

A Case Study of Clinicians' Perceptions of Enterprise Content Management at Tygerberg Hospital

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Abstract—Healthcare is a human right. The sensitivity of health issues has necessitated the introduction of Enterprise Content Management (ECM) at district hospitals in the Western Cape Province of South Africa. The objective is understanding clinicians' perception of ECM at their workplace. It is a descriptive case study design of constructivist paradigm. It employed a phenomenological data analysis method using a pattern matching deductive based analytical procedure. Purposive and snowball sampling techniques were applied in selecting participants. Clinicians expressed concerns and frustrations using ECM such as, non-integration with other hospital systems. Inadequate access points to ECM. Incorrect labelling of notes and bar-coding causes more time wasted in finding information. System features and/or functions (such as search and edit) are not possible. Hospital management and clinicians are not constantly interacting and discussing. Information turnaround time is unacceptably lengthy. Resolving these problems would involve a positive working relationship between hospital management and clinicians. In addition, prioritising the problems faced by clinicians in relation to relevance can ensure problem-solving in order to meet clinicians' expectations and hospitals' objective. Clinicians' perception should invoke attention from hospital management with regards technology use. The study's results can be generalised across clinician groupings exposed to ECM at various district hospitals because of professional and hospital homogeneity.

Keywords—Clinician, electronic content management, hospital, perception, technology.

I. INTRODUCTION

HEALTHCARE is a deserved human right. The sensitivity of health issues has necessitated the introduction of a Health Information System (HIS) known as ECM at the Tygerberg Hospital in the Western Cape Province in South Africa (SA). The acceptance of technology by healthcare practitioners should not be underestimated [3], as it is the primary and main factor in the success or failure of any ICT design, development and implementation [19]. Technology for healthcare should arguably be easy to use [1], easy to access [26] and beneficial to users – additionally, it should come at a reduced cost [15]. It has been argued that technology offers benefits, such as improved communication between professionals, accessibility of information, improved data backlog quality, and reduced medical errors [25].

The study objective is to understand clinicians' perception of ECM at their workplace. It was designed in-lieu of propositions developed and themes identified from the literature. The next sections of this paper will highlight the research question, the objective, discusses a review of the

literature, and methodology and analysis. It concludes with a discussion section.

II. REVIEW OF LITERATURE

Not all HIS implementations are success stories [1]. Some of the reasons for their failures have been cost [27], limited user participation, lack of information [26], as well as perceived complexity [14]. The vision of an interoperable ECM would create a mass database where clinicians can detect epidemics and study drug interactions; however, this idea is yet to be realised. In addition, there is on-going debate by the sceptics such as [16], [21] against the optimist such as [13] that the digital revolution and all the improvements in healthcare will remain promises until clinicians find EPRs more useful in medical and economic terms.

In SA and most especially in this study, the ECM system is the name of the system installed at Tygerberg Hospital and is defined as:

“...a repository of information regarding the health status of a subject of care in a computer processable form, storage and transmitted securely, and accessible by multiple authorised users”.

Using this definition, ECM caters for health information security, storage, processing, retrieval standardisation and use although information ownership is unclear, and thus, leaves interpretation to the regional legislative health authority to determine [11].

Though ECMs are developed with intent to have positive impacts on healthcare delivery services through improvements of existing service delivery mechanisms, its adoption and implementation successes have remained very low (between 5% and 30%) owing to reasons such as unsupportive organisational culture [2]; software and hardware complexities [18] amongst other reasons. Health practitioners have been reluctant to adopt ECMs in both their individual practices and general hospital implementations have failed because of varying reasons such as more work for clinicians [7]; financial barriers [22]; no support for change [28].

The ECM system is associated with certain benefits such as a shortening of the time taken to access records which takes only a few minutes per patient, especially when clinicians' time is tightly scheduled [6]. In addition, [12] considered ECMs as time and space-saving which can be life-saving, and cost effective, whilst maintaining confidentiality, and making transfers to other clinicians easy and immediate. Electronic records are more legible because the writing size and styles can be adjusted by the user to improve reading.

