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ABSTRACT

Waiting for elective surgery has been causing severe patient dissatisfaction and is becoming a major concern in most countries with publicly funded healthcare systems. While waitlists, which are used to rationalize the balances between healthcare service demand and supply, are almost impossible to avoid currently, healthcare policy makers could try to remove the tension through providing more satisfactory elective surgery waitlist information to patients on the waitlist. This work-in-progress paper seeks to build a framework towards improving elective surgery patients' information satisfaction. We propose that an effective waitlist information system (which can meet the information needs of waiting patients) empowers patients, creating a sense of autonomy and control for their own health situation, reducing their stress and uncertainty, improving their sense of perceived equity and power (relative to the healthcare authorities who manage the waitlist) and eventually improves patient satisfaction towards waiting.

Keywords

Elective Surgery Waitlist, patient-centric healthcare information systems, user information satisfaction, empowerment, sense of control, stress

INTRODUCTION

Elective surgery refers to surgery which can be delayed for more than 24 hours as judged by the treating physician (e.g., cataract surgery). Patients in this category are normally put on an elective surgery waitlist queue owing to the high demand for such services. These waitlists for elective surgery may be long, with delays of weeks or months before patients are operated upon. The length of wait is an ongoing health policy concern for many OECD countries[1] (Street and Duckett, 1996; Lewis et al., 2000; Everett, 2002; Siciliani and Hurst, 2004; COAG, 2008).

Insufficient information about waiting progress, incidental delays and only roughly estimated admission dates can be upsetting to patients. A study conducted in the Netherland on patient waiting experiences found that more than 50 percent of patients experienced feelings of uncertainty, dependence, stress and a lack of autonomy (Van Excel, 2008), all of which can lead to negative influences on morbidity (Krantz et al., 1996). Consequently, patients often end up building resentment towards the long wait when insufficient information is provided on their waiting status.

Without sufficient and reliable information, government and healthcare decision makers can be unclear about the severity of the long waiting list problem. They can have difficulty in prioritizing resources to the most critical part of the healthcare system to address the needs of the patients on the elective surgery waitlist (Lewis et al., 2000). These issues can be highly politicized when decision makers are pressured by needs of interest groups and often decision makers "have little choice but to apply grease to the squeakiest wheels and generalize from that (often anecdotal) basis" (Lewis et al., 2000:1297). The situation can be exacerbated when Governments are unwilling to invest in information systems, but focus only on direct health services (Lewis et al., 2000; Hadorn, 2005).

In response to this, the current study looks at the information needs of elective surgery patients. It seeks to demonstrate the meaning and consequence of meeting patient information needs to health authorities and decision makers in order to encourage them to improve their current online information services for patients.

Although the issue of elective surgery waitlists has been studied frequently from the perspectives of healthcare controllers (i.e. governments and health authorities) and healthcare providers (i.e., hospitals) (Mantzana et al., 2007), there is a dearth of published research on (a) *patient* information needs about waiting status; (b) the psychological

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[1] Germany, Japan and Switzerland are three notable exceptions that have minimal wait times for elective surgery. Postulated reasons include mandated universal health insurance through non-profit insurance companies and the elimination of "gatekeepers" who limit access to specialist services.

needs of *patients* while they are on waitlists; and (c) the impact on their satisfaction by addressing these needs. This paper intends to start to address these gaps. There has been a shift recently in e-health literature away from the perspective of policy makers and healthcare providers to that of patients (Wilson and Lankton, 2004). The underlying philosophy is "*patients as active participants*" in the health care process (also known as *patient empowerment*) (Brennan and Safran, 2003). This trend is also reflected in Victorian Surgical Service Strategy 2008 background paper (VGDHS 2008:4) which promulgated nine key principals for Victorian surgical services that revolve around the core ideas of getting patients involved and of being "patient-centric".

Therefore, in approaching this research problem, we take the contemporary "patient empowerment" (Brennan and Safran, 2003) view and borrow from the field of Psychology, the "Empowerment" theoretical lens (Zimmerman, 1995) to examine, from the patient perspective, the implications for user satisfaction of providing good quality information to patients via waitlist management information systems. It suggests that general satisfaction can result from empowering elective surgery patients to manage their expectations regarding their wait. The paper proceeds to use *Empowerment Theory* to provide guidance on the interactions of information system user satisfaction, indicators of empowerment outcomes and general patient satisfaction.

