CHAPTER

2

Health Management Information Systems Executives:

Roles and Responsibilities of Chief Executive Officers and Chief Information Officers in Healthcare Services Organizations

Joseph Tan

CHAPTER OUTLINE

Scenario: *Managing Waiting Time in Emergency Rooms*

Scenario: Managing Waiting Time in Emergency Rooms[1]

For the most part, patients entering the emergency room (ER) will not know what treatment they need or the specific department they should be admitted into; often, they are largely dependent on the ER to quickly and effectively diagnose their illness so as to get them transferred into the right department for optimal care and treatment. Some patients, for example, should be transferred to the intensive care unit (ICU), others should proceed to the operating room (OR), and some others to the recovery room (RR) waiting to be enrolled into possible long-term rehabilitation programs.

In November 2006, Beatrice Vance of Chicago, Illinois, was experiencing chest pains and quickly found her way to a local hospital ER. Hours later, she apparently died of a heart attack. The coroner's report concluded that the length of her wait time in the ER was partly responsible for her death because she died of congestive heart failure—the inability of the heart to pump the required amount of blood to her body due to a weakened muscle. At 10:15 P.M., she was already checked into the ER but was told to wait her turn for a doctor. At 12:25 A.M., she collapsed and died.

As Carol Haraden from the Institute for Healthcare Improvement noted, "The dangers are that the person's condition may escalate . . . (during) . . . waiting time in the ER." With wait time in the ER averaging 3 hours and 47 minutes nationally in the United States, it is clear that something should have been done. When an inquiry into a case such as that of Beatrice Vance is made, senior executives of the healthcare organization, including the chief executive officer (CEO) and others such as the chief information officer (CIO), may be held partly responsible. Thus, it is critical nowadays for healthcare organizations to shorten ER waiting times and be fully prepared to deal with differing needs of patients being admitted.

Indeed, the number of U.S. emergency departments has fallen by about 425, or about 12 percent from 1993 through 2006, while 26 percent more (or 114 million patients) have sought ER care during the same period. Hospitals across the nation are being pressured to find new ways of coding and assessing patients to keep the ER services efficient and effective by attending to

admitted patients within 30 minutes. At the very least, the hospital should provide accurate and timely services to their patients who come to the ER for care. An ER triage system, for instance, is essential for the prompt recognition of urgent cases.

Imagine yourself to be one of these patients who would like to see changes to the ER waiting times. Do you feel this might be an opportunity where it would be beneficial for appropriate IT solutions and effective leadership in healthcare services organizations to come into play? What could, or would, you do to fix the situation, if you were given a leadership role by the Chicago hospital where Beatrice Vance was admitted?

I. Introduction

For years, practicing physicians in urban areas, especially those catering primarily to underserved communities, have struggled with patients who frequently miss scheduled appointments. With the national no-show rate in 2000 averaging 5.5 percent, many physician offices have now adopted a double-patient booking schedule in order to remain productive and financially viable. In other words, two patients are scheduled every 15 to 20 minutes at the physician's office, resulting in patients having to wait their turn even if they arrive on time. This then puts a lot of stress on the system as office staff struggles to balance between patient flow and flaring tempers, greatly increasing the potential for staff frustration and patient dissatisfaction.

To further aggravate the situation, physicians also have the habit of placing patients on a wait list that may be months away. Typically, these physicians would advise their patients to go to the ER if it is something for which the patients cannot wait. With ER services, no appointments are maintained, so situations can be even more demanding because federal law dictates that no patient can be denied needed treatments when showing up at an ER. As with challenges encountered in many critical business operations, where scheduling, queuing, and waiting time create problems, one way of resolving the ER challenge in the U.S. healthcare system is the adoption and implementation of appropriate health management information systems (HMIS). This opens up discussion of the critical roles played by the chief executive officer (CEO) and the chief information officer (CIO) in healthcare services organizations. These executives are responsible for providing an appropriate vision for future HMIS directions. They are responsible for aligning IT departmental goals and strategies with corporate goals and strategies, and they are also responsible for strategizing appropriately, executing intelligently, and evaluating wisely on the system's performance of healthcare services delivery with the application of effective and efficient business processes and information technologies throughout the corporation.

II. Vision

The role of the CEO or CIO to oversee the use of HMIS in any healthcare services organization requires that the individual has at least been trained and has experienced and mastered a certain set of strategic, tactical, and operational IT competencies. Just as with any business organization,

every healthcare services organization drastically needs such an individual to be visionary in providing future directions with respect to the organizational HMIS infrastructure, product life cycle management, and innovations. Aside from being visionary, the CEO or CIO is expected to be goal-directed in resolving HMIS performance in different parts of the organization on the one hand and to be emphatic in dealing with HMIS staff and daily customer complaints on the other.

Imagine that with the shortage of administrative and clinical staff members hired to man ER services, you, as the appointed CEO or CIO, have been asked to execute and implement a triage system and other critical clinical database and reminder systems for the ER to monitor the flow of patient traffic and ER scheduling information. What will be your role and responsibilities? How would you go about aligning the IT goals and strategies to be pursued for the ER with the greater organizational mission, goals, objectives, and strategies?

Essentially, senior executives who are directing organizational information systems or technology development efforts are expected to think quickly and strategically, solve problems intelligently in many areas of IT specializations, and advocate influentially on the use of available and advancing technologies to close the gap between departmental HMIS strategies and "the business" strategies. In a healthcare services organizational context, the mission, goals, and objectives of the health organization determine how HMIS should be incorporated throughout an organization. Oftentimes, not only is senior management expected to be responsible for immediate challenges facing the organization due to a breakdown of computing services, but more importantly, top management is often looked upon to take the lead in championing existing and new HMIS services. Among the most important roles, then, is having a vision—a vision that involves the creation of scenarios and possibilities to drive needed directions for future organizational HMIS growth and investments. For the CEO, the end result of this visioning process may be an enterprisewide business plan; for the CIO, it is more likely to be an IT plan aligned with this corporate business plan.

