

Improving Electronic Medical Records (EMRs) Practices through a Clinical Microsystem in the Malaysian Government Hospitals

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Abstract

Healthcare is provided to patients by caregivers who give in complex organizational arrangements but the overwhelming amount of their own daily work is part of a clinical microsystem. The concept of clinical microsystem places medical error and harm reduction into the broader context of safety and quality of care by providing a framework to assess and evaluate the structure, processes and outcomes of care. The purpose of this paper is to examine the elements of the clinical microsystem developed by the Institute of Medicine (Godfrey & colleagues, 2004) and how it could be used to improve electronic medical records (EMR) practices in the Malaysian Government Hospitals. Among the critical elements of the clinical microsystem analysed in this paper include leadership roles, teamwork, working environment, patient needs and market focus, the use of electronic tools for patient care improvement, process of changes in implementing EMR and the role of technology in facilitating the integration of healthcare work. The concept of microsystem could provide a new frontier in organizational health services management research. There is an urgent need for research to be carried out to assess how well the government of Malaysia is in a position to provide efficient healthcare services within the context of electronic medical records practices as the government is making a significant investment in healthcare for its citizens.

Keywords: Healthcare, Clinical Microsystem, Quality improvement, Patient safety

Introduction

The health care industry's growing adoption of Electronic Medical Records is giving rise to a new perspective on the role of healthcare professionals. Information technology is proving to be as a vital element in the administration of healthcare. Specifically, most hospitals in Malaysia are adopting information systems that provide more accurate and timely information regarding patient care. The widespread of using information technology has affected the way of hospitals maintain documentation of their daily transactions such as in data storage, retrieving and communication. Now, we are in the midst of a landmark shift in record keeping, with the push for electronic medical records well under way (Christian, 2002).

An electronic medical record system was introduced as a way to facilitate a centralized patient information repository. The Electronic Medical

Records (EMR) are used for many purposes including patient care, administration, research, quality improvement and reimbursement (Shaun Treweek, 2002). These applications require a knowledge of the underlying quality of the data within the EMR so as to avoid misinterpretation (Shaun Treweek, 2002).

An EMR serves as the primary source of information for patient care. Information technology permits much more data to be captured, processed and integrated, thereby providing meaningful information and contributing to the knowledge of authorized users for legitimate uses (Computerised Patient Record Institute Work, 1995). The American Medical Association states that the current paper medical record is insufficient in content, format, accuracy and accessibility to allow determination of health care effectiveness and outcomes. According to the Medical Records Institute, electronic medical records (EMR) have the same structure, scope and information as do paper-based records in an electronic format. EMRs can remedy the inherent flaws of the conventional paper system through improvements in accessibility,

cost savings, quality of data capture and efficiency. An EMR system, therefore should be capable of appropriately capturing, processing and storing information and should be compatible with other related systems (Rod Lusk, 2002).

Today's health care system is undergoing rapid change as we strive for improvement in the health of all Malaysian people. Faced with a rapidly ageing population, an increase in patient expectation for health services and escalating costs of health technology, new mechanisms to organize, finance and deliver health services are being introduced. Central elements of these changes include increase the efficiency and effectiveness of service provision, public accountability, quality assurance and outcome measures. Current IT systems provide efficient means of gathering, storing and retrieving information and therefore perform as surveyors of human action (Collen and Frances, 1999).

Healthcare is provided to patients by caregivers who work in complex organizational arrangements but the overwhelming amount of their own daily work is as part of clinical microsystem. In relation with EMR, the concept of clinical microsystem puts medical error and harm reduction into the broader context of safety and quality of care by providing a framework to assess and evaluate the structure, process and outcomes of care. The purpose of this paper is to examine the elements of the clinical microsystem developed by the Institute of Medicine (Godfrey & colleagues, 2004) and how it could be used to improve electronic medical records (EMR) practices in the Malaysian Government Hospitals. The critical elements of this paper include leadership roles, teamwork, working environment, patient needs and market focus, the use of electronic tools for patient care improvement, process of changes in implementing EMR and the role of technology in facilitating the integration of healthcare work. The concept of microsystem provide a new frontier in organizational health services management research, further research is needed to understand the contributions of practice based research in improving delivery of safer care.