The paper proceeds as follows. After an overview of the current elective surgery information process (with a sample case of online waitlist information delivery in Victoria, Australia), we explore the meaning of good quality information from the patients' perspective (i.e., use information satisfaction). Then we review the theory of empowerment to look at how good quality information empowers patients on the waitlist. The online elective surgery waitlist patient empowerment model is proposed as a result. Finally, based on the insights from previous stages, we formulate a proposal for an "ideal" waitlist management system, followed by a discussion on the feasibility of such a system and our conclusions.

BACKGROUND

Elective Surgery Information Processes

In Australia and many other OECD countries patients can only access elective surgery waitlists after meeting with a general practitioner and getting referral to a specialist or hospital. An overview of the patient journey onto a waitlist is given in Figure 1. Patients are usually advised by the specialist or outpatient department on an estimation of how long it will take for their turn. Patient health changes will affect their position in the queue, so patients often keep regular contact with their admitting authority.
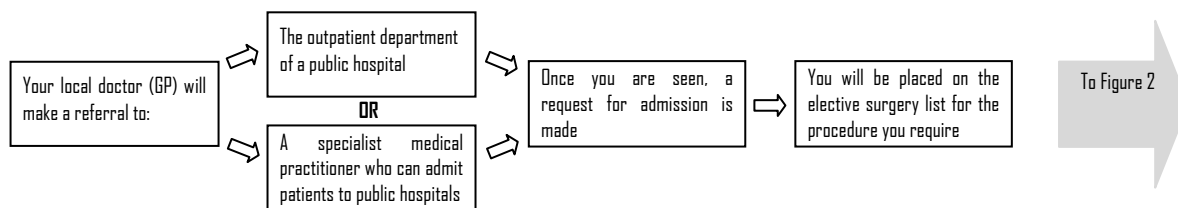

Figure 1. The Process of Being Admitted to an Elective Surgery Waitlist *(picture from* VGHI, 2009*)*

An example is provided in Figure 2 from the State of Victoria in Australia of how patients access online information about the waitlist. Patients log on to the website provided by the Victoria government and first choose an elective surgery procedure (Step One), then select hospitals that provides such procedures (Step Two). The patient is then given an estimated time to treatment for each hospital, based on the statistics from the past 12 months (Step Three). Patients can also select and compare information about all hospitals. This example is similar in many other states and countries. Patients can access general information about the average wait, but not about their position in the queue.

In order to access more personalized information, patients have to contact their admitting authority directly. This results in 'information asymmetry' where patients have to rely on health professionals to provide them with instructions and information (Duckett, 2002) and the resultant emotional anxiety can have negative impacts on the patients' emotion and physical health (Krantz et al., 1996). The current practice does not align well with the "patient-centric" principal given in the Victorian Surgical Service Strategy 2008 background paper. The standards and process for prioritization and waitlist management should rather be a joint-decision process involving the patients, physicians, decision makers and the public (Conner-Spady, 2004). It is desirable to empower patients by

