

Exploring Evidence-based Medicine Acceptance Process Based on a Perspective of Customer Experience Management

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Abstract—This study aims to explore evidence-based medicine (EBM) acceptance process of physicians. The perspective of customer experience management is applied to this study. A total of 32 in-depth interviews were conducted with 23 key informants and analyzed using the techniques of grounded theory. The result shows the acceptance process consisting of six stages: 1) perceived instrumental advantage; 2) perceived emotional advantage; 3) perceived anxiety; 4) communication improvement; 5) behavior influence; 6) omnipotent myth. This study provides an effective management strategy for hospital managers to diffuse an EBM system.

Keywords—evidence-based medicine,; innovation diffusion; technology acceptance; customer experience management; grounded theory

1 INTRODUCTION

Due to the improvement of medical knowledge and technology around the world, a great deal of new literature and other evidences about medical treatments are being published (Scalise, 2005b). However, since there exist the following problems: the growing body of medical knowledge, inexperience in searching and appraising the literature, lack of time, poor quality of indexing of some medical databases, poor organization of journal articles and the low validity of their content for clinical application (Covell, Uman and Manning, 1985; Delvenne and Pasleau, 2003; Haines, 1996; Osheroff, et al., 1991), the information needs of most physicians are not met. Therefore, issues about evidence-based medicine (EBM) become more common and critical in order to improve medical quality and promote competitive advantage in the hospital industry. EBM can be efficiently applied due to the impact of information technology (IT) and powerful statistical

computation (Delvenne and Pasleau, 2003; Simpson, Kingston and Molony, 1999). This study aims to explore the acceptance process of physicians interacting with an EBM system. The perspective of customer experience management is applied to this study. A total of 32 in-depth interviews were conducted with 23 key informants and analyzed using the techniques of grounded theory.

2 LITERATURE REVIEW

2.1 Evidence-based Medicine

The idea of EBM was initiated by clinical epidemiologists at McMaster University in Canada (Haynes, 2002). Cohen et al. (2004) pointed out that the core concepts of EBM originated by applying the principles of epidemiology to the practice of patient care during the 1970s and 1980s. EBM is a tool used to integrate the best research evidence, clinical expertise and patient values into the practice of patient care (Cohen et al., 2004; Delvenne and Pasleau, 2003; Haynes, 2002; Sackett, et al., 2000).

The basic scenario for the usage of an EBM system is described as follows. An EBM server, which consists of a knowledge database system, a management system and medical knowledge sources, functions as a platform of knowledge management. It mainly provides a medical knowledge database for any linked user (or client). Users can access the EBM system to acquire medical information and knowledge through a search engine. Furthermore, suggested solutions can be provided to support decision-making in medical treatment (Cheng et al., 2009). The practice of EBM is a rigorously systematic and scientific way of learning and applications. The operational steps (Gambrill, 1999; Delvenne and Pasleau, 2003) are: 1. Convert information

needs into answerable clinical questions; 2. Find the best evidence with maximum efficiency; 3. Critically appraise that evidence; 4. Apply this appraisal to developing solutions; 5. Constantly evaluate the performance.

Evidence-based medicine's (EBM's) potential to support medical research, improve medical quality and reduce costs has galvanized clinicians, policy-makers, insurers and others in health care to speed its implementation in hospitals (Scalise, 2005b). Although the concept of EBM has been around for three decades, hospital leaders have paid serious attention to EBM only within the last three years (Scalise, 2005a). In Taiwan, EBM is new to many hospitals so it is viewed as one kind of technology-based service innovation within the hospital industry.

2.2 Customer Experience Management

Customer experience management (CEM) means the management of the sum of all experiences a customer has with a supplier of goods or services, over the duration of their relationship with that supplier (Higie and Feick, 1989). CEM is a strategy that focuses the operations and processes of a business around the needs of the individual customer (Schmitt, 2003). Experience is generally related to the consumption process and thus the each touchpoint of customer experiences should be linked with customer perceptions in the consumption process (Streeter et al., 2005; Thomas, 2003). In this study, we apply CEM perspective to explore the dynamic acceptance process of physicians towards interacting with an EBM system.