Electronic Medical Records (EMRs)

The word of EMR is evolving, starting with *computer stored medical records*, then *computerized patient record (CPR)*, *computerized medical record (CMR)*, *computer-based patient record system (CBPR)*, *electronic health record (EHR)* and *automated medical record (AMR)*(Fisher,1999).

The term of EMR defines is a computerized medical records that can be accessed with concerned of patient privacy, confidential and security from multiple integrated system at any point of care within the

health care enterprise (Wagner, 2004). One of the healthcare experts, Jerome (1999) defines EMR as a computer-based information system that integrates patients-specific information from diverse sources and tracks that information overtime to facilitate clinical management and information retrieval, analysis and reporting. Morgan (2002) defines EMR as a confined medical record offering little integration with other system and is much restricted in its scope.

The electronic medical records is an evolving concept defined as a longitudinal collection of electronic health information about individual patients and population. Primarily, it will be a mechanism for integrating health care information currently collected in both paper and electronic medical records (EMR) for the purpose of improving quality of care (Tracy & Nicolas, 2005).The EMR replaces the paper records as the primary record of care meeting all clinical, legal and administrative requirements (Computerized Patient Record Institute Work,1996). Also, the EMR is more than just the electronic version of the paper record. It is not a record in the traditional sense of the term. The term 'record' connotes a repository with limitations of size, content and location and suggests that the sole purpose of a compilation of health data is to document events (Computerized Patient Record Institute Work, 1995)

An EMR is a structured and integrated approach to managing patient data with the end result of improving care by reducing the number of incomplete charts, reducing the number of incomplete charts, reducing the waiting time for paper-based test results and enhancing clinical decision making with real-time or on-line access to patient information. This way, a physician can have a complete view of a patient's medical history, which may allow him or her to check for duplicate prescriptions, overdosing, over treatments and such, thus reducing medical errors. At the same time, a nurse can access the same patient record, without waiting for the chart to be physically transferred. Among other benefits that IT can bring to healthcare are also reduction of paper handling and inefficient use of resources by lowering test charges, lab and radiology tests and hospital admissions (U.S. Department of Health and Human Services, 2004).

Describing Clinical Microsystem

Healthcare systems are cumbersome, unwieldy, unfriendly and opaque to the users and the patients. Healthcare systems are better described as complex adaptive systems. As such, they are a collection of individual healthcare professionals who are free to act in ways that are not totally predictable; the organizational boundaries are fuzzy, in that membership changes and providers can simultaneously be members of other systems.

Furthermore, given the complexity of these systems, the actions of individuals are interconnected so that the actions of one provider change the context for all of the other providers (Plsek, 2001).

As we continue to move beyond conceptual theory and research to clinical applications, the emerging fields of chaos theory, complexity science and complex adaptive systems have influenced how we have applied these concepts to improving Microsystems. The microsystem is allied with work in improving organizational systems (Senge, 1990) and complexity sciences (Zimmerman, Lindberg & Plsek, 1998) and has been disseminated internationally. This is evident in the work to bring together clinical Microsystems in our electronic medical records practices especially among the healthcare professionals in the Malaysian government hospitals and a good way to improve the quality of care.

The concept of clinical Microsystems as a framework for services improvement has been developed at Dartmouth Hitchcock Medical Centre in the US. They define clinical Microsystems as:

“A clinical microsystem is a small, functional, front-line units that provide most health care to most people. They are the essential building blocks of the health system. They are the place where patient and health care staffs meet. The quality and value of care produced by a large health system can be no better than the services generated by the small systems of which it is composed.”

The microsystem framework is a flexible set of ideas and tools designed to help people working in microsystem perform more effectively as a team and improve standards. The framework encourages team members to think objectively about how their team is structured and how it works and to understand the systems and processes that connect them. They can use the information to identify areas for improvement and to introduce changes in a systematic and well-managed way.