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III. METHODOLOGY

The study used a constructivist paradigm approach which claims that truth is relative and that it is dependent on one's perspective with an advantage being the close collaboration between the researcher and the participant [36], while enabling participants to tell their stories [4], [9]. A descriptive case study design was applied as it is an intervention or phenomenon, situation, and event and the real-life context in which it occurred [36]. An interview of 15 clinicians using purposive sampling technique to select participants was used. Snowballing was later introduced to improve the sample size due to initial low clinician participation. The research was conducted on clinicians working at Tygerberg Hospital in the Western Cape Province in South Africa.

Selection criteria for participants are listed below. A clinician must:

- have obtained a SA medical degree (NQF level 7 tertiary qualification);
- be registered with a medical/health professional council or body as required by the profession.
- be a practising public health practitioner, meaning the clinician is currently employed either full time, part time, or on contract.
- have access to and using ECM.
- be associated or working at Tygerberg Hospital in the Western Cape Province.

The case study employed a phenomenological data analysis method which explicitly avoided cross comparisons and instead orients the researcher toward the depth and detail. These can be appreciated only through an exhaustive, systematic, and reflective study of experiences as they are lived [29]. Added to this, this approach allows the researcher to immerse oneself in data, engaging with data reflectively, and generating a rich description that will enlighten a reader as to the deeper essential structures underlying a particular human experience.

The identified themes includes perceived usefulness [PU], relative advantage [RA], job fit [JF], perceived ease of use [PEOU], complexity [COM], attitude [ATT], facilitating condition [FC], and use behaviour [USE]. Propositions were developed to ascertain clinicians' extent of ECM use.

IV. RESULTS AND INTERPRETATIONS

100 clinicians were contacted in total, 19 responded to the invitation to participate, three declined, while 15 were eventually interviewed. The email invitations were repeatedly sent to clinicians over a period of seven months (August 2015 to February 2016).

All interviews were tape-recorded using a digital recorder, transcribed verbatim and coded under identified themes. Interview data indicated that overall, clinicians do understand what an ECM is as a clinician put it;

"that all the records at the hospital and in my mind preferably also the prescribing, everything that's paper based at the moment gets placed on an electronic system that is still restricted access, so it's still patient

confidentiality, it's still kind of respected, but that everyone has or all the involved party, the treating doctor, the sister have access to it, to go and see the notes there (clinician 6)"

The researcher agrees and further argues that ECM should also include laboratory and radiology results. Blood tests results for example, involve laboratory experiments which a clinician can use to diagnose and treat a patient. X-ray results are got from radiology scan which contain information that can also be used for diagnosis and treatment. In addition, authorised access to ECM by nurses is indecisive as nurses do not diagnose and treat patients. For this reason, the security of patient information can be compromised if nurses were to have access to ECM. Currently, nurses do not use ECM and so are excluded from this study.

Regarding security of ECM, clinicians were asked how they access ECM. The use of usernames and passwords is a common response:

"with a username and password you open up any of the hospitals desktop computers and there's an icon that you can click for ECM, put in your personal number or your password, and then you have access to the system (clinician 3)"

The ECM system is one of the many other systems currently available and in use. Other systems mentioned that are operational at the hospital include DISA, PACS, iSite, Clinicom and TrakCare. The PACS system for example, is for access to radiology (x-ray) results; TrakCare for laboratory results, while DISA was a prior system to the current ECM. In-house systems such as OrthoWare were developed by the hospitals' orthopaedic clinicians to aid their work owing to ECM shortfalls. One clinicians' opinion of OrthoWare is:

"it's difficult to get continuity for a patient, we also have an additional data capturing system called OrthoWare, so that we at least got a decent system to fall back on (clinician 15)"

Using all these hospital systems require multiple access codes and can be challenging for clinicians. One clinician summarised this situations like this:

"We've got many systems. We've got ECM, which is the electronic note keeping, but then we have obviously a lab system. But again, no ordering of blood digitally. We have a PACS system for radiology, there you can order the X-ray or whatever special investigation by the, digitally. so that has been, that's sort of moved up, it's not integrated so y'know it's a different icon for everyone, different username, it's a very user unfriendly way of doing it (clinician 5)"

To better understand clinicians' views of ECM, propositions were developed and questions formulated for each proposition. The idea was to get first-hand expectation and views from users of ECM's effectiveness. Each proposition and subsequent questions asked are explained further.