3 METHOD

In this section, we describe the subjects, the process of data collection and the outcomes of data analysis.

3.1 Subjects

There were total 23 physicians accepting our invitations. Ten physicians are from hospital A, which is a district teaching hospital and has close cooperation with us. Eight physicians are from some medical center called hospital B. And five physicians are from another medical center called hospital C. The invited physicians have gotten in touch with EBM at least five years. A total of 32 in-depth interviews are from these 23 key informants.

3.2 Data collection

In the study, the in-depth interview procedure is divided into three stages. It took about one hour for each interview. In the first stage, we interviewed with 10 junior physicians. In the second, we interviewed with 10 senior physicians. In the last stage, three EBM team leaders were interviewed. The interviewees were asked to describe their experiences interacting with an EBM system. The opinions of interviewees were taped under their permissions and subsequently word-by-word recorded.

3.3 Data analysis

A qualitative data analysis is employed to develop a framework of concepts or a preliminary theory through a coding strategy. The in-depth interviews are concentrated on the perception and experience of physicians interacting with an EBM system. The data analysis is through an iterative coding process. That is, the codes derived from the collected data should be modified again and again. The analysis process goes along with the data collection stages. Initially the interview transcripts are converted to a series of simplified codes. We noticed that certain codes are related to a specific subject. These common codes are accumulated and hence categorized under a meaningful label. The coded outcome organizes the diverse meanings of EBM realization and hence the physician mindsets towards interacting with EBM system are induced. Through iteratively linking the experience touchpoints of the interviewees (Figure 1), we establish the EBM acceptance process as shown in Table I.

TABLE I THE INDUCED AXIAL CODES IN THE DYNAMIC EBM ACCEPTANCE PROCESS

Axial codes	Open codes
Stage 1:	
Perceived instrumental advantage	➤ Supportiveness ➤ Efficiency ➤ Quality
Stage 2:	
Perceived emotional advantage	➤ Fashion ➤ Confidence ➤ Pride ➤ Enjoyment ➤ Embodiment
Stage 3:	
Perceived anxiety	➤ Information anxiety ➤ Patient education ➤ Patient misunderstanding ➤ Colleague competitiveness ➤ Coercive force of Institution
Stage 4:	
Communication improvement	➤ Shared language ➤ Physician-patient communication
Stage 5:	
Behavior influence	➤ Attitude ➤ Expansion ➤ Knowledge conversion
Stage 6:	
Omnipotent myth	➤ Rare matched cases ➤ Insufficient high-level evidences ➤ Difficult practice ➤ Practice limitations

4 RESEARCH FINDINGS

Based on customer experience management we induce the dynamic EBM acceptance process consisting of six stages: 1) perceived instrumental advantage; 2) perceived emotional advantage; 3) perceived anxiety; 4) communication improvement; 5) behavior influence; 6) omnipotent myth. The dynamic process shows the experience transfer process of physicians towards interacting with an EBM system. The experience in each stage is described as follows.

Stage 1: Perceived instrumental advantage

The perceived instrumental advantages of physicians towards accepting the EBM system are induced as 'supportiveness', 'efficiency', and 'quality'.

Supportiveness

Physicians are supported to acquire, identify and apply knowledge stored in EBM databases. Certain conversations are taken as examples: "Now, I clearly know how to acquire medical knowledge since EBM is an excellent tool for retrieving data." "Network becomes my textbooks." and "There are some good and prefiltered databases in some websites." As for EBM application, it mainly supports physicians' clinical practice, academic research and administrative affairs. An EBM system plays a guiding role that provides a method of searching for knowledge, guidelines of literature appraisal, appraisal of clinical application, reading skill, learning guidelines and construction of clinical guidelines.

Efficiency

The EBM system efficiently assists users to retrieve medical knowledge, solve problems and appraise literature. The reason why it can reach such a potential of efficiency is that EBM realization provides a systematic approach for physicians to learn medical knowledge. Certain quotations reveal the meaning of 'efficiency': "EBM helps me to solve some clinical problems in time.", "Sometimes I meet unfamiliar clinical problems questioned by some patients, and then I immediately question EBM and it quickly responds.", "Some powerful search engines can rank the papers you retrieve. Then you only refer to the papers of higher rank. Thus this saves more time for you.", "It is easier for you to acquire the knowledge you want." and "Since I touch the systematic learning way, I can readily filter papers and efficiently appraise papers." These quotations identically describe EBM as a systematic learning way and hence an efficient tool for retrieving knowledge and solving problems.

