth (DTE), which is based on Dooyeweerd's aspects - a set of distinct ways, or viewpoints, from which things are look at - which provides a rich picture of information systems (IS) use, and hence was adopted by this study.

The main aim of this paper is to explore the potential of DTE, in extracting hidden EMR issues that will improve the transition to EMR process.

2 LITERATURE REVIEW

This literature review confines itself to a summary of discussion about the potential and problems of electronic medical records (used here synonymously with 'electronic health records.

2.1 The Potential of Electronic Medical Record

Paper medical records are often incomplete, out of date, illegible or difficult to read, leaving clinicians without crucial information when trying to make decisions on treatment protocols and medications (Bliemel and Hassanein, 2004). EMR, as Ofri (2010) suggests, are: more efficient; safer (see also Fetter, 2009); can solve record movement issues (McDonald, 1997); enhance physician order entry, hence preventing serious medication errors (Mukherjee and McGinnis, 2007) and help to reduce

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duplication of patient records, (Hardiker et al., 2000). All such issues are time savers.

Stausberg, et al., (2003) have noted that paper and electronic-based records, of patients, are generally used in unison, for the benefit of implementing different tasks.

2.2 Problems with EMR

Some problems arise from the design of the EMR system. McDonald (1997) draws attention to hardware problems, such as interference between the EMR system and electronic equipment. Berg (1997) raises the 'rush hour' problem, where many information sources exchange procedures of laboratory results and other information at the same time causing "important obstacles to the network's smooth functioning".

Often the user interface is of a design that does match the users' needs or the way they work. Traditionally information is entered by filling pre-set fields, but Pallav (2006) mentioned that a narrative format is preferred by some doctors, especially some psychiatric practitioners. Walsh (2004) explains, "every patient tells a story...", and "the patient is seen as a page ….and the doctor becomes the author of stories within the medical record". However, as Pallav (2006), points out, narrative style might make design and implementation of EMR more difficult, both in specific data of patient and the structure of the data in the system. Standardization of not just format but also of the exact meaning of pieces of information becomes a challenge (Altiwajiri, 2010).

IT skills is a major complex problem (Walsh 2004). Devitt and Murphy (2004) stated that doctors needed to be taught, or to have, information skills, and Altiwajiri (2010) confirms that there is a general illiteracy of IT-related issues among health care people.

As there are many stake-holders in EMR, (Berg and Bowker, 1997), (Berg, 1997) suggested that physicians need to be made part of the IS, to overcome their "learning to type" objections.

Dick and Steen (1991 cited by berg, 1997) draw attention to costs, and Miller and Sim (2004) argue that there are financial barriers to the use of EMR. There are also important legal and ethical issues that need addressing (Davis and Konikoff, 1998), as well as, as Berg and Bowker (1996) argued, that potential of sociological perspectives that has not been sufficiently recognised.

Ilie, Courtney and Slyke (2007) analysed the reactance of physicians to usage, and eventual, acceptance of EMR. Altiwajiri (2010), also shares this point in Saudi Arabia, where his research was conducted. Timmons (2003) notes this reaction is not limited to physicians but also includes nurses. He finds that resistance is to both the implementation and use of computer systems, and to both the ideas and the ways of working of such systems, and cites Dowling as giving the following types, or forms, of resistance: passive resistance (non-cooperation), oral defamation, data sabotage and refusal to use. Pallav (2006) claims that "many EMR system[s] are rejected by clinician because they are not based on a story metaphor".

On the other hand, 'Learning to type' is not just a matter of training, but an issue of self-belief and vision for one's work. Physicians argue that 'learning to type' is not they are trained to do. Altiwajiri (2010)'s study also encountered a multitude of religious-related issues.

2.3 The Need for a New Approach

The picture given in the literature is one of confusion, with a wide variety of advantages of EMR but also a wide variety of problems. Because of this, Stausberg et al., (2003) suggest that paper-based and electronic-based patient records are often used in unison, to support a variety of tasks. Problems cited by many studies cannot be relied upon because the research methods used are not made clear. Few studies give much attention to the patient, for instance, and Davis & Konikoff (1998) survey medical students.

Ahmad (2012) argues that the traditional approaches to IS use in general (of which EMR is one specific type) cannot address the problems that really matter to bring about high quality IS use. She suggested that there are a number of deeper problems with the way in which traditional approaches view IS use.