The microsystem concept is based on an understanding of systems theory coupled with James Brian Quinn's theory of a smallest replicable unit (Quinn, 1997). Nelson and colleagues have described the essential elements of a microsystem as (a) a core team of healthcare professional; (b) the defined population they care for; (c) an information environment to support the work of caregivers and patients; and (d) support staff, equipment and a work environment. A focus on Microsystems is a way to provide (1) greater standardization of common activities and customization of care to individual patients, (2) greater use and analysis of information to support daily work, (3) consistent measured improvement in performance, (4) extensive

cooperation and teamwork across disciplines and specialties within the microsystem and (5) an opportunity for spread of best practices across Microsystems within their larger organization (Nelson & colleagues, 1998).

Unique features in each practice environment, unit or microsystem may favor the adoption of best practices, but the success of an initiative may be thwarted if the interdependent members of the practice do not share common points of view or perceive support to implement best practices. With data-driven decision making, performance improvement, teamwork and cooperation successful implementation of change throughout larger organizations can be achieved by focusing attention on the unit where health care is delivered (Donaldson & Mohr, 2000; Weinstein, Brown, Hanscom, Walsh & Nelson, 2000). The key component needed for improving health care quality lies within the unique practice environment.

The dynamics of how individual practice settings have adapted the use of their electronic records of their own use, developed new practice patterns incorporating clinical guidelines and integrated all staff actions towards common goals established within the practice are critically important to develop deeper understandings related to the nature of how to implement EMR successfully.

Making The Link Between EMR and The Microsystem

Initiating the improvement of the EMR practices in clinical Microsystems pertaining to Malaysian government hospitals involves increasing the work unit's awareness of its functioning as a microsystem. The focus on Microsystems invokes consideration of team performance and the relationship of individuals within teams. The idea of high reliability organizations suggests that team and individual performance depends on the development of certain organizational norms. Furthermore, a focus at the microsystem level changes the role of senior leadership. It means that senior leaders would mandate that each microsystem should have tight alignment of its mission, vision and strategies with the organization's mission, vision and strategies. But it also means that senior leadership gives each microsystem the flexibility needed to achieve its mission. Finally they hold the microsystem accountable to achieve its strategic mission improve EMR practices. Technology is strongly endorsed by healthcare professionals and administrators to support all workflow and processes in the hospital. An electronic system can enhance multidisciplinary patient data collection, organization, communication and sharing.

By using the microsystem framework, it helps to view each practice of the healthcare professionals in the process of improving a system, guided the evaluation of the culture of the practice, by focusing on the relationships on the individual involved and the interdependence of the team, understanding their roles and responsibilities and how information is managed by the advancement of technological tools.

Learning from Clinical Microsystem

The elements in the microsystem as such:

- **Leadership**
 - Leadership
 - Organizational support
- **Staff**
 - Staff focus
 - Education & training
 - Interdependence
- **Patients**
 - Patient focus
 - Community & market focus
- **Performance**
 - Performance results
 - Process Improvement
- **Information & Information technology**