Proposition 1: Perceived usefulness will have a significant impact on attitude toward ECM use.

The question asked was: *"Do you find it useful in your*

job?" Most clinicians' were positive that ECM is useful, as it has the potential to meet their work needs in providing better service to patients. The fact that ECM is perceived as useful by most clinicians' irrespective of its shortcomings was an indication that ECM is acceptable. In view of this, [10] in their study found that perceived usefulness had a statistically significant individual relationship to attitude towards using ECM. Their data confirmed that nursing staff members who believed that ECM improved the quality of care, reduced the cost of care, and increased the number of patients that can be cared for, or improved work circumstances showed a more positive attitude toward ECM use. An example of clinicians' views is expressed here:

"...so if we get a patient that came from a primary care facility through a district hospital through a regional hospital ultimately to us, we have access to all the information and that's very, very useful (clinician 1)"

Proposition 2: Perceived ease of use will have a significant impact on attitude toward ECM use.

Continuing, clinicians' were further asked: "Do you find it easy to get the system to do what you want?" The clinicians interviewed expressed a positive attitude saying ECM is easy to use as this positive attitude enables them to use the ECM system irrespective of its shortcomings. It is also because all clinicians are computer literate, thus minimising the effort required to learn, re-learn and use ECM. This is not to exclude the fact that hospital policy and procedure mandates them to use ECM, as paper notes become inaccessible after patient treatment. Even though attitude changes quickly according to [31], continuous efforts should also be given to maintain the attitude because it is temporary, unstable, and malleable. The issues associated with ECM should be attended to by management as clinicians are already burdened with so much workload, their frustrations can only be further tested even though they still perceive ECM to be easy to use. An example is:

"ya I think it's easy, very easy, the interface is well designed, it clearly states where you can go..... (clinician 3)"

Proposition 3: Relative advantage will have a significant impact on attitude toward ECM use.

The initial question for this proposition was re-phrased for better understanding. Clinicians were asked: "Do you find ECM having any advantage over any prior system you have used in the past?" The paper-based system still has an advantage over ECM according to many clinicians because it provided continuity of care in the past. The researcher observed amongst clinicians that, when using paper records, they are still able to access some form of patient information even in the absence of the complete medical history. For this reason, not all clinicians are convinced ECM has full advantage over other systems (such as paper), as its continuity of care results in longer turnaround times. Also, access to paper records is straight-forward for clinicians. They walk to the record room and retrieve patient record even though it will take them time to search for the record. For ECM, access codes restrict their immediate access as they first have to find

a workable and available computer system, key-in their access code and then scroll through the entire patient record to find a document. When their access code is faulty, there is no backup information in any format for them to use in the meantime. In the study by [32] on perception, attitude and adoption of cloud computing, they found relative advantage to have a significant impact on the attitude to use technology on a personal level, rather than on an organisational level. This is because their ability to access and also the convenience to use technology is considered important and relevant. At an organisational level, relative advantage had no significance on attitude since research participants were not aware of organisation's service level agreement (SLA) regarding products and services with third parties. Personally having technology was advantageous to the research participants because of its ability to process information much faster and a larger storage capacity. Examples of varying views are expressed:

"yes, I think so.....some pages are faded y'know, as paper will do that sort of thing, whereas at least once something's being captured in the ECM.....so, I definitely think from that point of view it is an advantage.....also, there's never a question of we cannot find the folder or y'know because it's an electronic system, it's always there. Once it's there, it is always there. So that I, definitely think that's an advantage (clinician 13)"

Proposition 4: Complexity will have a significant impact on attitude toward ECM use.

