“Evaluating the Organizational Impact of Telemedicine for Project Akamai”

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Abstract
As an innovative form of healthcare delivery, telemedicine involves technology and process changes that will profoundly affect the organizations into which it is introduced. However, few comprehensive studies have been conducted to determine the impact on organizations that implement such a healthcare delivery process. This paper examines some of the issues that will be studied during Project Akamai when telemedicine is introduced into a natural, yet limited, military setting—Tripler Army Medical Center and Hickam Primary Care Clinic.

1. Introduction
There are few well-designed studies concerning the organizational impact of the implementation of telemedicine. Consequently, using the findings of these studies as generalizations for the military healthcare system and its patient populations is not likely to be valid. There is clearly a need for well-designed research in this area.

The Project Akamai Evaluation Initiative described within these pages is an evaluation project conducted under the auspices of Project Akamai, a federally-funded program designed to ameliorate healthcare delivery to the Department of Defense and its beneficiaries in the Pacific Basin by using telecommunications technology. This initiative, an organizational impact project, is a systematic and comprehensive evaluation of the potential organizational contribution that the technologies and processes of telemedicine potentially have for a military healthcare delivery system. This evaluation initiative has dual functions—functions that are, in reality, different sides of the same organizational research coin. The evaluation initiative seeks to assess the impact on the organization which occurs as a consequence of the introduction of telemedicine technology (organizational effect), and, concomitantly, seeks to identify and assess the organizational factors which, if effectively prepositioned, will minimize resistance and maximize acceptance and utilization of the telemedicine technology (organizational readiness).

This research team has chosen to focus on variables at the individual, group, and organizational levels; by choosing all of these levels, this research will encompass both the formal and informal organizational factors that may be affected as well. In addition to measuring the impact of the introduction of telemedicine at these three levels, sensitivity analysis will be performed in order to identify variables which have the greatest potential impact in insuring successful implementation of future telemedicine programs.

2. Description
The nature and magnitude of the changes that occur within an organizational system when a new technology is introduced are often difficult to anticipate. Depending upon the intrusiveness of the technology, the changes in the organization will range from minor to profound; i.e., the more intrusive the technology, the more profound the changes anticipated. As an organizational system, a healthcare delivery system is exempt neither from change nor the uncertainty accompanying the change. And telemedicine is a medical technology of the most intrusive sort; telemedicine changes fundamental aspects of the processes and structures of diagnosis and patient-doctor communication. In changing these integral aspects of
healthcare delivery, telemedicine will produce changes that will permeate the entire organization.

The evaluation initiative described here is one part of a pilot study utilizing a natural, yet limited, military clinical setting under the umbrella of Project Akamai. Project Akamai as a whole will investigate several areas that might be affected by the introduction of telemedicine into this setting: quality of care delivered, patient satisfaction, economic and financial costs and benefits, and organizational impact. In evaluating the effects of the introduction of telemedicine into this setting, this organizational impact project will examine the qualitative and quantitative nature of organizational change produced by such a technology.

It is intended that this evaluation initiative will broaden and deepen our understanding of how to organizationally leverage the benefits derived from telemedicine in a military medical setting and how to avoid some of the latent dysfunctionalities and costs that may accompany the implementation of such a system. Furthermore, the study may offer insight into designing appropriate programs of organizational readiness that may be implemented prior to a full-scale initiation of telemedicine consults in order to maximize acceptance and utilization of the system.

Reported here are the initial design of the study, results available from early trials of the methodology, and insights gained by the researchers with regard to organizational impacts of telemedicine. Full data collection is scheduled to commence in Spring, 1999.

3. Method

Because the effects of the implementation of telemedicine are expected to penetrate the organization to its core functions and structures, the unit of analysis are similarly comprehensive: individuals, groups and the organization as a whole. For the individual as the unit of analysis, the research team has identified job task characteristics as the variables to be investigated. At the group level, the research team has identified communication patterns and the medical decision-making process as the variables to measure. At the macro (organizational) level, the team has chosen to examine the variables organizational culture and organizational learning.

3.1. Job Task Characteristics

The implementation of a telemedicine system is an extraordinarily complex endeavor. The key is the early involvement of the users whose lives will be impacted by the design and adoption of the technology in their daily activities. Changing the daily job activities involves a learning process that requires unscrambling old procedures and attitudes, moving to new patterns and then cementing these new processes into the procedures of the individual and groups. Successful implementation (developing these new processes) requires that individuals learn new ways of thinking about their jobs and job tasks.

Job task characteristics are the cognitive perceptions that people have of the tasks involved in the performance of their jobs. In terms of job task characteristics for individual healthcare providers (primary care physicians and specialty care physicians), this study focuses on two aspects of job task characteristics: 1) determining how healthcare professionals cognitively perceive the patient care aspects of their jobs and how those perceptions change with the implementation of a new technology (telemedicine) and 2) how healthcare providers perceive their workloads and changes in their workloads as a result of the implementation of telemedicine.