Backtracking to our ER example, for instance, one vision of the CEO/CIO may be the deployment of IT systems to ensure that all future incoming patients who are being transported via the hospital ambulance service are assessed even while en route to the hospital through the use of tele-medical devices, thereby shortening the assessment wait time for other incoming patients. Furthermore, installation of courseware for self-help and patient education can further help to reduce wait time. A targeted wait time for incoming patients can also be effectively cut down by ensuring that any available treatment records of new and previously admitted patients be abstracted electronically and in real time to all attending ER physicians and nurses; the entire ER patient record systems could also be wirelessly connected to all local area hospitals, and patients who banked their personal health records (PHR) with any secured health information agencies can then download their records conveniently and/or allow the reading and updating of their records by the attending ER physicians and nurses.

In practice, however, crafting such a "vision" is a long-drawn-out process whereby a set of shared and related notions in the form of a vetted "proposal" or "business plan" supported by top management in the organization is generated. Presumably, there is an assumed need to sell both the professional staff and other employees within the organization on the vision in one

fashion or another. This means that a large majority of the organizational members should become aware of it, must be willing to support it, and must be able to participate in it in some fashion to bring about the realization of that vision. Surveys of management, professional staff, and other employees are some of the ways to promote an understanding and keen awareness of such a corporate view.

Strategic IT planning sessions could also be held on a continuous basis. These sessions need to be attended and supported by the key stakeholders across the organization, with the possibility of instituting changes as new ideas are introduced. Top management of the organization must also approve the finalized proposal, because future directions of the organization should extend the major thoughts captured by that proposal. It is also important to generate a business plan clarifying the strategies, policies, and procedures connected to unfolding the vision—one that is shared and supported by the majority of the organizational stakeholders. Essentially, this articulation should bring together all the pieces of HMIS components related to the organization: data, people, hardware and software, network requirements, and functional tasks to be supported.

While the CEO/CIO may not yet find complete answers to many of the questions raised by such a visioning process, having a well-consolidated plan is better than having none at all. After all, if you don't really know and can't articulate where you are heading, any road will lead you to it. This simply means that the next best thing to do may just be to do nothing because there will be no significant difference if you take (or don't take) actions without first having a strong conviction about the purpose for doing so.

Key questions to be answered by the CEO/CIO in such a business plan include:

1. What is the core mission of the IT department vis-à-vis that of the organization?
2. What are the major IT department goals to be accomplished in the longer term?
3. What are the specific objectives relating to each of these major, longer-term goals?

To turn the vision into reality, however, top management will need to take a practical approach to understanding and detailing the "strategies" in the context of unfolding the business plan.

III. Strategy

Whereas vision is concerned primarily with future directions and mission with a sense of purpose, "strategy" is concerned with how we go about achieving that vision and/or mission. For all intents and purposes, there are several levels of strategies, which should not be confused with those at the tactical and/or operational levels that pertain to shorter-term or more immediate goals and objectives, respectively. Among major groups of strategies with which top management should become fully acquainted are corporate strategies, competitive strategies, and functional strategies, as depicted in Figure 2.1.

Developed through a detailed scanning of the corporate environment at its highest level, in which the threats and opportunities of the external environment are assessed with respect to internal corporate strengths (core competencies) and weaknesses (inadequacy of corporate resources), corporate strategies may be further categorized into four major groups: growth, diversification, turnaround, and defensive strategies.

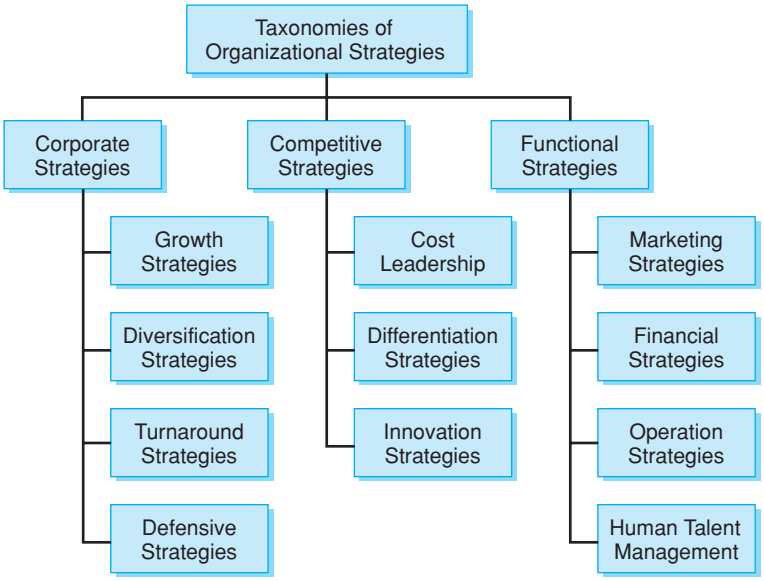

FIGURE 2.1 Taxonomies of Strategies.

Growth strategies, in the form of product and market development, mergers, acquisitions, and/or internal ventures, are aggressively followed when the healthcare organization's internal resources and competencies serve identified market opportunities readily. With a growing population of baby boomers, seniors and elderly persons facing the challenges of increased physical limitations and mobility, and increased chronic ailments, it may signal a time of growth for tele-home healthcare services. Moreover, with increased fuel and public transportation costs, an aggressive entry into the mobile healthcare market opportunities such as the promotion of tele-home care products and services may also be justified. Several national pharmaceutical chains in the United States and Canada (such as London Drugs) are already pursuing this strategy. Examples of such products and services include wearable medical devices; in-home, medical tele-consultation; and in-home, real-time monitoring care services via secured electronic networked devices.

Diversification strategies represent an approach to risk management. These strategies are often adopted when the existing healthcare organizational business portfolio is threatened; for example, delays in the reading of digitized images taken for ER patients may be a problem if other competitive healthcare services organizations are able to provide one-stop comprehensive ER services due to the availability and round-the-clock accessibility of in-house radiological services. One diversification strategy in this instance may be for the CEO/CIO to increase outsourcing of digital imaging services through the value chain by adding tele-radiological services to assess ER patient conditions quickly.