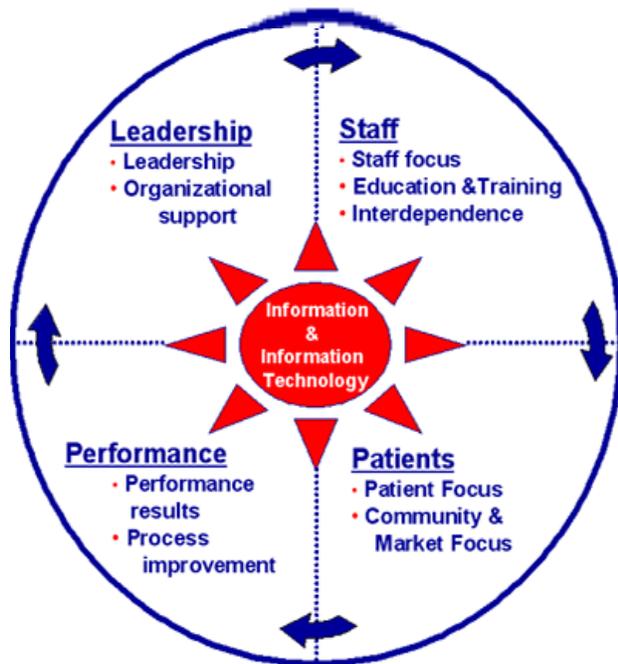


Figure 1.1

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Each of dimensions can be thought of on a continuum that represents the presence of the characteristics in the microsystem.

Leadership

Leadership is needed to develop an improvement-oriented practice setting. Becher and Chassin (2001) defined major barriers to widespread adoption of quality improvement in health care: difficulty and expense related to the efforts; a lack of return on investment; a lack of demand for improvement and the local nature of health care (Becher & Chassin, 2001). In order to activate providers to make changes in their practice that improves health care quality, one needs to consider the mixed financial incentives of providers and practices. There are differences in training and age demographics, fragmentation of physician practices, resistance to change, lack of data related to outcomes of improvement efforts and high costs related to undertaking quality improvement projects.

To implement systematic change in processes, developers of interventions need to understand the nature of the practice, the financial implications of implementing change and the leadership style used to structure the practice environment. The innovation or change must be clear to the group to whom it is presented and the process to be changed must be seen as an improvement or “best practice.” Visionary clinical leaders are needed to make improvements in chronic care, and provider groups need to be able to overcome the system barriers to be able to use tools and redesign systems as needed to be as effective as possible (Bodenheimer, Wagner & Grumbach, 2002).

The unpredictability of the current health care environment increase the needs for leaders to provide direction, using navigational tools such as a compass (to provide general direction) rather than a map (providing specific direction) for ‘sense making’ (Weick,2001). Leadership and relationships among followers shift in this environment that requires less of a focus on decision-making and more attention to the way things unfold. Weick suggests that leaders develop skills in animation, improvisation, lightness, authentication and learning.

On a systematic basis, clinical improvement requires a group to be committed to evaluating and learning from their practice patterns once information is presented. By facilitating the local development of strategies for aligning practice with evidence-based best practices, leadership can provide an infrastructure for change (Coye, 2001). This creates an

organizational context for change or improvement. Health maintenance organizations have been able to set up the organizational infrastructure through investments in the information technology to support broad changes in provider practice patterns, however the impact of these infrastructures on the majority of providers who contract with health plans is marginal at best.

Leadership for change involves communication and the ability to translate the need for change. Leaders build support for the change and recognize that not all individuals will have the same perceptions about the change. When leaders recognize where their team is on the adoption curve of a change, they can better support their team to embrace change. Leaders use different strategies to build and sustain momentum during the implementation of change, focusing on the key priorities. Successful leaders focus on fewer priorities to increase the effectiveness of the prioritized efforts (effecting change in higher education project, 2004). By integrating five core competencies: attending to a broader moral purpose, keeping on top of the change process, cultivating relationships, sharing knowledge and setting a vision and context for creating coherence in organizations, leaders will be empowered to deal with complex change. Integrating these core competencies will transform these leaders, enabling them to mobilize the individuals on their teams to adapt to change in their environments (Fullan, 2001).

The role of leadership for the microsystem in a new phenomenon especially in Malaysian government hospitals pertaining to EMR is to maintain constancy of purpose, establish clear goals and expectations, foster positive culture and advocate for the Microsystems in the larger organization. Furthermore, the leaders need to balance setting and reaching collective goals and to empower individual autonomy and accountability through building knowledge, respectful action, reviewing and reflecting towards EMR practices in Malaysian government hospitals.

Organizational Support and Culture

The larger organization may be either helpful or 'toxic' to the efforts of the microsystem. The hospital system has shown great effort in helping out with patient restraint protocols and in quality end-life issues and how cultural differences of people necessitate individualized care.