Quality

The quality of EBM databases could be evaluated by three aspects: breadth, depth and correctness.

(1) Breadth

The three main features of 'breadth' are diversity, internationalization and updating. The physicians consistently mentioned that the diversity of medical issues actually broadens their research view. A physician said, "Even a daily and ordinary issue is investigated by a serious experimental design and subsequently formed as valuable evidence. It really breaks my traditional viewpoints on research." Internationalization is another critical feature of EBM databases. Research from all over the world can be aggregated in the same platform through the internet and the breadth in time domain shows the histories of some issues. Therefore, the medical knowledge is continuously updated and presented in the EBM databases.

(2) Depth

The literature stored in an EBM database is

professional and systematic knowledge refined through a rigorous research method. A senior physician said, "Most of the published papers in the EBM databases possess a rigorous and complete experimental design." A junior physician said, "I regard EBM as a professional assistant because it is based on a rigorous and systematic methodology." Since the research method is rigorous and systematic, the quality of EBM databases is excellent in its depth.

(3) Correctness

Because the research method of EBM papers is more scientific and systematic, the content of the EBM databases is viewed as objective and valid. Some instances are presented as follows. "I think EBM can provide objective and correct solutions for some clinical problems." "When I come against unfamiliar clinical problems, the first step I take is to retrieve it (EBM database). This is because EBM papers have high validity." "If you refer to EBM papers, your solutions are viewed as more standard and correct." In addition, as a physician said, "Some databases, e.g. Cochrane library, further provide a prefiltered literature," thus a prefiltered database increasingly enhances the quality of EBM databases.

Stage 2: Perceived emotional advantage

The perceived emotional advantages of physicians towards accepting the EBM system are induced as 'fashion', 'confidence', 'pride', 'enjoyment' and 'embodiment'.

Fashion

The medical knowledge in EBM databases is continuously updated and distributed. If physicians cannot follow the trend in knowledge, their knowledge may be regarded as out-of-date knowledge. "EBM is an unchangeable trend for medical development, especially in advanced countries." "EBM provides a novel way of learning." "EBM is continuously developed and has become a hot issue today." These conversations reveal that EBM is a novel tool and convinces physicians to follow the trend of medical development. Therefore, the physicians have feelings of fashion when they participate in EBM learning and application.

Confidence

Some conversations clearly indicate the viewpoint. "When my medical knowledge is continuously updated from EBM learning, I actually feel confident in clinical decisions and patient care." "Through retrieving EBM papers, I can follow new evidence and medical trends and hence enhance my professional confidence." "Since the evidence is rigorously derived by researchers, I have more confidence in applying the evidence to my patients." Thus the physicians feel more confident in their clinical practice after they have retrieved and appraised the relevant EBM studies.

Pride

We observed that the interviewees have a sense of pride when they talk about their professional and enterprising image caused by EBM learning. "I give

enterprising image to my colleagues because I devote myself to EBM research.” “When I give evidence-based explanations to my patients, they sincerely trust me and praise me as a professional doctor.” Although the physicians didn’t present their sense of pride, the feeling actually exists in the deeper part of their soul.

Enjoyment

The enjoyment feeling mainly comes from finding solutions to some clinical problems. “I feel so happy to find the solutions to my problems.” Additionally, one physician said, “When I browse EBM websites, this is as if I travel in a knowledge palace.” Another physician said, “To my surprise, I find this case interesting and enjoyable!” Thus, EBM realization brings happy, pleasant and surprising feelings for the physicians.

Embodiment

Several conversations are taken for examples: “When I come upon any clinical problem, the first step is to retrieve EBM research. In daily work, I cannot do without EBM.” “It is necessary for me to use EBM tools since it provides clinical suggestions.” “I have a high tendency of usage because I need it.” “In an international conference, the presented paper has to meet EBM criteria. It is an essential process.” and “I can immediately solve some clinical problems, thanks to EBM learning.” Due to necessity and importance of EBM, the physicians have a high tendency and frequency of usage. As one physician said, “I cannot do without EBM.” Therefore, emotion of embodiment really exists in the physicians’ mind. They also recognized that it is fortunate for them to have such an EBM tool.