Turnaround strategies essentially take advantage of situations to retrofit the organizational strengths and internal capabilities to market opportunities that may still be available and waiting to be served. Typical approaches pursued in turnaround situations may be those of outsourcing,

organizational restructuring, business process reengineering, budgetary cost-cutting measures, assets reallocation and reduction, or even service downsizing. One example here may be the introduction of expert-based courseware in integrative medicine to combat the strong growing market forces in the complementary and alternative medicine services for educating ER patients in follow-up and self-care services to reduce the need for time-consuming patient education by the attending ER physicians and nurses.

Finally, *defensive strategies* come into play when the stage of the industry and/or product life cycle is experiencing a steady decline due to its ongoing maturity. Here, several approaches that are typically used include divesting and liquidating to reduce the losses sustained by unproductive and increasingly inactive engagements as well as exiting the oversubscribed industry niches and/or practices. As an example, traditional paper-based patient records and paper-based prescribing are difficult to maintain but still used by many physicians across U.S. healthcare systems. These practices will eventually decline in popularity as competitive clinics move to electronic patient records and e-prescription services—and gain a larger percentage of the market share of patients. Part of the role and responsibilities of the CEO/CIO is then to employ defensive strategies to move the organization to a 21st-century healthcare services organization by replacing these paper-based medical records and drug prescribing systems with server-networked electronic health records (EHR) and/or e-prescription systems.

Based on Porter's classical work on competitive advantage strategies, for a healthcare services organization to stay competitive, commonly employed strategies include cost leadership, differentiation, and innovation strategies. In *cost leadership*, cost advantage is gained through economies of scale and cost-effectiveness as well as other cost-cutting measures. *Differentiation* highlights the uniqueness of certain aspects of the business activities maintained by the organization in a competitive marketplace. Lastly, *innovation strategy* for an organization is to be constantly at the leading edge of its product offering and service development. We illustrate the applications of these various strategies in terms of how a specific health maintenance organization such as Blue Care Network (BCN) can stay competitive in the marketplace so as to provide its clients with greater benefits as well as continuing to attract new subscribing members.

BCN, an affiliate of Blue Cross Blue Shield (BCBS), for example, is relatively successful in attracting new clients in the Detroit metropolitan area. Their clientele include neighboring state universities and other major corporate employers such as the University of Michigan, Michigan State University, Wayne State University, General Motors, Ford One, and Chrysler Corporation. Their competitors operating in the same regional area are less competitive because of somewhat higher co-payment options for active and nonmedical retirees; less benefit coverage; greater limitations for servicing active subscribers; and/or less comprehensive and competitive benefits for emergency, diagnostic, and preventive services.

With regard to differentiation strategy, what distinguishes BCN from its competitors here is the sheer growth in the number of its subscribing physicians, all of whom practice in the surrounding area and will thus be able to accept new patient-subscribers. Not surprisingly, their less competitive counterparts may have a relatively limited list of available general practitioners and specialists. Other factors distinguishing BCN from its competitors may involve BCBS and its affiliates' voluminous purchasing power, rapid third-party service reimbursement schemes,

and effective supply chain management. Many third-party healthcare provider organizations would gladly work with BCN subscribers due to easy third-party reimbursement payment schemes. For instance, Dynamics, a Michigan company specializing in neck-and-back pain therapies for accident victims, will readily accept subscribers of BCBS of Michigan, BCN of Michigan, and Community Blue PPO (another affiliate of BCBS of Michigan), but may have difficulty accepting patient-subscribers of less known health maintenance organizations (HMOs) because of challenging third-party service provider reimbursement schemes. Finally, new-product developments and wellness programs such as smoking cessation, nutrition, and other health preventive measures are being actively propagated and introduced to BCN subscribers in order to stay competitive in the HMO marketplace.

Functional strategies, another set of strategies typically employed at the more operational level of managing the healthcare services organization, are nonetheless still critical for success in the longer-term and intermediate-term time frame. These strategies include marketing strategy, financial strategy, operation strategy, and human talent management.

Marketing strategy has to do with how the products and services are being propagated and promoted in the marketplace. BCN, for example, may decide to join forces with other competing HMOs to provide educational seminars and presentations to major corporate employees who represent the bulk of potential new HMO subscribers on a yearly basis. Financial strategy has to do with the intelligent use of financial information to make key decisions on resource allocation and financing of new programs within the organization. In an attempt to understand how chief executives use HMIS for strategy implementation in hospitals, David Naranjo-Gil and Frank Hartmann surveyed 218 public hospital CEOs in Spain and noted that executives with a "predominant administrative" background tend to be more effective in "establishing cost-reduction strategies, through their larger inclination to emphasize financial information in combination with a diagnostic use of the MIS" whereas executives with a "predominant clinical" background will "focus more on nonfinancial information for decision making and prefer an interactive style" of using HMIS, which tend toward use of flexibility strategies.[2] The latter, it appears, has to do more with operation strategy where quality improvement and greater efficiencies become the key focus for achieving greater patient satisfaction in healthcare services organizations. Thus, both financial and operation strategies are important for senior executives of BCN to implement appropriately and intelligently to achieve immediate, intermediate, and longer-term goals in the face of competitive challenges in the healthcare marketplace. Above all, human talent management is critical to determine the success of any organization because it is the people who work for the organization who portray the organization—they are the ones who put a face to how the organization really is perceived by its customers, third parties, and external relations.

IV. Execution

The McKinsey 7-S framework was developed by McKinsey & Company to guide the evaluation and implementation of organizational strategies. The underlying premise is that all seven elements of this model—strategy, structure, systems, style, staff, shared values, and skills—

should be moving in the same direction in order to achieve a "strategic fit" for the organization. In other words, the strategy of the organization "fits" with every other variable within the 7-S organization framework[3] of strategy, structure, systems, style, staff, shared values, and skills as illustrated in Figure 2.2.