First, the problem is of wrong perspective. Most discussion of IS use is in terms of what management, ICT suppliers, academics etc. find meaningful, rather than in terms of what the users 'on the ground' find meaningful. Altiwajiri's (2010) study is an example of this. He discusses a range of issues, including IT-illiteracy, standardization, resistance and general religious issues, but he explicitly states that these issues are from the perspective of the designer, management or government. According to Ahmad, taking the perspective of the user is one reason why IS's failure is so common. Judging by resistance of nurses, and some physicians, this is the case in EMR too. This problem was touched by Timmons's (2003) study,

which mentioned that "Resistance was as much about the ideas and ways of working ... as it was about the actual technology being used".

Resistance by nurses has not been thoroughly studied from a sociological perspective (Berg and Bowker, 1997), so many sociological issues remain hidden.

The plethora of problems discussed by Ahmad (2012) has shown the potential for being directly related to EMR. There is one problem she discussed that might not apply. In many extant theories of IS use, the issues tend to be of narrow scope and focus, for example technical or economic issues.

2.3.1 Toward a New Approach: The Down-To-Earth (DTE) Approach

DTE is a paradigm for research, has a philosophical underpinning, and provides a methodology for analysis. Under the DTE paradigm, the issues that matter are those of the everyday activity of people that relate to their use of IS, rather than those of ICT suppliers, academics or management.

The method devised by Ahmad employs open interviews, with the interview transcripts being analysed by reference to aspects. During analysis phase, Ahmad first employed a standard qualitative analysis technique, but then used Dooyeweerd's aspects to extract DTE issues from transcripts. There are three ways by which meaningful issues are revealed in the transcript text: first directly from the words used, second making inferences by deduction, third looking for indirect effects while looking at interviewee's background. Using aspects helps to reveal multiple meanings of the situation to the one respondent.

In this way the diverse complexity of medical records use can be investigated more systematically. It matters now whether the medium of the IS is paper or electronic is of secondary importance to the human activity with the information itself.

2.3.2 Dooyeweerd's Aspects:

Dooyeweerd suggested that there are, at least, fifteen diversified aspects, or ways of being meaningful, which one can utilise to look at reality. Appendix 1 lists them. The first three aspects - quantitative, spatial and kinematic - are what Dooyeweerd called mathematical aspects. The next three - physical, biotic and psychic/sensitive - are pre-human aspects, in that they govern material, plants and animals. The next three - analytical, formative and lingual - are aspects of individual, cognitive human life. The next three - social, economic and aesthetic - are organisational aspects of living together. The final three aspects - juridical, ethical and pistic/faith - are of global or societal reality. It must be said that, Dooyeweerd did not think of these aspects as exclusive, but rather a mere proposal.

2.3.3 Using Dooyeweerd's Aspects to Understand Potential and Problems

As an example, the potential and problems of EMR will be analysed by reference to aspects. Each is a potential and problem precisely because it is meaningful in a certain way, as shown in Table 1. For example, costs are meaningful by virtue of the economic aspect, not any other aspect.

3 VALIDATING THE APPROACH: INITIAL RESULTS

40 interviews were undertaken in four hospitals in Saudi Arabia, involving health-care givers in four hospitals. The interviews have been transcribed and are in the process of being analysed for Down-to-Earth issues that are meaningful to the interviewees. In some hospitals some EMR is in place while others still use paper records. The aim of the interviews was to discover kinds of DTE issues that relate to using medical records of either type, in order to disclose what is important in such use, so that such issues can be taken into account in any transition to EMR.

The following is a selection of small parts of the transcript, to demonstrate the method by which DTE analysis using aspects is carried out. The method is to seek to find, from within the respondent's answer to the researcher's question, what the health-care giver on the ground finds meaningful. As will become plain, and in most cases, the respondent goes beyond merely answering the question bringing-in other material that is meaningful to them. Sometimes they bring in something they grumble about, and sometimes they branch off onto other matters that occur to them while speaking. Tailing each Q&A is a table of DTE issues involved, in each Q&A session, as in Table 2.

Q: which is better to work on, the paper file or on the electronic file?

A: both are good, but both must be correctly used. Because I cannot tell you which is better, because this requires study. Therefore, in order to know which is better, we must do brain storming. And all concerned parties must meet to take such a

Table 1: A list of Dooyweerds' aspects is shown.