Stage 3: Perceived anxiety

EBM realization actually brings considerable contributions for physicians. However, some of the interviewees unwittingly reveal their information anxiety. “Due to information popularization, I worry about whether my knowledge is obsolete.” “I worry that much non-evidential data is everywhere so as to result in patient misunderstanding and threatening patient safety.” “Sometimes I am afraid that the evidence I retrieved is not appropriate for my patients. ... I even doubt my competence in literature appraisal.” Moreover, one physician said, “I have no choice but to face the endless learning because of rapid changes in medical knowledge.” EBM realization provides a new concept in learning, but at the same time it also brings information anxiety for physicians. The perceived anxiety of physicians towards accepting the EBM system are induced as ‘Information anxiety’, ‘Patient education’, ‘Patient misunderstanding’, ‘Colleague competitiveness’, and ‘Coercive force of institution’.

Stage 4: Communication improvement

Communication improvement resulted by learning infusion of EBM consists of ‘shared language’ and ‘physician-patient communication’.

Shared language

EBM realization provides a shared language for physicians. “Before the EBM realization, almost every physician had his own opinions and hence we frequently had disputes on some issues.” “We have no idea about the validity of some literature before EBM realization. But now we can reach a consensus by following EBM criteria.” So, by using the shared language physicians easily reach a consensus and eliminate disputes among themselves. From the interview transcripts we understand why EBM realization has these advantages. This is because EBM realization forms the following standards: criteria of common agreement, criteria of literature appraisal, standardization process of research presentation and standardization process of literature discussion.

Physician-patient communication

EBM realization can enhance physician-patient communication. “EBM teaches me to focus on patient value.” “The best evidence is not the best solution for patients.” Thus, the physicians contended that they should reserve autonomy of patients and not make decisions for patients. Since EBM realization also allows patients/external customers to acquire medical knowledge easier, it reduced asymmetric information on the patient side. This is helpful for patients to communicate with physicians. As for physicians, they have to make evidence-based explanations to patients. Due to improvements in physician-patient communications by EBM realization, physicians can obtain the trust of patients and their families and hence physician-patient relationship is improved.

Stage 5: Behavior influence

The influence of individual behavior includes improved learning attitude, learning expansion and enhancement of knowledge conversion.

Attitude

One of the most important changes for the physicians is that EBM realization fosters their rigorous and cautious attitude to learning. There are three meanings to be discussed. First, the attitude is an introspectional attitude. Certain opinions of the physicians are taken for examples: “My clinical behavior has become more careful. I always retrieve more evidence to support my decisions.” “Sometimes I find some excellent studies that conflict with my previous clinical experience; then I carefully examine the new evidence and modify the previous treatment.” and “EBM realization continuously reminds me to pursue patient care” The introspectional attitude includes rigorous and deep learning, self examination and emphasis on patient value. Second, the attitude is a continuous learning attitude. Due to the impact of internet technology, knowledge is distributed and shared more easily. Physicians have to continuously update their medical knowledge in order to provide better patient care. When the EBM concept is gradually embedded into physicians’ mindset, physicians imperceptibly show their active and voluntary learning attitude. Third, in the practicing attitude for clinical

problems, the physicians put emphasis on a scientific and objective way of learning and a rigorous process of clinical experiment and verification after clinical application.

Expansion

EBM realization also benefits physicians from the following viewpoints. "There really exists such an EBM study for the issue. This is so interesting and unbelievable." "EBM changes my focus and skill of appraising medical literature." EBM realization eventually broadens the views of research and changes learning skills. Some other opinions contended that EBM realization makes users understand recent research, expand the field of learning and promote medical issues. Finally, it is worth noting that several interviewees commonly disclose their rigorous learning attitude not only towards medical knowledge and clinical practice but also towards other knowledge fields and even daily behavior.