Culture plays an important role in shaping structural programs adopted within an organization. The research regarding organizational culture within the management literature is abundant. There has not been significant research on the effect of organizational culture on quality or the process of

change within health services. While the effect of culture on health care outcomes has been the focus of research within the past decade in the health care environment (Shortell et al., 2000; Shortell et al., 1995; Shortell, Rousseau, Gillies, Devers & Simons, 1991; Shortell et al., 2001; Shortell et al., 1994; Wakefield et al., 2001; Zimmerman et al., 1994; Zimmerman et al., 1993) studies that were primarily undertaken within larger health systems did not consistently demonstrate that a particular type of organizational culture was associated with improved clinical outcomes. Specific factors such as teamwork, innovation, risk-taking and growth were seen as related to quality improvement interventions (Shortell et al., 1995).

The quality of care and the quality of work life are driven by the culture within a health care organization (Gershon, Stone, Bakken & Larson, 2004). Culture is reflected in "the way things are done" in an organization (Stetler, 2003), surrounds all individuals and influences leadership. In research conducted by Kaissi and colleagues surveys of 88 medical practice groups in the upper Midwest assessed the influence of organizational culture on the types of quality improvement programs used (Kaissi, Kralewski, Curoe, Dowd & Silverman, 2004). A variety of quality improvement strategies were undertaken by physician group practices that emphasized differing cultural characteristics. The culture of the organization influenced the type of quality strategy adopted. Cultures that value information embraced electronic data and comparative data to improve their clinical practices, while quality focused cultures relied upon patient satisfaction data to guide quality improvement and business-oriented cultures used typical bureaucratic methods such as benchmarking and physician profiling.

The larger organization looks for ways to support the work of the microsystem and coordinate the hands-offs between Microsystems. In Malaysian perspective, the Ministry of Health should give a great support to make the quality of care and the quality of work life is much more meaningful. It can be done through policy making, rules and regulation, providing IT facilities, staff training and others.

Staff Focus

There is selective hiring of the right kind of people. The orientation process is designed to fully integrate new staff into culture and work roles. Expectations of staff are high regarding performance, continuing education, professional growth and networking. Key factors for a successful orientation follow:

- The orientation must be well defined, new employees must know

what is expected of them in their role within hospital's culture

- New staff receive extensive training on the tasks and skills needed for their roles
- All staff evaluate the new employees on the basis of practice standards
- All staffs are encouraged to appreciate the individuality and interdependency of one another and to remain clear on the aim and objectives of the practice, as reflected in the expectation of cross-coverage and contributing to each staff member's performance evaluation.

The healthcare professionals should be informed pertaining to EMR especially aims, goals and objectives and how it can contribute towards the staffs' performance to be more efficient.

Education and Training

Alignment of role and training suggests that there is deliberate effort within the multidisciplinary team to match the team member's education, training and licensure with their role. The staffs should have "expanded role" especially for their own career development. They need to enhance their knowledge through learning and training. Ongoing training and education are supported with skill labs, special education nights and rigorous performance evaluation program. Everyone is cross-trained at each workplace within the practice (beyond the individual person's specific role) during orientation to enable staff members to assist or to fill for one another. Then, staffs are given the opportunity to learn new administrative roles in addition to their daily workplace assignments.

Key elements that support cross—functioning include the following:

- Standardized processes and protocols for each role that clearly define what is expected and how to accomplish various tasks for that role.
- Staff training at each workplace and continued on-job training.
- Skill labs in core subjects such as marketing, telecommunications, financial management, clinical procedures, customer management techniques and information system.

- Special education nights or in house-training on topics such as variance reports and for situations that fall outside normal protocol (e.g: handling patient complaints).
- Regular scheduled meetings to promote clear communication and to build esprit de corps. Mutual respect between clinical and administrative staff is viewed as being a critical success element for good staff interactions and relationship.
- Memos that are frequently used by all staff members to communicate new ideas to make their work easier and smarter.