giving them options to (a) explore more detailed and timely information about their waiting status and (b) participate actively in the decision making regarding their queuing process.   Therefore, we next examine what comprises quality information that satisfies patients' need before moving on to suggest how this mi8ght affect their feelings of empowerment.
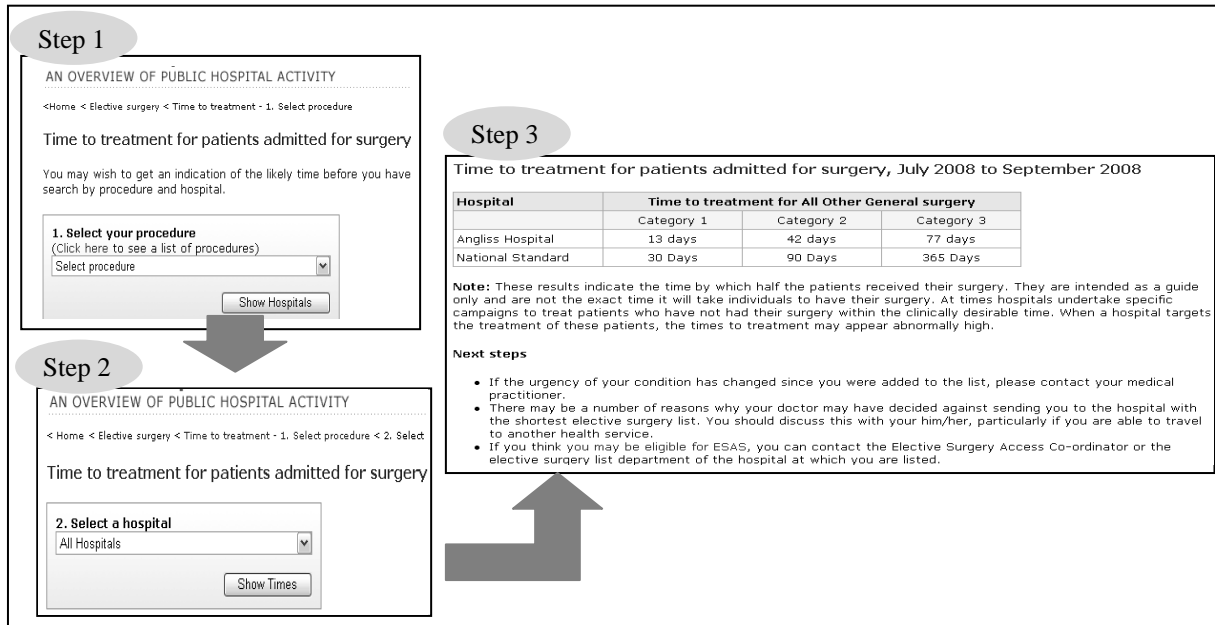

Figure 2: Overview of how Victorian patients receive information about their waiting status (*Screenshots from* VGHI, 2009)

Information Quality as Reflected by User Information Satisfaction (UIS)

Good quality information addresses the needs of the customer and meets certain criteria such as accuracy, timeliness, relevance and understandability (Miller, 1996). In other words information is only meaningful when it is used and understood by the customer (Miller, 1996). Consequently, user information satisfaction (UIS) is used in this study to reflect the quality of information in meeting the patient's need. This section discusses the key attributes of good information quality as reflected by user information satisfaction. These key attributes can be used to improve the effectiveness of information systems and to develop information quality strategies for health authorities. This will be looked at in the Discussion section.

User Information Satisfaction (UIS) has long been used by researchers to reflect information system success (Raymond, 1985; Mckeen et al., 1994; Yoon et al., 1995; Park and Kim, 2006; Jin et al., 2008). Salient research efforts to assess user information satisfactions include Bailey and Pearson (1983) and Ives et al. (1983). The former produced a 39-item User Information Satisfaction (UIS) instrument and the latter come up with a shorter form by excluding 26 items from the original 39-item instrument to avoid poor quality responses due to survey respondents being overwhelmed by the lengthy questionnaire.

Many later researchers derived items from or extended Bailey and Pearson's (1983) and Ives et al. (1983)'s UIS instruments. Table 1 summarizes the key dimensions of this UIS research and indicates most common UIS criteria. Among the 13 dimensions given in Ives et al. (1983), *relevancy, precision, involvement, transparency, completeness, accuracy and reliability* are the main UIS dimensions that are considered applicable to the elective surgery waitlist context. We follow the UIS dimensions given in Ives et al. (1983) due to its wide utilization and good psychometric properties, but include *timeliness* due to the "time is life" attitudes in healthcare. Next, as elaborated in the Introduction section, we turn to a theory of empowerment to examine how the provision of good quality information empowers patients.