Knowledge conversion

Nonaka and Takeuchi's (1995) knowledge conversion model presented the processes of transferring and creating knowledge. The model distinguishes four modes of knowledge conversion: socialization, externalization, combination and internalization. EBM databases provide lots of excellent research. However, this is not the only purpose of EBM realization. Furthermore, EBM realization encourages physicians to create an innovative knowledge through integration of medical research existing in EBM databases. This is a process of explicit knowledge conjugation which is known as 'combination' in knowledge conversion. Additionally, EBM realization also encourages physicians to convert their tacit knowledge and clinical experience as an explicit knowledge. It is possible for them to practice the conversion since EBM realization provides the guidelines and protocols to help them accomplish evidence-based research. This is the process known as 'externalization' in knowledge conversion.

Stage 6: Omnipotent myth

Some physicians, especially junior physicians, usually fall into the omnipotent myth of EBM realization. They often think that most of their clinical problems can be solved by EBM. We conclude that the limitations of EBM realization in this technological perspective are related to database content. Several physicians pointed out that there are rare cases of a complete match with their patients in EBM databases. In addition, the physician in the psychiatry department said, "Qualitative evidence, e.g. the issues of patients' quality of life, is hardly found in EBM databases." They further contended that EBM databases have insufficient high-level evidence. The omnipotent myth of physicians towards accepting the EBM system comes from 'Rare matched cases', 'Insufficient high-level evidences', 'Difficult practice' and 'Practice limitations'.

5 CONCLUSIONS

Based on the perspective of customer experience management, this study induces the EBM acceptance process as six stages: 1) perceived instrumental advantage; 2) perceived emotional advantage; 3) perceived anxiety; 4) communication improvement; 5) behavior influence; 6) omnipotent myth. That is, the acceptance process of physicians shows a dynamic transformation process while the physicians interact with an EBM system. This study can provide an effective management strategy for hospital managers to diffuse an EBM system.

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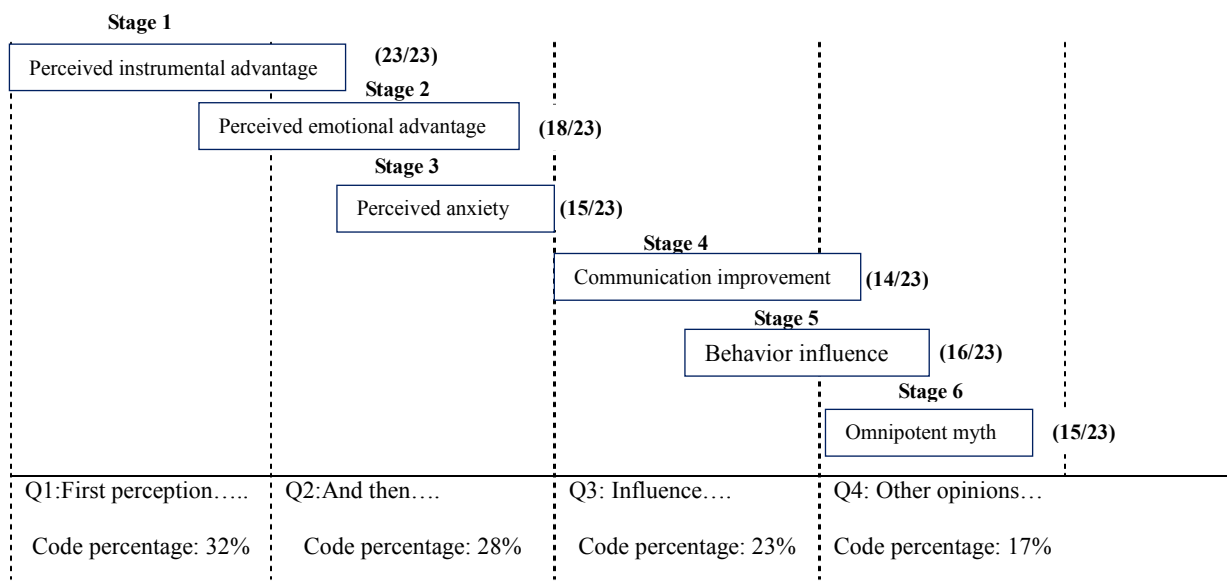


Figure 1: EBM Acceptance Process