Due to implementation of EMR in Malaysian government hospitals, all staffs need to enhance their knowledge and skills especially in IT. Thus they need to go to training or pursue their studies in appropriate course related to their work field.

Interdependence of care team

The interaction of staff is characterized by trust, collaboration, willingness to help each other, appreciation of complementary roles, respect and recognition that all contribute individually to a shared purpose. Key players such as the providers and staff who work together on a daily basis are a fundamental element of the microsystem. However, the interdependence of these key players tends to vary across Microsystems. Microsystems with a high degree of interdependence are mindful of the importance of the multidisciplinary team approach to care, whereas those with a lower degree of interdependence are characterized by providers and staff working as individuals with no clear way of sharing information or communicating.

In EMR practices, everyone involved in caring patient. The major value is having everyone communicate directly with one another. IT is a main tool to support in communication and sharing information among healthcare professionals.

Patient Focus

The primary concern is to meet all patient needs such as caring, listening, educating and responding to special requests, innovating to meet patient needs and smooth service flow. Patient is the main customer in the hospital. The hospital management needs to provide infrastructure and info structure for the benefit of the patient. Patients must have a good place to stay during their treatment in the hospital.

In EMR practices, by using IT patient will get efficient service from the hospital. According to Mandl et al (2001), electronic medical record system is designed so that they can exchange all their stored data according to public standards. Furthermore, giving patients control over permissions to view their record as well as creation, collation, annotation, modification, dissemination, use and deletion of the record is a key to ensuring patients' access to their own medical information while protecting their privacy. Many existing electronic medical records systems fragment medical records by adopting incompatible means of acquiring, processing, storing and communicating data. Records system should be able to accept data (historical, radiological, laboratory, etc) from multiple sources including physicians' offices, hospital computer systems, laboratories and patients' personal computers.

As EMR implementation in Malaysian government hospitals, patient is the main customer. They have their own right to request a good service from the hospital. Every information is given to the patients must be well informed. Staffs can access the patient medical records by using IT facilities. All staffs are using computer to do their work starting from the creation of the records until patient discharge from the hospital. Thus, it can save a lot of time and more patients can be treated from time to time.

Community and Market Focus

The microsystem is a resource for community, the community is a resource to the microsystem, and the Microsystems establish excellent and innovative relationship with the community. Connection to community represents a symbiotic relationship between the microsystem and the community that extends well beyond the clinical care of a defined set of patients. As a resource it provides education and review the quality of care for the whole region.

Performance and Process Improvement

Basically performance focuses on patient outcomes, avoidable costs, streamlining delivery, using data feedback, promoting positive competition and frank discussions about performance. Performance evaluation is an ongoing process to evaluate the performance of all employees in the hospital. Effective microsystem evaluation what they do and recognize that the evaluation at the microsystem level are not always helpful at the microsystem level. Part of the work of the microsystem becomes the development of a set of measures that are appropriate for the goals of the microsystem. It may be that this recognition is important in developing a microsystem that routinely

measures processes and outcomes, feeds data back to providers and makes changes based on data. An atmosphere for learning and redesigning is supported by the continuous monitoring of care, use of benchmarking, frequent tests of change and a staff that has been empowered to innovate.

In implementing EMR, the processes help to build a good relationship among employees. Every staffs will be evaluated on their performance and changes will be made based on results given. However, every change will produce a positive culture towards the environment. Every staffs will be more motivated, knowledgeable and skillful.

Information and Information technology

Information is a key; technology smoothes the linkages between information and patient care by providing access to the rich information environment. Information is the connector staff to patients, staff to staff, needs with actions to meet needs. Technology facilitates effective communication and multiple formal and informal channels are used to keep everyone informed all the time, listen to everyone's ideas and ensure that everyone is connected on important topics.

Universal among high performing Microsystems is integration of information. Microsystems vary on how well information is integrated into its daily work and the role that technology plays in facilitating the integration. Sharing information with patients is the biggest safeguard against medical error. Today in a modern environment, information technology can be transformational through its machine-human interface. For example, e-mail seems to offer simultaneously distancing and intimacy. The use of IT as one key to threshold levels of quality improvement is now coming to the foreground in government policies relating to quality.