	Ives et al. (1983)	Raymond (1985)	Mckeen et al. (1994)	Yoon et al. (1995)	Iivari and Ervasti (1994)	Jin et al. (2008)	Current Study
Items from Ives et al. (1983)	Relationships with the EDP staff	Relationship with EDP staff	N.A.	N.A.	N.A.	N.A.	N.A.
	Processing of requests for changes to existing systems	Processing of requests for system changes	Processing of requests for changes to existing systems	N.A.	N.A.	N.A.	N.A
	Degree of EDP training provided to users	N.A.	Degree of EDP training provided to users	N.A.	N.A.	N.A.	N.A
	User's understanding of systems	User's understanding of system	User's understanding of systems	N.A.	N.A.	N.A.	Transparency
	User's feeling of participation	User's participation	N.A.	N.A.	N.A.	N.A.	Involvement
	Attitude of the EDP staff	Attitude of EDP staff	Attitude of the EDP staff	N.A.	N.A.	N.A.	N.A
	Reliability of output information	Reliability of output	Reliability of output information	Reliability	Reliability	N.A.	Reliability
	Relevancy of output information (to intended function)	Relevancy of output	Relevancy of output information (to intended function)	N.A.	N.A.	Perceived information relevance and disconfirmation of information relevance	Relevancy
	Accuracy of output information	Accuracy of output	Accuracy of output information	Accuracy	Accuracy	Disconfirmation of information accuracy	Accuracy
	Precision of output information	Precision of output	Precision of output information	N.A.	Precision	N.A.	Precision
	Communication with EDP staff	Communication with EDP staff	N.A.	N.A.	N.A.	N.A.	N.A
	Time required for new systems development	Time required for systems development	Time required for new systems development	N.A.	N.A.	N.A.	N.A
	Completeness of the output information	N.A.	Completeness of the output information	Completeness	Completeness	Disconfirmation of comprehensiveness	Completeness
Items from Bailey and Pearson (1983)	N.A.	Timeliness of output, Currency of output, Convenience of access	N.A.	Output timeliness, Usefulness	Currency (Timeliness), Response/turnaround time, Format of output, Error recovery, Convenience of access, Language, Flexibility of systems and integration of systems	N.A.	Timeliness
Other Context-Specific items	N.A.	N.A.	N.A.	Ease of use, Ease of learning		N.A.	N.A.

N.A.: Not applicable

Table 1: Key UIS dimensions

Empowerment Theory

Empowerment is a construct that applies at individual, organizational and community levels that interact or influence one another. It refers to the "process through which people, organizations and communities gain mastery over issues of concern to them" (Zimmerman, 1995:581; Rappaport, 1987). Empowerment includes "beliefs that goals can be achieved, awareness about resources and factors that hinder or enhance one's efforts to achieve those goals, and efforts to fulfill those goals" (Zimmerman, 1995:582). Empowerment is considered important in this context because of the impact empowerment can have on patient health. For instance, an empirical study by Gustafson et al. (1999) demonstrated empowerment of HIV-positive patients through the provision of information, decision support, and connections to experts and other patients. Outcomes included improved quality of life and more efficient use of the health care service. Zimmerman (1995) suggests that Empowerment theory should be analyzed through examining the "empowering processes" and "empowerment outcomes".

Empowering Processes

Empowering processes refer to "efforts to gain control, access to resources, and a critical understanding of one's sociopolitical context" (Zimmerman, 1995:583). Processes may be driven "top down", such as when authorities involve community members in the development of interventions, or they may be "bottom up", such as when members of a community become active in programs affecting their lives. Processes extend to include all activities "where people create or are given opportunities to control their own destiny and influence the decisions that affect their lives."

In this study context, accessing good quality information (i.e., *relevancy, precision, involvement, transparency, completeness, accuracy, reliability and timeliness)*, as reflected by high user information satisfaction, is a key aspect of the empowering process. In other words, the provision of good quality information that meets the needs of patients is a key empowering enabler that creates the opportunity for people to have a better sense of control over their health situation and destiny, attain more perceived power, improve the perceived equity and reduce their stress during waiting.

Empowerment Outcomes

Empowerment outcomes refer to specific measurements that might be used to study the effects of the empowering processes (Zimmerman, 1995). The themes of *power* and *control* are commonly used in reflecting the concept (Zimmerman, 1995). *Reduced stress* and improved *sense of equity* are two primary concerns raised in elective surgery waitlist literature (Lewis et al., 2000) that should also be considered as viable dimensions for evaluating empowerment outcomes.