Strategy is the set of activities or actions targeted at achieving a competitive edge in the marketplace through organizational process improvements, intelligent capital management application, and systemic resources allocation. *Structure* is the reporting hierarchy of the organization as determined by the placement of personnel within the organization and the accompanying division and/or integration of organizational tasks, roles, and responsibilities to be accomplished on a daily and longer-term basis. *Systems* are the task and informational processes and workflow that together determine how the organization conducts its daily affairs. Examples include information systems, healthcare delivery systems, performance evaluation systems, quality control systems, and capital budgeting systems. *Style* refers to the way management behaves within the organization, not just what is being communicated—the tangible evidence of how the organization spends time, pays attention, and performs collectively. *Staff* refers to the human resources—the people hired by the organization to perform its daily functions—although it is important to

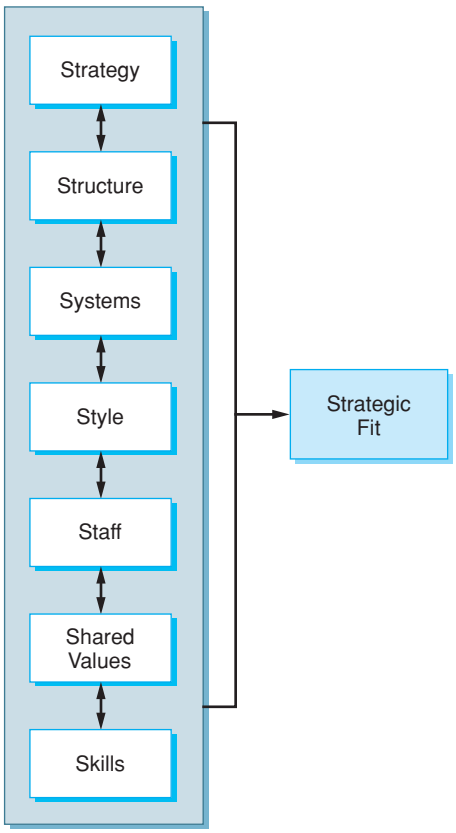

FIGURE 2.2 McKinsey's 7-S Strategic Fit Framework.

think of this not in terms of individuals, but of corporate demographics. *Shared values* portray the common goals, objectives, and beliefs of most members of the organization and may be indicative of both the organizational identity and corporate destiny. Finally, *skills* may be conceived as the total competencies of the organization due not simply to individual expertise in isolation, but more appropriately, to the interactive coordination among the hired employees. In essence, it is a derivative of the other six organizational elements noted in the 7-S framework.

Ginter, Swayne, and Duncan[4] used the case of Allegheny General Hospital (AGH) as sourced from David Burda's article[5] in *Modern Healthcare* to illustrate the McKinsey 7-S framework as applied in a healthcare organizational setting. Today, as a top-performing, tertiary-care hospital and academic medical center serving Pittsburgh and the surrounding five-state area with 724 beds,[6] AGH competes in an extremely sophisticated healthcare marketplace against the background of other highly performing, tertiary-care competitors. These competitors include the 729-bed St. Francis Medical Center, the 583-bed Presbyterian-University Hospital, the 500-bed Mercy Hospital of Pittsburgh, and the 452-bed Western Pennsylvania Hospital. Without a proper strategic fit, AGH would not have been able to excel in one of the country's most challenging and competitive tertiary-care marketplaces.

Strategically speaking, AGH has, over a critical period of time, been able to establish itself as a significant regional level-1 resource trauma center in Pennsylvania for tertiary-care services, with added recognition in pediatric trauma. Services offered by AGH include specialized patient care, resident physician teaching, and research administered collaboratively by more than 850 physicians and 4,000 employees. Located in the North Side section of Pittsburgh, AGH admits more than 29,000 patients and registers no less than 450,000 outpatient visits annually.

In term of its structure, AGH is strongly linked both professionally and academically. Not only is it affiliated with the Medical College of Pennsylvania, which has significantly strengthened its resident physician teaching mission, but it has significantly augmented its research mission through the ASRI (Allegheny Singer Research Institute). ASRI has an annual research budget of more than $30 million and conducts research in many clinical areas, including cardiology, cardiothoracic surgery, diagnostic radiology, gastroenterology, nephrology, neurology, neurosurgery, obstetrics/gynecology, oncology, ophthalmology, orthopedic surgery, pediatrics, psychiatry, pulmonary medicine, and transplant surgery.

Management style at AGH is known to be both aggressive and direct. AGH management is externally oriented and is prepared at all times to take the challenge of meeting the tertiary-care needs of the region. More recently, the hospital has focused on providing comprehensive care to those with behavioral disorders in their central nervous systems through the Allegheny Neuropsychiatric Institute (ANI). By emphasizing service quality, operational efficiencies, and individual productivity with a strong internal orientation, AGH management is highly committed to the excellence of the hospital's overall performance and to becoming the region's top hospital.

AGH also employs a variety of systems to guide future directions for the hospital progress and for new services and technology. For example, a system of objectives and strategies is maintained for implementing organizational policies and procedures, an advanced system is used for matching referring physicians to specialists, and plans are available for medical staff development and clinical services development.

Shared values of AGH's medical staff and employees reach above and beyond the highest level of community involvement, advanced technology deployment, and service excellence. The aim is to promote employees' commitment through supporting development and training programs as well as gain-sharing programs.

Staffing at AGH, as noted previously, comprises more than 850 physicians and 4,000 employees. These include more than 565 medical staff members, more than 1,350 registered and practicing nurses, and other personnel. AGH's residency program for junior and senior Medical College of Pennsylvania students is well managed, with a reputation that attracts fully qualified practicing specialists who love to teach and practice high-quality medicine. The hospital runs a medical staff development plan that emphasizes the training of the medical staff to meet the medical needs of the community.