In EMR practices, technology has been carefully designed into the practice and contributes to process flow and the success of the staff. All billing, scheduling and day-to-day management is done electronically and all medical records are electronic. The information system includes quick access to pertinent information, process guidelines and clinical protocols. The information systems were designed to capture all aspects of a patient's contact with the practice, including voice-mail, prescription-refill requests, diagnostic-test ordering and referral and medical record requests. Below the relationship with quality measures and electronic medical records system designed by Mc Donald (1999)

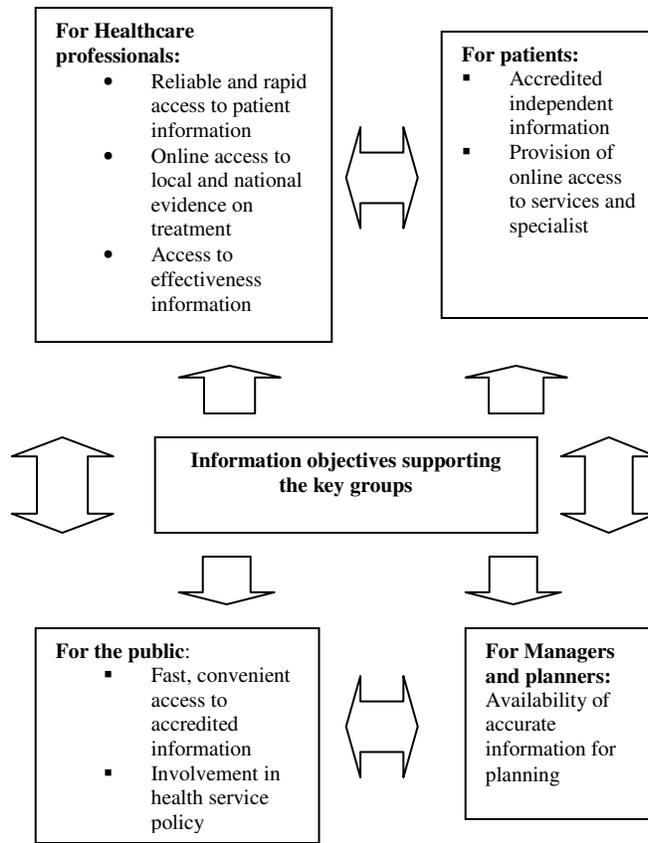


Figure 1.2: Information objectives supporting the key groups.

Discussion: Improving EMR practices in the Microsystem

The concept of Microsystem can make a great contribution in improving EMR practices among healthcare professionals in the Malaysian government hospitals. It is believed that healthcare today is sought, created, delivered and purchased at the level of the clinical microsystem. It is there that real gains in the quality, value and patient care can occur. Furthermore, the implications of Microsystems framework for the improving of EMR practices are much broader than just a given microsystem and the people working within it. Healthcare professionals can find new energies for common efforts to study and improve their work for patients as they gather around the focus of the actual unit of daily practice crossing disciplinary and special boundaries using the language of processes and systems rather than the more conventional role or discipline bound conversations that often seem to limit change and improvement. The concepts enabling a broad approach to understanding how leadership functioned in each practice; the roles of the people working within the practice; the level of

performance and investment in improvement and the way information was handled, both at the technological and basic communication levels. By using the clinical microsystem framework for EMR practices among healthcare professionals in Malaysian Government hospitals enable

- to develop a focus for their service,
- to provide better meeting the needs of their patients,
- to improve the process underpinning service delivery and
- to share information on performance and development.

Conclusion

The need to improve the quality of healthcare has never ended as since the publication of *To Err is Human* (Institute of Medicine, 2000) and *Crossing the Quality Chasm* (Institute of Medicine, 2001). The concept of microsystem could provide a new frontier in organizational health services management research. Microsystems can help to organize and design resilience into the communications, work processes and clinical environments of complex healthcare organizations.

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