APPLYING THE THEORY IN THE DESIGN OF A CUSTOMER ORIENTED INFORMATION SYSTEM

Following the line of thought in the above section, we depict (Figure 3a) a general model of elective surgery waitlist patient satisfaction that is underpinned by empowerment theory. The model is adapted to our specific research context in Figure 3b by identifying user information satisfaction as the empowering enabler and reduced stress, improved sense of power, control and equity as the key empowerment outcomes of interest.
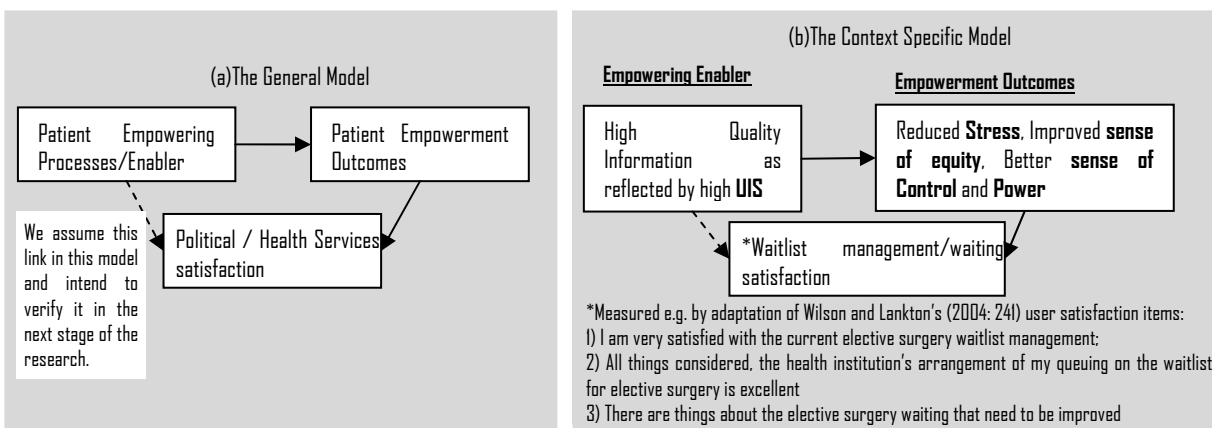

Figure 3: A model of patient satisfaction driven by Empowerment Theory

User Information Satisfaction (UIS) was discussed in the Introduction and Empowerment Theory introduced in the previous section. It remains to clarify the empowerment outcomes of better perceived equity (Lewis et al., 2000; Conner-Spady et al., 2004), reduced stress (Rigge, 1994; Conner-Spady et al., 2004), improved sense of power relative to the healthcare organizations (Lofvendahl et al., 2005) and a better sense of control over their destiny (Duckett, 2002). These key empowerment outcomes of interest are described below.

Perceived Equity

Perceived equity refers to patient perceptions of the degree of fairness in conforming to the elective surgery waitlist management rules. Good quality patient-side information, which is transparent, complete, involving, relevant, timely, precise, accurate and reliable, is likely to give confidence to the patient that everyone on the waitlist is being treated equally based on the rules set by the healthcare authorities (Lewis et al, 2000). Prior literature suggests that providing patients with information about their waiting time improves their perception of fairness. Besides, it is shown that perceived equity and the quality of patient information influences patient satisfaction towards waiting (Conner-Spady et al., 2004). Hence, we propose meeting the information needs of patients (higher UIS) would improve perceived equity, which in turn, increases patients' satisfaction towards elective surgery waitlist management by the healthcare organization.

Stress

Stress refers to the patients' perceived anxiety while waiting for their elective surgery. Emotional stress is shown to lead to negative health results such as atherosclerosis, thrombus formation (Harkness et al., 2003). Many patients reflected that they feel stressed by the poor quality information about the timing of their surgery (Rigge, 1994; Conner-Spady et al., 2008). We propose that meeting the information needs of patients would reduce their emotional stress towards waiting. Also, patients who have a lower level of stress while waiting for elective surgery are more likely to be satisfied with the elective waitlist management practices of the healthcare organization.

Perceived Power

Perceived power refers here to the patient's perceived capacity to influence the date of receiving surgery. Adequate information, "levels the playing field between the doctor and the patient" (Tang and Newcomb, 1998: 568). In contrast, arthroscopic patients who felt they had no influence in deciding the date of surgery had a more negative view than others about their time on the waiting list (Lofvendahl et al., 2005). Providing good quality information might include options for patients to explore further information about their waiting status, ability to get more involved in the decision making process on prioritization, more capacity to negotiate with relevant healthcare organizations and to make decisions on waiting arrangement. Such options are likely to enhance patient's perceived power over the date of surgery. We propose that meeting the information needs of patients would improve their perceived power over the date of receiving the surgery. Consequently, patients who perceive themselves as having bigger power (influence) over their surgery date will have a higher level of satisfaction towards waiting.