Finally, skills and competencies at AGH are the sum derivatives of all the other elements within the 7-S strategic framework. AGH not only employs highly qualified experts, specialists, and staff members, but also promotes a learning environment throughout the organization to ease the flow of key clinical and nonclinical procedures, processes, and services. Both the public and its referring physicians are well aware of AGH's high-performing and accreditation standing and professional marketing strategies.

At this point, we move on to discuss the differing roles and responsibilities of the various senior executive positions within a healthcare services organizational context. For HMIS to make a significant contribution and impact on the organizational performance, understanding the role and responsibilities of the CIO is most critical, which is where our discussion is concentrated. In an organization where a CIO has not been appointed, the CEO or another designated senior officer is expected to step in and take on the CIO role and responsibilities.

V. Senior Executives in Healthcare Services Organizations

Among the highest-ranking officers appointed in a healthcare services organization is the president and chief executive officer (CEO). This individual is largely responsible for articulating the organizational vision and mission, specifying the core competencies of the organization, and delineating its strategic plan and directions typically with the aid of an appointed high-level board of governors. It is also often the case that this individual is elected as the chairman of the board.

The CEO is also expected to appoint and oversee the meetings involving all other senior executives of the organization. These senior executives may include a chief financial officer (CFO); a chief operations officer (COO); a chief marketing officer (CMO); and other IT-related strategic appointments such as a chief information officer (CIO), a chief technology officer (CTO), a chief security officer (CSO), a chief privacy officer (CPO), and a chief knowledge officer (CKO). For small businesses and start-ups, the CEO may be the only person who takes on the roles and responsibilities of all these different executive functions. In healthcare organizations, a chief medical officer (CMO) is also appointed. Table 2.1 provides brief definitions of the different roles and responsibilities of these various executive officers.

Table 2.1 Executive Roles and Responsibilities for Healthcare Services Organizations

Executive Designation	Executive Role and Responsibilities for Health Services Organizations
Chief executive officer (CEO)	Articulates corporate vision, mission, and strategy; chairs senior executive meetings and conducts performance evaluation of top management personnel; oversees corporate growth and development; and ensures the realization of strategic business goals and objectives over time.
Chief financial officer (CFO)	Oversees the financing function, budgeting, and funding of the health services organization's operating programs and services, including advising the CEO and other senior executives on strategic capital investment decisions, capital expansion projects, market competition, and organizational revenue-generation strategies.
Chief operations officer (COO)	Oversees the daily healthcare services delivery operations, business processes, policies, and procedures of the health services organization's care delivery, including advising the CEO and other senior executives on strategic business process reengineering; human resources development and productivity improvement projects; operational and clinical efficiency and effectiveness enhancement projects; scheduling, facility, and inventory management; logistics; and changes in daily organizational production functions.
Chief marketing officer (CMO)	Oversees the marketing and promotion operations, business processes, policies, and procedures of marketing and promoting the health services organization's care delivery, including advising the CEO and other senior executives on strategic marketing opportunities, purchasing and external relations projects, customer relation and satisfaction ratings, and changes in daily organizational marketing functions.
Chief medical officer (CMO)	Oversees the decisions and operations of physicians and other clinical personnel providing services within the context of a health services organization.
Chief information officer (CIO)	Oversees all HMIS applications and technology procurement, acceptance, and adoption practices throughout the healthcare services organization; responsible for the alignment of corporate and HMIS strategic goals and objectives, including use of IT to improve administrative efficiencies and clinical productivity and effectiveness.
Chief technology officer (CTO)	Oversees the throughput, accuracy, speed, availability, and reliability of an organization's HMIS; improving the efficiency of IT systems; and the appropriate implementation of hardware, software, communication, and network technology solutions.
Chief security officer (CSO)	Oversees the security and backup of HMIS applications and developing strategies, including safeguarding HMIS technology applications against attacks from hackers and viruses.
Chief privacy officer (CPO)	Oversees the ethical and legal dimensions of organization information use and releases; sets policies, standards, and procedures for privacy and confidentiality of health information release in compliance with HIPAA rules and standards.
Chief knowledge officer (CKO)	Oversees the gathering, maintenance, and dissemination of the health organization's knowledge; designs the organizational programs and systems to ease the reuse of knowledge among organizational employees, with the aim of creating a knowledge-enabled organization.

In this discussion, our focus is on the overall roles and responsibilities of the CIO for a health services organization because these functional duties are representative of the key duties to be performed by a single individual or a combination of senior officers who are asked to take charge of the procurement, development, use, and servicing of health management information systems within the organization. As we know, when a company does not have a CIO or any other senior officer appointed to be in charge of HMIS, it would be included as part of the role and responsibilities of the CEO. In this instance, the CEO in the healthcare services organization would be responsible for aligning the HMIS mission and goals with the enterprisewide mission and goals.

Before spelling out the specific roles and responsibilities for the CIO with respect to HMIS strategic planning and service management, it is critical to note that most senior executives share some important functions and should have a number of key traits in order to successfully carry out their share of duties. These important characteristics include being (1) a trustworthy leader, (2) an inspirational manager and motivator of others, and (3) an effective communicator.

A Trustworthy Leader

Regardless of the senior executive appointments, trustworthiness is an essential trait of effective leadership. Because "trust" is the essence of leadership effectiveness, extraordinary leaders must have the ability to exude trust from their direct reports and corresponding followers. As leaders, senior executives should be able to command the highest respect from their subordinates. In other words, for this trustworthiness to be sustained, it cannot simply be one-sided. The development of a mutual trust and respect over time between the superior and his or her direct reports is key to building a lasting and successful working relationship. This is true for a CEO, CKO, CTO, CSO, or any other executive officer (such as a CIO asked to take charge of HMIS).

Closely related to trustworthiness and respect is the concept that leaders should not upset their followers with any unannounced surprises—which requires that they stick to their principles, keeping precisely to what they have articulated or promised, with a clear and open attitude about how and why certain things are or are not being executed. Effective leadership can then result naturally in having the highest trust and respect from others. For a CIO, this means being consistent in everything that he or she does, showing good judgment on equality and equity issues, and providing equal opportunities for the advancement of subordinates.