	Aspect	Potential of EMR	Problem of EMR
1	Quantitative (Discrete amount).		
2	Spatial (Continuous extension)		
3	Kinematic (Flowing movement)		The presence of other extant electronic data sources.
4	Physical (Fields, Energy, mass.)		
5	Biotic/organic (Life, organism)		
6	Sensitive/psychic (Sensing, feeling, emotion)		
7	Analytical (Distinction, concepts Abstraction, logic)		
8	Formative (Deliberate shaping, Technology, skill, history)	EMR Productivity	-Narrative format. - technological barriers for the use of EMR
9	Lingual (Symbolic signification)	Narrative format is preferred by some doctors.	
10	Social (Relationships, roles)		a multitude of culture-related issues.
11	Economic (Frugality, resources; Management)	EMR is safer than paper.	financial barriers for the use of EMR
12	Aesthetic aspect Harmony, delight		
13	Juridical (Due', appropriateness; Rights, responsibilities)	EMR is more efficient work	legal issues
14	Ethical (Attitude, Self-giving love)		Resistance from nurses and physician
15	Pistic/Faith (Faith, commitment, belief; Vision of who we are)		Physicians learning to type

decision and to take the appropriate decision about which is better. I, on my own, cannot decide that, but there are some documentations that i can do for them minimizing and they become wireless.

Table 2: A DTE issues list, stemming out of the Q&A, above is shown.

Aspect	DTE Issues
Juridical	both are good, but both must be correctly used.
Analytic	in order to know which is better, we must do brain storming.
Social	-all concerned parties must meet to take such a decision. - I, on my own, cannot decide that.
Formative	I can do for them minimizing and they become wireless

Q: who is responsible to print the lab results?

A: it's both the nurse and physician can do it but 90% nurses do it like me. Some doctors will initially look at the system but they will eventually print it out. It's a habit formative. A DTE list, of this Q&A session, is shown in Table 3.

Table 3: A DTE issues list, stemming out of the Q&A, above is shown.

Aspect	DTE Issues
Juridical	it's both the nurse and physician can do it but 90% nurses do it like me
Lingual	Some doctors will initially look at the system
Economic	but they will eventually print it out. (waste of paper)
Formative	It's a habit

Q: Why does the nurse writes the nurses note in a form of a story?

A: its mean explain the details of the patient's condition written in a form of a story. I already told you that lack of improvement and development caused shortage and the absence of update. Documentation that is particular for nurse is supposed to developed and updated by the ministry because since 8 years ago nothing has changed and never developed. And when we ask for position paper, I think it does not l exist, especially the nurse that makes the position of the patient. Also, as for the emergency nurses' notes, we still update them through personal efforts from emergency

management. A DTE list, of this Q&A session, is shown in Table 4.

Table 4: A DTE issues list, stemming out of the Q&A, above is shown.

Aspect	DTE Issues
Lingual	its mean explain the details of the patient's condition written in a form of a story
Economic	The lack of improvement and development caused shortage and the absence of update
Juridical	since 8 years ago nothing has changed and never developed (implies they did not do what they should do)
Ethical	the emergency nurses' notes, we still update them through personal efforts

Q: Do you think can stop to print the lab results?

A: it will be very useful. But sometimes doctors are too busy to sit in front of the computer all the time. It's only a matter of getting used to it. Do you want to know how many pages we fill up? I will show you later the ICU sheet. This is just one thing they fill everything, every sheet. Now these are loads of pages. Aside from this one there are other papers as well. So it's all about documentation. We don't spend too much time with the patient. This is time consuming.

Sometimes, my staff look at me and cry. Even after going home I am working, for 14 hours. A DTE list, of this Q&A session, is shown in Table 5.

Table 5: A DTE issues list, stemming out of the Q&A, above is shown.

Aspect	DTE Issues
Aesthetic	it will be very useful
Economic	sometimes doctors are too busy to sit in front of the computer all the time.
Faith	It's only a matter of getting used to it.
Lingual	This is just one thing they fill everything, every sheet. Now these are loads of pages.
psychic	Sometimes my stuff look at me and cry
Juridical	Even after going home I am working, for 14 hours

In making the aspectual analysis, the analyst looks for which aspect makes what they say meaningful, usually sentence by sentence but sometimes by phrase or by group of sentences. The analyst asks themselves "Why did the respondent say this rather than keeping silence or saying something else; which is the main aspect that makes this utterance meaningful?"