Sense of Control

Sense of Control refers to the degree to which a patient believes his/her voluntary activity can change the probability that a health-related outcome will occur. A lack of good quality patient-side information often means that patients have to rely on providers to advise them about their healthcare needs (Duckett, 2002). If adequate information is provided, it is very likely to improve patient's sense of control over their destiny or health situation. Patients who get better information have a higher sense of control over their care, an improved sense of health, an increased optimism concerning the efficacy of therapy, and reduced illness episodes (Tang and Newcomb,1998; Seeman and Seeman, 1983). We propose that a sense of control over their destiny as a result good patient-side information means that patients are more likely to appreciate the efforts of health authorities and thus be more satisfied with waitlist management.

The proposed framework for elective surgery patient waiting satisfaction is shown in Figure 4. The model shows that meeting the information needs of elective surgery waitlist patients through providing timely, relevant, precise, involving, transparent, complete, accurate and reliable information empowers them, leading to empowerment outcomes that include improved sense of equity, reduced feelings of stress, improved sense of control over their destiny, and more perceived power relative to health authorities.
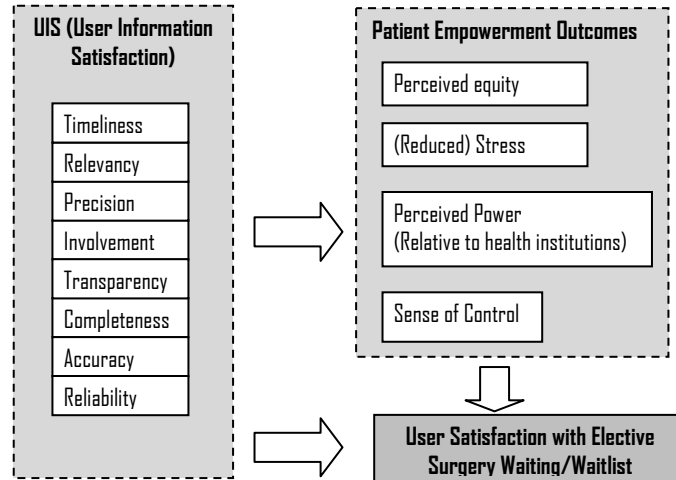
Figure 4: Empowering processes leading to empowerment outcomes and user satisfaction

In the next section, we demonstrate how this model could guide design of waitlist management information systems so they supply adequate information online. We acknowledge that these proposed guidelines are "ideal" practices and it is not feasible for an information system to meet all these criteria at the current stage due to practical concerns and technological limitations. However, the model serves as a starting point and benchmark for evaluation and improvement of current online waitlist information delivery practices.

DISCUSSION

Most government agencies in Australia are now running online advisory services on their websites to improve their service provider image (Li, Gregor and Goode, 2008). Following this strategy for elective surgery waitlist management would empower the public and could improve their satisfaction with the public healthcare service. This section speculates about an online elective surgery waitlist management system that would work for both healthcare providers and the general public.