The question asked was: "Is it difficult to understand the system and how it works?" Clinicians perceive ECM not to be difficult to understand and use. This is because the more complex ECM is, the less it's used. In this case, the ECM system was found not to be complex in both use and understanding, but some aspects of its features and functions were frustrating to clinicians. One frustration is the incorrect note-labelling of files which results in clinicians having to go through a patients' entire medical record while searching for a document or item. This issue results in frustration, and so clinicians sometimes perceive ECM as complex. The study by [32] found complexity to have a significant impact on the attitude to use technology, as users felt the technology (cloud computing) is difficult to code, debug and understand, especially from a developers point of view. Reference [33] were in agreement with the findings of [32], as their study investigated internet banking in Taiwan and found complexity has a negative impact on attitude to adopt and use Internet. Though negative, their perception of a complex innovation will impact their attitude to adopt and use that innovation. For clinicians, the more complex the ECM is, the more resistant they will be towards its use.

"It is quite, it can be quite frustrating in the sense of having to read through all the different things because things are incorrectly labelled and the notes are scanned late..... (clinician 14)"

Proposition 5: There will be a positive relationship between facilitating conditions and attitude towards EPR use.

For proposition 5, clinicians' were asked: "*Are specific support staffs available for assistance with difficulties?*" For the clinicians that have contacted the systems support team, their experiences were positive in many ways and they were satisfied. For ECM, technical support is very important since the system was used on a daily basis. Standby support may be necessary to enable ECM continuously function efficiently. It indicates that if adequate support is provided then clinicians will show a positive attitude towards ECM use. The alternative will yield an opposite result. In view of this, [35] examined the influence of subjective norm and facilitating conditions on the intention to use technology among pre-service teachers in an educational context and found facilitating conditions had medium impact on attitude toward technology use. Facilitating condition is also a motivator that enables clinicians' ECM continuous use. Some comments are expressed here:

"For ECM, if we have a problem you log a call or you log a complaint or a problem, and I must say in the beginning I used to phone them.....so then I get help quite quickly, but it's been frustrating quite a few times with it not functioning well..... (clinician 6)"

Proposition 6: There will be a positive relationship between perceived job fit and attitude towards EPR use.

This question was asked to simplify an initial question asked: "*Does the ECM fit into the kind of job you do?*" Clinicians generally know the importance of technology and positively embrace its implementation, but currently ECM has not met their desired expectations optimally. With the current teething problems experienced, clinicians have not fully embraced ECM into their daily work, as it seems to add to their workload in some cases rather than remove from it. Literature showing the relationship between job-fit and attitude is scarce and may be because job-fit is termed differently. Reference [34] indicated that job-fit encompasses beliefs about how technology (a PC as example) will help with current job tasks. This can show the relationship between clinicians' positive attitude and ECM helping them with their current work task such as information review, storage, retrieval and share.

".....if you use it correctly its much faster, it streamlines my work, makes it easier to access results and to get the right information (clinician 4)"

Proposition 7: Attitude towards EPR use will have a significant impact on actual EPR use.

Attitude is the same as affect in this study, so clinicians were asked: "*Do you find ECM interesting or fun?*" With the current situation at the hospital, clinicians' attitudes towards ECM are negative, as the system is not interesting or fun in any way. They use ECM primarily for work and nothing else. For this reason, there is no willingness to explore any additional functionality or to understand more about the system. Clinicians' attitude is an indication that the ECM system is not functioning well, it does not meet their expectations and goals so no extra effort or interest to maximise its use. In view of this, [31] study agree with the findings here that attitude has influence on use, although

positive and only in part. They identified two (2) dimensions of attitude, namely cognitive and affective. Their study found that cognitive attitude has a high significant impact on use, while affective was insignificant. They proposed using the cognitive dimension as a measurement variable in future studies. Attitude in this study was used as a single dimension. In retrospect, clinicians' attitude determines their ECM use to a large extent. Their comments indicate that their negative attitude toward ECM use is high, a reason why they are reluctant to explore ECM further, troubleshoot issues or contribute towards its improvement. This may be a reason why the orthopaedic unit opted to develop their own system to work in parallel with ECM.