Data concerning job task characteristics in relation to patient care will be gathered by using a job task characteristics inventory. This inventory is a standard survey that the research team has adapted with the healthcare context, as well as the types of healthcare providers (primary care physicians or specialty care physicians), in mind. The inventory consists of statements that describe the healthcare professionals’ subjective cognitive views of the task characteristics of their jobs; i.e., the patient care aspects of the jobs of the healthcare professionals. The statements probe issues concerning the structure of, the psychological aspects of their jobs—specifically, perceptions in skill variety, task identity, task significance, autonomy, and job feedback.

This inventory will be administered three times during the course of the research project: three months before the introduction of telemedicine, at the time of introduction and three months after introduction. A written survey will be given to primary care physicians. While in groups of four or five, primary care physicians will complete individual surveys. The estimated time for this survey is 15 minutes. The specialty care physicians will answer these same survey questions in the course of one-hour, one-on-one interviews. During these interviews, specialist care physicians will also be asked other questions according to a set of pre-developed questions.

Data concerning workload perceptions will be elicited during the field interviews that examine communication patterns and decision-making processes. The focus of these interviews is described in section 3.2.

3.2. Communication Patterns and Decision-Making Processes (Loci and Structure)

Communication patterns and decision-making processes concern the ways in which people communicate and subsequently make decisions within an organization. The implementation and utilization of telemedicine—because telemedicine by its nature is a new communication process—recreate the patterns of communication and resultant decision-making loci and structure.
When communication patterns change, the disbursement of that information also changes: Who receives the information? When do they receive it? How much information do they receive? What kind of information do they receive? What is the quality of the information they receive?

Similarly, the transmission (and changes in that transmission) of information affects the ways in which decisions are made: Will the same people make decisions? Is a change in the locus of decision-making intentional or accidental? Are fewer or more people involved in making decisions? Is the quality of the medical decisions made at least as good as they were before telemedicine? This research will focus on how and to what degree communication patterns, and the subsequent decision-making processes, are changed.

These data will be gathered through the qualitative research methodology of ethnography—field observations combined with interviews. During these observations short, informal, semi-structured interviews will done with primary care physicians and specialty care physicians as appropriate. (These informal interviews are different from the hour-long interviews [for specialty care physicians] mentioned under job task characteristics.) These observations and interviews will be used to probe healthcare providers’ interactions with the telemedicine technology and each other and to note their actions.

During the three months before the introduction of telemedicine, observations/interviews will be conducted approximately every three weeks. After introduction, observations/interviews will be conducted approximately every two weeks.

3.3. Organizational Culture and Learning

The impact of a new technical subsystem, such as a telemedicine subsystem, has ramification not only on the micro-level of the social subsystem of the organization, the people and the dynamics of person-to-person interaction but also for the macro-level of the social subsystem of the organization, including the organization’s climate and culture and the organization’s propensity to learn and adapt. A technological change such as telemedicine affects the social system of the organization informally or formally; the impact on the social system affects the likelihood that the organization will adapt to the new technology. In particular, the introduction of a change in the technical subsystem, such as the implementation of a telemedicine project like Project Akamai, may result in single-loop and double-loop learning in the organization.

Many factors affect an organization’s propensity to change: leadership style, openness in communication, direction of that communication (i.e., top down, bottom up), the degree to which different areas of the organization view themselves as connected to other areas, the willingness to recognize shortcomings, and the willingness to try new things. All of these combine to indicate and affect the degree to which an organization is likely to change in the long term.

The organizational culture and organizational learning data will be gathered by utilizing a standard Organizational Culture and Learning Survey adapted for the military healthcare setting. This survey consists of questions designed to examine specific aspects of the organizations’ cultures and predilections for organizational learning.

This survey will be administered at the same intervals and according to the same regimen as the job task characteristics inventory. This Organizational Culture and Learning Survey is estimated to take 30-45 minutes for completion.

4. Hypothesis and Expectations

The central (general) hypothesis of this initiative is that “the introduction of telemedicine in a healthcare organization will result in significant social and technical changes, at both the micro and macro levels of organizational functioning.”

Since the levels of investigation are comprehensive—individual, group and organizational, the expected impact is equally as broad; the research team expects that telemedicine will manifest changes at all levels of the organization.

4.1. Organizational Impact

4.1.1. Job Task Characteristics. The impact on the patient care aspects of the jobs of the individual healthcare providers (primary care physicians and specialty care physicians) is likely to be significant. The research team expects to find that the primary care physician will perceive an increase in skill variety, task identity and task significance. The team expects to see the autonomy and job feedback to change; however, the direction of that change is not predicted. These expectations are due to the research team’s belief that primary care physicians will view the introduction of telemedicine as a positive development.

The research team expects that the specialty care physician will perceive an increase in job skill variety and perceived autonomy. We expect that the perceived task significance and job feedback will decrease for the specialty care physicians. We also expect that the specialty care physicians’ perception of their task identities will change, but do not predict a direction for that change. These expectations come from the belief that specialty care physicians may see the introduction of telemedicine as an ambiguous event.