Since it is "essential to identify how the IS adoption affects and is affected by human relationships and organizational processes" (Mantzana et al., 2007: 92), the main actors in the elective surgery queuing context need to be identified. Actors may be aligned to Mantzana et al. (2007) concept of actors as (a) Acceptors, (b) Providers, (c) Supporters, and (d) Controllers. Figure 5 provides an "idealized" concept of an online elective surgery waitlist management system (ESWMS) using these classes of actors. It is idealized because privacy and security issues exist with providing centralized patient records online (Anderson, 2000), and these are ignored here. A feasible system would lie somewhere between the scant information provided currently (cf Figure 2) and the idealized view in Figure 5. The Information Systems theory discussed in this paper provides the desired information properties, resulting benefits in terms of empowerment outcomes, and the potential for improved patient satisfaction towards waiting.
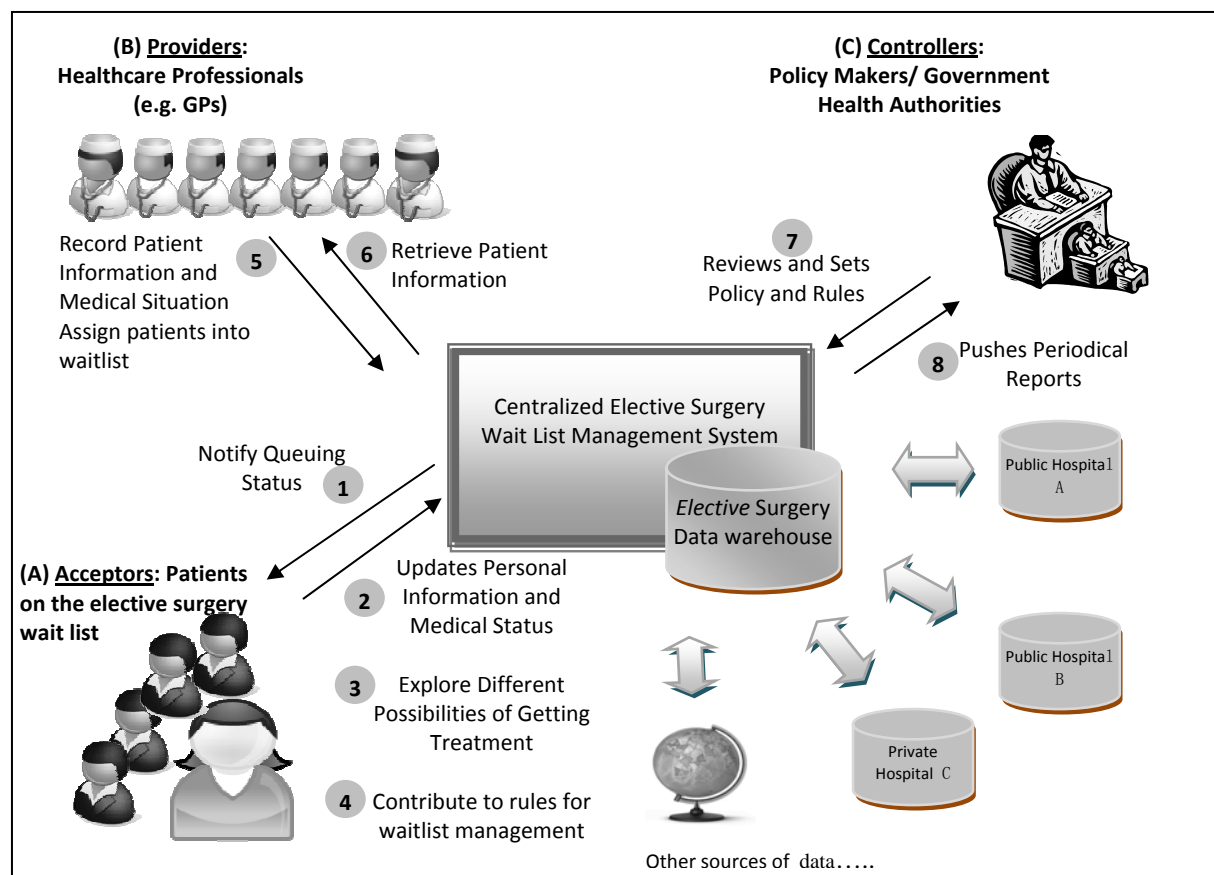
Figure 5: An idealized view of patient information flows relating to elective surgery waitlist management

What might be the benefits of the system depicted in Figure 5? Turban et al. (2008) propose that the value of information systems should be examined from three levels, namely the technical, managerial and strategic levels.

At the basic or technical level, the ideal system of Figure 5 increases waitlist management efficiency and effectiveness by providing more consistent and accurate records of data and transactions.

At the managerial level, this ideal system has potential for testing different queuing algorithms and waitlist management models. One example might be the use of sensitivity analysis in decision support. The system also facilitates data mining to predict waiting list trends and other items of interest so that the health providers can be better prepared to meet demand. Centralized coordination and control also means better allocation of available resources (e.g. people who are willing to be assigned to another hospital to get surgeries done faster).

At the strategic level, the satisfaction of customers might be improved by meeting their information needs on waiting status. The empowerment outcomes of good quality information provided through the ideal system to patients include reduced stress, better perceived equity, improved perceived power relative to health providers and a better sense of control by patients over their destiny.