"it's frustrating to use it because there's a lag on it, so I see a patient or my registrar sees a patient casualty a week ago, now I have to follow the patient up a week later and I don't have any clinical information - so it's very frustrating to be involved in ECM (clinician 11)"

Taking into consideration clinicians' responses to each individual proposition and responses thereof, each clinician was further asked:

"You did highlight some problems with the system which is typical of every IT system, I was thinking, if you were to advise the government about this system, how do you think it should be fixed, what would you say?"

In answering this question, the responses related to suggesting a solution to ECM centred on the idea of problem fixing. To formulate solutions to ECM and maximise its use, each problem and possible solution was explained in categories such as system integration, system access, note labelling/bar-coding, features/functionality, working relationships and turnaround time.

For system integration, clinicians would prefer ECM to be integrated with other hospital systems (OrthoWare, TrakCare and Clinicom). The integration of these systems would reduce their time moving around to access each individual system. Through integration, multiple access codes will be avoided and thereby making access simple and provided then that clinicians will show a positive attitude towards ECM use. The alternative will yield an opposite result. In view of this, [35] examined the influence of subjective norm and facilitating conditions on the intention to use technology among pre-service teachers in an educational context and found facilitating conditions had medium impact on attitude toward technology use. Facilitating condition is also a motivator that enables clinicians' ECM continuous use. Some comments are expressed here:

"for ECM, if we have a problem you log a call or you log a complaint or a problem and I must say in the beginning I used to phone them.....so then I get help quite quickly but it's been frustrating quite a few times with it not functioning well..... (clinician 6)"

For system integration, clinicians would prefer ECM to be integrated with other hospital systems (OrthoWare, track care and Clinicom). The integration of these systems would reduce their time moving around to access each individual system. Through integration, multiple access codes will be avoided,

thereby making access simple and probably more secure. The fact that ECM is also present in other hospitals should be another reason for integration, as clinicians sometimes rotate in the course of their professional practice. Patients also migrate, and therefore, integration can help clinicians monitor and do follow-ups on patients conditions as well as acquaint themselves with patient's problems before consultation and treatment. There is evidence to show that system integration is positively related to perceived system success. This is contained in the study by [8] on information system integration, enabling control and performance which proved that the association between information system integration and perceived success of systems is positive and very strongly statistically significant. This is an indication that if ECM is integrated with other hospital systems, clinicians' attitude towards ECM use will improve their performance and subsequently result in ECM efficiency.

Regarding note labelling/bar-coding, time is a luxury to clinicians. Time wasting can cost a life. Inadequate and insufficient information can also cost a life. Clinicians do not have the luxury of time and a reason why nurses are always complementary to their line of work. Incorrect classification, labelling and filing of documents is compounding clinicians work task. The time spent searching through lots of information can better be simplified if documents and folders are correctly classified, labelled, filed and documented. In resolving this issue, clinicians should be allowed to partake in the labelling and bar-coding of their own notes, since they are the primary users who will eventually use the same notes for future diagnosis and treatment. Where time does not permit, nurses should be assigned the task of note-labelling and bar-coding, since they work hand-in-hand with the clinicians. Although nurses' workload has been highlighted as a burden, the use of hospital administrators should be encouraged. They should be trained and supervised to label notes, documents and file correctly. This will lighten clinicians work tasks.

According to [24] in their study, they suggested that the choice of a documentation method can alter the balance between expressivity and structure in the resultant notes [24]. Also, it will hamper the healthcare provider's workflow as well as influence the process and products of recording clinical information, thus, influencing how well the note can be incorporated into an electronic record system [24]. This can be done in such a way that the note's contents can be automatically reused and analysed. In simplifying the documentation issue to improve performance by clinicians, [24] recommended that management adopt a computer-based documentation product that meets the needs of clinician users, rather than attempting to find a single best documentation method. Then a need to integrate specialised software into ECM to improve note-labelling and bar coding of clinical notes should be taken for as long as it will improve clinicians' performance and attitude towards ECM optimal use.