4 REFLECTION ON ANALYSES

These are demonstration analyses, but are similar to those made by Ahmad (2012). We do not claim that they are representative of the entire plethora of meaningful issues, but merely seek to highlight some of the ways that using aspects can facilitate understanding DTE issues:

- Aspects help us appreciate the diversity of issues that are meaningful to health-care givers concerning medical records. This is because they help us distinguish one way of being meaningful from another, using a philosophically sound set of spheres of meanings. Thus, for example, from the analyses above, we find: 1 psychic aspect, 1 analytic, 2 formative, 3 lingual, 1 social, 3 economic, 1 aesthetic, 4 juridical, 1 ethical and 1 faith aspect. This confirms that DTE issues are of many kinds, even more than was apparent through the literature review.
- Aspects provide support for that which is intuitively felt as important to health-care givers, which might not be revealed in normal interviews or questionnaires. This is because they are allowed to bring out any matters that occur to them, and aspects provide the analyst with a way of judging why they might be meaningful (rather than merely verbal padding). In this way, things that the respondent might have felt were trivial, or embarrassing, are revealed, as was found by Kane (2005).
- In such ways, aspects give priority to the respondents' answers over the researcher's questions. In this way, DTE issues are disclosed that the researcher might not have thought about. Aspects give incentive to take what the respondent says at face value.
- Aspects can stimulate the researcher to make deductions about meaningful issues, not on the basis of bias, but of shared ways of being meaningful. This discloses DTE issues that would ordinarily be hidden (taken for granted or indirect).
- Aspects provide a way of broadly classifying

issues. Admittedly this is quite broad when taken to one level, but Dooyeweerd provides points to more sophisticated analyses, at several levels, and employing notions of aspects with special roles: qualifying, leading and founding. These will be investigated during the main study.

- Aspectual profiles can be generated by counting things in each aspect and comparing counts. We might, for example, compare the counts from above analyses with a count of the number of times each aspect is deemed important in the extant literature.

Guidelines for transition to EMR can be obtained both from the list of DTE issues revealed, collated under aspects, and also from the general form of aspectual meaningfulness. In each aspect we can expect that a number of issues will have surfaced, but not all. The revealed issues can form the core for proposals, but the possibility of still-hidden issues will motivate flexibility in design. The design of both technical system and human context are important, and aspects provides for their integration.

5 CONCLUSIONS

This paper has applied Down-to-Earth issues technique to medical records, in the hope of facilitating better transition from paper to electronic records. Medical records are seen as a kind of information system (IS), which needs to be considered from the perspective of its users 'on the ground' (health-care givers), which possesses many hidden issues, the wide variety of which needs to be understood and managed. Dooyeweerds' aspects provide the core idea, which are spheres of meaningfulness in which all MR activity functions, and which are all important. The potential of aspects has been demonstrated by aspectual analysis of several interview transcripts.

There are several venues for future work. This research will continue analysing the 40 transcripts to find more multiple and hidden meanings from a users' perspective. Aspectual profiles will be formed, by cohort, by hospital type, and overall, to ascertain the kinds of issues that each tends to find meaningful and, more importantly, to identify the kinds of issue that each might have overlooked. These profiles will be compared and contrasted with cohorts in the literature, to identify over- and under-emphasis on issues therein. The DTE issues that emerge from transcript analysis can be collated under their aspects to provide a comprehensive view of what needs to be discussed when planning transition to EMR. Exactly how this will be carried out has yet to be explored.

6 CONTRIBUTIONS

The DTE method (Ahmad, 2012) have contributed to the analysis methods, in situations fogged by a plethora of issues. DTE exposed hidden issues and orientated toward a user's perspective.

The notion of Down-to-earth issues, with its philosophical underpinning in Dooyeweerds' aspects, can contribute to a theory surrounding medical records, ranging from Weed's early work, through theories of resistance to technology and narrative form. The DTE approach can provide a basis for their integration, so that insights from different theories can be seen as part of a wider picture. Identifying which kinds of issues are over- and under-emphasised in research literature, can provide strategic guidance to research and academic discourse about EMR.

The method for revealing DTE issues promises to ease the study of problematic medical record situations. It can guide managers and system designers in drawing-up guidelines for the benefit of the transition process from PMR to EMR. It can guide government organizations in drawing-up relevant, useful and easy to follow policies on all EMR pertaining issues, from an everyday life perspective. These tasks would build on the DTE aspects, thus avoiding pitfalls that other implementation exercises have faced. These contributions are relevant to all cultures and countries, but could be particularly useful for those like KSA, when embarking on feasibility studies, or are just about ready to start implementing such transitions.

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