Table 2 lists features of the system that would meet patient information requirements as empowering processes lead to empowerment outcomes and user satisfaction (cf Figures 4).

UIS indicators	Features of the ESWMS that reflect UIS (*numbers correspond to those on Figure 5*)
Timeliness	The system supports real time notification of waiting status to customers in advance when a patient's turn is about to arrive. Based on a certain optimized queuing algorithm, the ESWMS pushes the alerting message to patients through patients' pre-customized channels e.g., SMS, Email, Mobile or landline phones. This could be done using PUSH technologies (1). ESWMS also allows patients to check their waiting status through multiple channels listed above (2).
Precision Timeliness Accuracy	Patient updates personal information and medical status through ESWMS: the system allows patient to update their contacts and medical status (deteriorating or improving). This allows real time update of the elective surgery database; so that the whole waitlist management process is more efficient and precise (2) and GP can also revise their decisions on the patient's urgency category or status based on the patients' up-to-date medical situation (5). Inputting information directly through the online portal also ensures accuracy of data (2) (3) (4) (5) (7).
Transparency Involvement	Transparent decision support functionalities: The online ESWMS could also embed a combination of technologies including DSS, KBS and ES. It allows patients to explore different possibilities of waiting and getting their surgery done to their advantage (e.g., what if the patient chooses to go to another hospital, public or private to get the surgery done; more details and knowledge about the healthcare professionals in that hospital, pros and cons etc.) (3).
	The ESWMS Online Government Agency Interface allows the health authorities to review the elective surgery waitlist management data and set corresponding policy and rules for the coming years (7) and pushes periodical reports for the health authorities and the public to see (8). The public can also contribute to the rules and policies for waitlist management such as those related to prioritization, through the ESWMS's patient interface (4).
Relevancy Reliability	Good decision support functionalities of ESWMS (cf. Transparency and Involvement part above) and highly personalized user interface ensures that the information provided to patients is relevant and reliable.
Completeness	Through increasing transparency and user involvement in contributing to the rules and policies for waitlist management, patients, healthcare providers and government agencies are all able to benefit from the complete information they have.

Table 2: How the ideal Information System of Figure 5 supports the model proposed in Figure 4

In this initial phase of the study, this elective surgery waitlist management system is an ideal model with optimized features. We do recognize that many practical challenges must be met before such a system become a tangible reality. Therefore, the next stage of the study involves interviewing several healthcare providers and patients and will bring out more critical concerns and issues in practice. These concerns might be related to accessing to data from different hospitals, politics against hospital finding or security of personal information. The proposed model and system features will be refined as a result of this interviewing process. After qualitatively probing for these key issues of concern, we plan to quantitatively assess the research model through survey methods.

CONCLUSION

The fear of the unknown and the desire for information have been shown to be the common stress among patients (Beckerman et al., 1995). Not being able to access adequate information about their waitlist status, especially when they are suffering from pain or related inconvenience, can greatly add to patient stress. At the current stage, waitlists are viewed as inevitable in elective surgery in most public funded healthcare systems in OECD countries. Waitlists are said to be a tool to rationalize supply and demand. However, there are things we can do to reduce the negative feelings of patient such as anxiety and stress as a result of waiting. We proposed that improved user information satisfaction can relate to reduced stress for waiting, increased sense of control and improved perceived equity and power. Empowering the patients through meeting their information needs via an online waitlist management system is an effective way to improve patient overall satisfaction towards waiting and the waitlist management by the health authority.

The study proposed a framework of elective surgery waitlist patient empowerment. Theory suggests that any waitlist management information system should provide patients with good quality information regarding their waiting status instead of simply presenting average figures (as currently displayed on many health authority portals). The system should also equip patients to explore alternatives such as opting for alternate hospitals. We then speculated on an idealized centralized online elective surgery waitlist management system that would serve as a starting point and benchmark for health authorities to consider while designing or improving their online elective surgery waitlist information systems.

The limitation of the study is that we proposed an elective surgery management system with idealized features. We need to acknowledge the real life challenges and practical concerns related to the system. We will explore these during the empirical stage of the study.

At this stage of the study, we focused on describing our idea fully rather than detailing research methodology and outcomes. The next stage of the study will empirically test the proposed model with healthcare professionals and patients through interviews and surveys.

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