At times, some employees may become frustrated because there is more work to be completed than there are people assigned to the task—due, perhaps, to budgetary constraints, regulatory changes, and/or economic downturns. This frustration may result in employees having difficulty understanding where they should focus their time. It is the job of an effective CIO, then, to prioritize tasks for the employees: framing major issues, simplifying complex assignments, and spelling out what is the most to the least important. By eliminating the unnecessary distractions to employees and focusing on what should be the central issue, the employees will be less frustrated with their work. Not only will they become more satisfied, but they will also be more creative and productive in achieving the key goals set for them by the CIO.

An Inspirational Manager and Motivator of Others

As a manager, the CIO wants to ascertain that all HMIS projects are delivered on time and within budget. This requires the CIO to provide in-depth inspiration and self-motivation as well as to be a motivator of others. *Motivation* is the art of inspiring others, giving them a sense of confidence and/or the desire to accomplish certain goals. Because it is an "art" form, motivation requires that the CIO have special skills and elevated expertise before he or she can effectively manage and inspire others.

How, then, is the CIO able to effectively motivate others? Among the first critical steps is effective communication, which is discussed more fully later. Here, rather than making generalizations, effective managers should be as specific as possible when detailing the goals and objectives for their employees. A follow-up point is that when goals are set, the employees must be sold on the feasibility of achieving those goals, and how best to reach them. Once the employees are clear about what is expected of them and realize how the goals may be achieved, they can then be inspired to do so.

Another characteristic of an effective manager and motivator of others is that not only is the CIO able to position specific individuals who are capable of accomplishing the different tasks in the appropriate spaces throughout the organization, but when all tasks are fully accounted for as a whole, the CIO can expect his or her subordinates to have reached key goals of the organization at an even higher level. In addition, it is the job of the CIO to support his or her subordinates to become skilled and ever ready to complete the most challenging tasks at hand. Above all, instituting a collaborative spirit with a strong sense of team belonging and task information sharing among subordinates is critical to success when faced with executing any complex HMIS-related project goals.

Another very important step in motivating others is measurement; that is, for subordinates to remain motivated, not only must they have a clear grasp of their assignments, but they must also be clearly informed on how they are performing at any given time. Providing constructive feedback as opposed to micro-managing and unnecessary criticisms is therefore the key to successful goal attainment among employees. Conversely, employees often need to be encouraged and recognized for their achievements, which would give them a sense of being valued while they seek to improve further. Without individualized recognition, the employees are not motivated to do their best—to work past their potentials and to reach out for the top or to perform to the best of their abilities.

An Effective Communicator

Effective communication is essential for forming all kinds of work relationships. It is especially important for building strong social networks among key stakeholders, whether it is to be executed through e-mail, one-on-one meetings, bulletin boards, Weblogs (or blogs), or other more formal means of communication. Communication is, in fact, the core of effective management. Without it, chaos and dissatisfaction can emerge and evolve over time.

Clearly, one-sided communication is ineffective, which means that it is essential for a CIO to learn to "listen." What is the difference between just "speaking" and "speaking and listening" to

others? To ensure that subordinates understand what is being communicated, it is critical for the CIO to remain open and "listen" to his or her subordinates. Listening requires patience. It is having eye contact with others; spending time to acknowledge what others have articulated with appropriate gestures; and being able to provide feedback, whenever necessary, by rephrasing what others may have articulated to achieve clarity of thoughts. This will then begin to build a good rapport between the conversing parties. Listening also allows the CIO to relate the concerns of the subordinates to those key points he or she wishes to communicate to them.

As well, effective communicators are media-sensitive. Understanding the media used in the communication is important because different types of information may be received under each setting. For example, certain means of communication, such as television and radio broadcasting or even a newspaper press release, may be appropriate for specific or more formal messages to be conveyed, whereas other means such as e-mail and telephone communications are useful for informal, humorous, and/or lighthearted exchanges.

Moreover, having specific knowledge about your audience or those to whom you will be communicating is critical in effective communications because every audience is different with different needs to be satisfied. Among senior-level colleagues, for example, the CIO must advocate and articulate the HMIS vision and strategy through developing and maintaining cohesive executive relationships. He or she has to communicate the same message, but in a very different way, to his or her direct reports internally and/or to the customers and third parties externally.

VI. Specific CIO Role and Responsibilities

Broadly speaking, the CIO role is to provide strategic HMIS vision and leadership for integrating IT initiatives in a healthcare services organization. As most healthcare services organizations are increasingly dependent on IT to improve on service quality, enhance efficiencies, and productivity, as well as to reduce human errors, a CIO is expected to work intelligently in a growing political environment.

Today, the CIO job has become increasingly stressful, more business oriented, and less hands-on. For example, he or she directs the planning and implementation of enterprisewide HMIS in order to improve health information exchanges within the organization and enhance overall cost-effectiveness, operational efficiencies, and healthcare services delivery quality. This individual is clearly responsible for all aspects of the organization's HMIS functions and applications. In addition, most CIO responsibilities now have expanded beyond the traditional role to include concerns about enhancing "customer satisfaction" and being "customer-centric."[7]

The formal education and on-the-job training for a CIO can differ significantly, but having a university degree in a related field such as industrial engineering, computer science, and/or business administration is a very good start. A CIO must be able to execute strategic as well as tactical HMIS planning effectively. He or she must have knowledge and experience in managing and directing increasingly sophisticated HMIS operations, and possess acumen in routine business operations, periodic performance evaluation activities, and strategy and human resource management. The CIO is expected to demonstrate the ability to apply HMIS concepts

in real-world business problem-solving situations. He or she is also largely responsible for negotiating, outsourcing, and/or managing vendor contracts on HMIS products, services, and other related projects (such as ensuring the compliance of the health organizational information systems with HIPAA rules and standards).

Overall, the key role of a CIO is the need to develop and preserve tight integration between HMIS decisions and corporate business goals. The CIO must have superior understanding of both the organization's and HMIS departmental goals and objectives so as to align these goals and objectives seamlessly. This single set of responsibility calls upon every CIO's political, negotiation, and project management skills.