In terms of workload, the team anticipates finding that the introduction of telemedicine will result primary care physicians’ perceiving an increase in workload, while specialty care physicians perceive no change in workload.
4.1.2. Communication Patterns and Decision-Making Processes. The research team expects that the amount of information primary care physicians receive will increase and that they will receive information more quickly than before the implementation of telemedicine. We expect primary care physicians to make more and varied medical decisions after telemedicine is introduced, while specialty care physicians are expected to make more medical decisions in an hour than before telemedicine.

The team expects that communication may increase between primary care and specialty care physicians, at the request of the primary care physicians. Because of easier access to specialty care physicians, primary care physicians may wish to involve the greater expertise of specialized colleague more often than before in their medical decision making. Primary care providers may alter the classification of cases from routine consult to non-routine consult because they may believe that a particular case would benefit from diagnostic information that can only be acquired by the expert specialist through hands-on, face-to-face examination, rather than through the data available within the constraints of a telemedicine consult. However, the opposite could occur because of an institutional safeguard to prevent over-use of face-to-face consults.

Changes in decision-making loci and structural patterns may also be observed at the consulting site. Staff may be required more often to be involved in direct diagnosis of telemedicine data, rather than interns or residents.

The rationale for these expectations results from a belief that introducing telemedicine will be perceived by all healthcare providers involved as enhancing the availability of expert knowledge in the organizational system as a whole.

4.1.3. Organizational Culture and Organizational Learning. The research team expects the perception of a performance gap (propensity to address shortcomings), involvement of leadership (the degree of democratic leadership), climate of organizational openness, opportunities for new initiators of learning (two-way communication), support for trying new things and focus on the organizational components as interdependent to increase. These expectations are based on the belief that introducing telemedicine will create a shared value of utilizing telemedicine to its fullest in order to apply the expert knowledge as extensively as possible.

4.2. Organizational Readiness

Through a comprehensive analysis of how organizations and their people are impacted and how they react and adjust to changes, the research team expects to gain insight into helping organizations prepare for and implement technological change. Determining aspects of ease and difficulty are equally important in helping organizations get ready for technological change. We expect to begin laying some groundwork for understanding the catalysts and obstacles in introducing new technologies into organizational settings. Specifically, we expect to determine some ways to assess organizational needs and ready (train) people for coming changes. In addition, we expect to be able to propose ways to prepare the organizational systems and management for championing and supporting the change.

Helping people at all levels of the organization prepare for and work with the change cannot be emphasized enough. If people are not ready for the change (psychologically or in terms of skill), they will not utilize the telemedicine system to its fullest.

No or low utilization has serious consequences. First, many programs have already failed because of insufficient use. Next, low utilization increases the per consult cost each consult requested and fulfilled. Finally, failure wastes human and financial resources, reduces morale, falls short of the intended goals, and hinders confidence in leadership.

5. Significance

Prior to any wide-scale implementation of telemedicine in the military healthcare system, it is worthwhile to understand the potential impacts (and the corresponding significance of each) that such an implementation will have upon the organizational structures, processes, and functioning of that system so that appropriate anticipatory designs and preparations may be undertaken. This study may help us understand how to organizationally leverage the benefits derived from telemedicine in a military medical setting and how to avoid some of the unanticipated dysfunctionalities and costs that may accompany the implementation of such a system. We expect to show that telemedicine significantly changes the way people organize to deliver medical care (organizational effect/impact) and that, if correctly anticipated, those changes can enhance of medical care delivery which telemedicine may provide (organizational readiness).

5.1. Initial Indications

Initial organizational observations indicate several things: 1) Telemedicine has a promising role in the enhancement of quality medical care as well as the enhancement of access of medical care and may likely do both without a significant change in the cost of medical care. 2) The implementation of telemedicine has the highest potential for success when it includes a program of organizational anticipation and preparation (unfreezing), as well as a program of organizational feedback and evaluation (refreezing) prior to the actual introduction of telemedicine. 3) Any preparation and evaluation effort needs to be centrally coordinated and should include training, team-building and development, and work group self-management as component parts of its design.
5.2. Implications

The questions surrounding the implementation of telemedicine are not “if” questions; the questions are “when,” “how,” and “how well” the implementation occurs. For this reason, understanding the ramifications of the introduction of telemedicine is critical.

Telemedicine has already begun changing the face of healthcare delivery. The changes wrought by telemedicine are so fundamental that it may seem melodramatic to say that telemedicine has the potential to exact a revolutionary face lift on the traditional way of “doctoring”—medical education and training, the basic elements of doctors’ jobs, the role and status of doctors, and the organizations (small or large, public or private) for which doctors work. Blooming in a field of service that pervades society in the ways that the healthcare field does, telemedicine may play a burgeoning role in societal change.

To date, we have accounts of more failed telemedicine implementations than successful ones. However, telemedicine has staying power and has gained ground that cannot be retracted. It has demonstrated its potential. We must now determine how to most effectively and efficiently harness and channel that potential.