For system access, sufficient computers with access to ECM should be made available to clinicians and where possible these access points should be closer to clinicians' treatment space. The IT support service must be readily available to

assist clinicians with logging into ECM where a problem exists such as password reset. Internet and intranet connectivity should be considered as clinicians are embracing of technology. All clinicians interviewed are computer literate, and as such the hospital should improve its infrastructure in accordance with clinicians' skills and knowledge. The security of patient information is always a challenge when using the Internet, but it should not be used as an excuse to limit its use. The possibility of ECM access via web-links and wireless are suggested possibilities. ECM access is shown to have a direct impact on the performance of clinicians. This is contained in the findings by [20] on the perceptions of impact of electronic health records system on nurses' work. Kossman's findings indicate that nurses identified increased access to patient care information (spent less time searching for records), improved efficiency (quicker documentation and information retrieval processes) and organisation (provision of task lists, systematic charting and prompts, and less reliance on their memory or written notes) as the system attributes that enhanced their work performance [20]. Constant access and use of ECM can resolve some of the issues of increased time spent searching through tons of information and less time spent with patient. This is because consistent access and use can become second nature of how to locate the information they want, thereby resulting in less time spent finding information and more time with spent with the patient.

A good working relationship with clinicians' will result in their input into current and future design, development and implementations of all technologies at Tygerberg Hospital. This will curtail the many problems expressed by clinicians today. Hospital management should allow clinicians contribute knowledge, skills and information before and during implementations since they are the primary users and know what they want; this way the ECM system would be tailored to meet their specific needs. Clinicians hold vital information that can aid the smooth operation of the hospital. Their participation in decisions that directly affect their work roles and tasks is necessary. Clinicians are both internal and external stakeholders of Tygerberg Hospital, and their contribution in decisions will play a leading role in the optimal use of ECM to deliver quality health service. And just as a clinician suggested, a representative from the different specialist teams can be assigned to represent clinicians when decisions of importance such as ECM upgrade is to be undertaken.

Hospital management and clinicians need to constantly interact and discuss. This can prove to be meaningful and productive in meeting the hospital goals and objectives in delivering better health service to all. Reference [5] conducted a research on an empirically-based model for clinician-managers' behavioural routines, in which he states that interaction is the social DNA of clinical management behavioural routines. Interaction typically involves exchanging views and mobilising influence. Hospital management and clinicians need to organise official meetings as it does represent a large investment in time and effort, and is the main way ideas and issues are processed, sense making

about hospital events and issues occurs and the negotiated order is enacted. Reference [5] continues by saying, clinician-management work activity is centred on ongoing interaction, coordinating work with and through others, influencing people and the constant creation and dismantling of relationships and teams. In addition, he claims management activity in clinical units is heavily social, centres on discourse, persuasion and negotiation, and involves working with and influencing individuals and groups. The idea of clinician representative can play a vital role here. So to be effective, it will require a well-developed social skill and verbal ability and the capacity to cope with multiple issues, tasks and responsibilities. Health environments are complex so constant interaction is necessary to understand each team in order to meet hospital requirements.

System features and/or functions can make a positive difference in its performance. For example, the search feature and functionality can greatly improve the clinician's performance in finding critical information quickly for patient diagnosis and treatment. The edit feature and functionality can also improve clinicians' performance through updating patient medical record and sharing. Another feature and functionality such as email and internet can improve ECM performance by secure and reliable access by clinicians from multiple locations to share information relevant for their work.

There is a positive association between an electronic record system feature/functionality and performance. Reference [23] assessed the relationship between the use of an electronic health record and the use of specific its features with quality of care using a survey linked with Healthcare Effectiveness Data and Information Set (HEDIS). Reference [23] discovered that the use of certain electronic health record features was associated with better performance on a number of HEDIS measure group scores. They concluded that adopting an electronic health record system alone is insufficient to improve quality but rather specific features of the record system must be available and used before an increase in quality is expected.