In response to an increasingly hyper-competitive HMIS marketplace, the CIO of a healthcare services organization today has to learn to focus on external relations such as customer satisfaction concerns, HMIS security issues, technology acceptance and evaluation ratings, budgeting, staffing, outsourcing, hosting, and return on investment (ROI) analysis. With advancing technology and a more computer-literate U.S. population, the role of a CIO will continue to evolve over the next several years; most likely, the future CIO will be expected to act as a change agent and as a business change leader. The traditional HMIS functions will move from internal-focused tactical operations to more global-oriented strategic functions. For example, if an HMO decides to branch out to a different country such as Mexico, then the HMIS department must necessarily support the Mexican operations. Indeed, globalization and advancing technology are "flattening" the competition among multi-provider organizations in the healthcare services industry and are breaking down traditional barriers to business, which will impact significantly on the evolving role of the CIO.

Ultimately, CIOs must combine strong technological and business skills with leadership, persuasion, and communication skills to be successful at their jobs. Over the years, chief information officers have helped many different companies to succeed as well as fail. Lac Van Tran, former CIO at Children's Hospital Boston, has now relocated to join Houston-based Methodist Health Care System. His new role and responsibilities as senior vice president and CIO at Methodist Health Care System will be to boost e-health development, solicit and establish business partnerships, and promote standardization and common practices.[8] Danny Shaw, the first chief knowledge officer at Children's Hospital Boston, for example, has helped integrate information from diverse sources and systems to enable analysis of both the hospital's administrative and clinical operations.[9] Beginning with a series of small HMIS integration efforts, Shaw quickly demonstrated value, which eventually led to increased operational efficiencies, clinical effectiveness, and improved quality of the hospital's care delivery systems. Building on past successes, Shaw was able to create a knowledge-enabled organization out of Children's Hospital Boston. The CEO/CIO of Green Valley Hospital, discussed in one of the cases presented in the previous edition of this text, failed the hospital miserably by relying on personal friendships to decide vendor outsourcing of the hospital's HMIS services. Thus, if a healthcare services organization does not have a good strategy or a good CIO, it can be devastating for the organization. Even successful businesses can fall behind if there is lack of leadership to guide IT development for the organizations.

VII. Conclusion

Management students should pay particular attention to the role and responsibilities of senior healthcare executives if they want to follow in their footsteps. This is why such a topic has been placed near the beginning of this text. Senior health executives must not only have a strong vision and an awareness of different types of strategies, they must also be able and ready to execute such strategies to ensure that any obstacles encountered while achieving the ultimate organizational vision and mission can be wisely eradicated. This is one difficult challenge for many budding executives to overcome.

Moreover, real-world practices are not easily replicated and cannot be learned by merely reading published theories or cases in textbooks. Successful practices have to be learned on the job, hands-on, and must be orchestrated in a variety of social settings. Hence, the use of the word *inspiration* in this chapter does a great justice to the idea. It is vital that senior managers are "inspirational" and "on fire," doing what the employees are not able to "articulate" clearly for themselves; these executive leaders must be the "mouthpiece" of the organization in crafting the organization's future visions, strategic directions, and strategic thinking. They must meet and talk with everyone who is a part of the organization, both at the top and on the front line. It is the inspiration from senior executives that will ultimately make a difference in transforming the organization. For the CIO, this inspiration has to be transcribed into words, articulated, and produced as an active HMIS plan, in alignment with the overall corporate plan. The corporate plan must then be rolled out into actions, thereby subsequently realizing the key goals and objectives that have been envisioned.

An effective leader and manager must also possess several specific characteristics, each of which significantly affects the performance of subordinates. The abilities to communicate effectively, to motivate others, and to lead followers are all essential for being a good leader. By earning the trust and respect of their employees, these senior executives help and allow their subordinates to work to the best of their abilities. This not only generates personal success for the employees but, ultimately, for the organization. Another essential point is the importance of continuing to "sharpen the saw" when it comes to effective management skills.[10] We have to be willing to learn from our own mistakes and understand that learning is a part of the total process of becoming an effective manager. It is not possible to always get things right the first time; thus, good managers learn from their own mistakes, turning those mistakes to their advantage at the earliest points of opportunity.

Finally, one of the most important steps that an effective CEO/CIO should take is seeking feedback from his or her direct reports. Using such feedback to turn the CEO/CIO's noted weaknesses into additional strengths makes the CEO/CIO that much more effective. In other words, being an effective leader is a continuous process. By possessing and continuing to sharpen those effective management skills, the CEO/CIO can positively affect the morale of the organization's employees. It also naturally enlarges the CEO/CIO's circle of influence, and the less senior managers can then be inspired to follow through with the outstanding model exemplified by the senior management team. Effective management inspires everyone from your

employees (who will manage successfully in the future) to other managers (who will immediately manage more effectively). By effectively managing people, the CEO/CIO is ensuring the success of his or her subordinates, which will ultimately translate into the organization's success.

In summary, senior executives play critical roles in organizational success. The overall performance standard of a healthcare services organization, in particular depends not only on the quality and work productivity of its employees, but also on the training, quality, and active participation of the administrative and professional staff in supporting the services of the organization. It also depends on the extent to which IT support has empowered and enabled these various individuals to perform as productively as possible. The sharing of a technology vision among top management team members, professional staff members, and employees within the organization is also critical in determining the success of the HMIS leadership. The culture of a healthcare services organization can transform because of changes in HMIS implementation, as well as the extent to which employees are accepting the HMIS innovation and working collaboratively with each other, and with the organization's customers. In healthcare services organizations, these customers are those patients who are helping the organizations generate much-needed revenues. Under the supervision of a proactive, productive, and politically astute CEO/CIO, the health organizational HMIS support and services can grow and expand effectively and quickly, leading to a transformed organization and the envy of all its competitors.