The turnaround time is unacceptably lengthy and effort should be made to shorten it. Clinicians have no patient information to work with after their notes are taken away for input into ECM as this can result in mis-diagnoses and wrong treatment during follow-ups. Turnaround time was used here to describe the interval between when a clinical note is collected for input into ECM and the time it takes to appear on the system. Theoretically, clinicians desire a rapid, reliable and efficient service delivered at low cost [17]. Of these characteristics, [17] claims timeliness is perhaps the most important to the clinician, who may be prepared to sacrifice analytical quality for faster turnaround time. Reference [17] concludes that turnaround time monitoring is the ideal choice of activity to illustrate the laboratory's commitment to providing a high quality service. For Tygerberg management, turnaround time should be explicitly made clear, that is within 24hrs. This means the time from collecting clinical paper notes after patient is seen by a clinician and the information made available on ECM should not exceed 24hrs. Patient

information is dire to patient, clinician and the hospital. Delays can result in the loss of a life. ECM should be operationalised to function at it was designed; anything contrary is unacceptable.

V. DISCUSSION AND CONCLUSION

The propositions mentioned were developed from the literature and tested using themes identified within the study. The themes included perceived usefulness [PU], relative advantage [RA], job-fit [JF], perceived ease of use [PEOU], complexity [COM], attitude [ATT], facilitating condition [FC], and use behaviour [USE]. The objective of the propositions is to measure the level of significance, relevance and framework-fit which are under construction for a larger study. This objective is beyond the scope of this paper. The objective of this paper is to understand clinicians' perception of ECM at their workplace. Clinicians have summarily expressed their views, opinions and perceptions of what they think of ECM. The system was designed with good intent to streamline work procedure and process at Tygerberg Hospital for both clinicians and administrative personnel. At present, ECM is not functioning optimally. In one clinician's view:

"...The actual development of the ECM is probably a reasonable program, it's just the applicability we've been given is very poor (clinician 15)"

The teething problems identified are many (such as system integration, system access, note labelling/bar-coding, features/functionalities, working relationships and turnaround time), thus a panacea for resolving these problems is for the Tygerberg Hospital management to work closely with the primary users - the clinicians. Resolving these problems should be undertaken one at a time. First and foremost, prioritise the problems according to relevance, then attempt to solve each problem to meet clinicians' expectations and hospitals' objective. Of the 15 clinicians interviewed, their average satisfaction level was 4.65 out of 10 being highest (very satisfied) and 1 being least (very unsatisfied).

There is an association between clinicians' satisfaction and ECM performance expectations, as indicated in the works of [30]. Their study focused on student satisfaction in a blended e-learning system environment. They found performance expectations to be positively associated with learning satisfaction. Clinicians' satisfaction would mean that ECM met their expectations and a further motivated them to want to continue use. Unfortunately, clinicians' satisfaction fell short of meeting ECM performance expectations. Similarly, [30] found that a higher level of interaction is positively associated with a higher level of performance expectations. Interaction is explained as physical contact between students, instructors, e-learning system environment (which includes learning technologies). When applied to this study, clinicians' interaction with each other and with ECM is said to be associated with their performance expectations. In view of this, it can be said that clinicians' interaction is associated with their performance expectation, which is also associated with their satisfaction of ECM. This concludes that there is a relationship between system interaction, performance and

satisfaction. This relationship can be improved if ECM functionality and features are improved.

In concluding, clinicians' perception of ECM was necessary as a strategy to invoke attention to hospitals' management with regards to the implications of introducing technology without the full cooperation of the users. Though the limitations of this study include a small sample size, inadequate access to clinicians and the use of one research method, the results can be generalised owing to the fact that ECM is available at many of the district hospitals in the Province. In addition, all clinicians that use ECM are homogenous and their work procedures and work settings are similar. The research sample size was small, but the frustrations expressed by clinicians interviewed at Tygerberg Hospital can be generalised across other clinician groupings exposed to ECM at various district hospitals.

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