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Chapter Questions

2–1. Imagine you came into a company without an organizational IT strategy. Describe in detail how you would develop an IT strategy. Some questions to consider are:
   a. Who would be involved in the strategy meeting?
   b. How would you involve participants in developing a strategy? What questions would you ask?
   c. How would you get participants to adopt your shared vision?

2–2. In your own words, what are the role and responsibilities of a CIO? What would be the difference between the role and responsibilities of a CEO versus a CIO in a healthcare services organization if both of these executives were appointed? Who would the CEO pick to be the most appropriate senior executive responsible for HMIS in the absence of a CIO? Why?

2–3. What are the three most important traits of a CIO? On a scale from 1 to 10, rank yourself in each of these categories. For each trait, give an example of a time that you did and did not demonstrate this trait effectively. How might you improve your score in each category?

2–4. How does an executive such as a CIO become an effective leader? What will be the greatest challenges in a healthcare services organizational context?

Mini-Case: Predicting Future HMIS Trends by Chief Information Officers

Quammen Group, an Orlando, Florida–based consulting firm, co-sponsored the *Health Data Management* 2008 CIO Survey and found CIO and HMIS executives to be optimistic on many aspects of future HMIS growth, including real-time claims adjudication and clinical decision support.

When asked, "How do you expect your organization's total IT budget to change in your next fiscal year?", 37 percent rated it to grow between 5 and 10 percent, 23 percent felt it would grow less than 5 percent, 20 percent expected it to exceed 11 percent or more, 13 percent did not expect a change, and only 4 percent claimed there would be a decline—leaving 2 percent for all other rating categories. More generally, the survey found that most healthcare services organizations expect this growth to be fueled by greater information access needs for clinicians, especially in the form of electronic and personal health records (EHR).

In short, most chief executive officers and other IT executives indicated that the top priority for the coming year for healthcare services organizations is implementing EHR. The full survey results are given at http://www.healthdatamanagement.com/CIO_Survey/.

Mini-Case Questions

1. Why do you think a CIO survey is important for the HMIS industry?
2. Predict what type of hardware investments would be considered key to HMIS future. Then check out the full survey results, and compare your prediction to the actual results.
3. Why do you think the results showed investment in EHR to be a top priority for CIOs in the coming year?

RESEARCH BRIEF

Personal Digital Assistants Enhance Data Collection Efficiency during a Study of Waiting Times in an Emergency Department

N. Elkum, W. Greer, and A. Al-Madouj

ABSTRACT

Objectives

To explore the suitability of the personal digital assistant (PDA) as the primary vehicle for data collection within the context of a clinical research study and to quantify the improvement in performance compared with a conventional paper-based approach.

Methods

This investigation was an adjunct to a study of waiting times in the emergency department (ED) of a large, tertiary-care hospital. Medical charts were randomly selected for those patients who had been recently triaged in the ED. In addition to patient identification and demography, five principal variables were collected: day of arrival, registration time, triage level, room assignment time, and MD time (time physician spent with the patient). A database application was developed for the PDA. When the PDA was subsequently connected to a desktop computer, the data were automatically synchronized with the PC-based Access database. The data for each patient were captured in two different ways: using the PDA and using the traditional paper-based approach. For each method, the data-collection time was recorded for each patient.

Results

Using the traditional paper-based approach, the average time per patient for data capture was 226 seconds, whereas using the PDA, average time was significantly reduced to only 78 seconds.

Conclusions

The PDA is a superior alternative to traditional methods for data collection in simple clinical research studies. PDAs are more convenient and diminish overall data-collection time by 60 to 70 percent, thereby significantly reducing the cost of clinical research.

Introduction

Data collection is the spine of most medical research studies. The ideal data-collection methodology should be inexpensive, easy to use, and applicable to widely varying types of studies. Paper forms have traditionally been used to record these types of data. However, these forms can lead to a number of different errors, such as ineligible scripts, undefined codes, and illegal or inappropriate dates. It can also make it difficult to obtain complete answers to questions within the time allocated for the patient interview or chart review. Furthermore, data collected in this way are often subsequently entered into a computer database, which can introduce additional sources of error. Problems associated with the paper-based method can be minimized by improving the quality of the training given to data-entry personnel and by performing double data entry, but this incurs a larger cost to the research project.

Electronic methods of data capture have been available for many years. Mark sense technology, for example, uses "marks" (usually shaded boxes) at predefined locations on specially prepared sheets of paper to store information.[1] This approach is very successful when the data can be easily categorized into a small number of categories (such as multiple-choice examination questions) but becomes unwieldy for continuous data or when a large number of categories are involved. A more recent electronic alternative is to use optical character recognition (OCR) technology to "read" data directly from paper-based questionnaires and automatically transform the contents into electronic form.[2]

Although OCR software can achieve excellent results when the data have been typed using predefined fonts, the fidelity of the recognition process leaves much to be desired when handwritten text is involved and would not normally be considered for clinical research studies. In any case, any electronic scanning approach requires the raw data to be stored on loose (and losable) sheets of paper; it therefore offers no advantage with respect to missing pages, data storage space, or confidentiality issues. The extra cost of the technology can also be prohibitive.

One relatively recent electronic alternative is the personal digital assistant. Personal digital assistants (PDAs) are already being used throughout clinical medicine to deliver information at the point of care in such diverse areas as anesthesia,[3] surgery,[4] pediatrics,[5] general practice,[6] obstetrics,[7] evidence-based medicine,[8] and public health.[9] They are also being used to collect patient information and improve clinical records for administrative functions such as electronic prescribing,[10] coding and tracking,[11] and medical education.[12] This research brief explores the suitability of the PDA for the collection of clinical research data.

King Faisal Specialist Hospital and Research Centre (KFSHRC) maintains many disease registries, such as the National Cancer Registry[13] and the Congenital Heart Defects Registry,[14] which routinely require detailed patient interviews and structured data abstraction from medical charts. There are also a large number of scientists and clinicians who regularly conduct research projects involving the collection of large amounts of data.

The cost of recording, entering, and cleaning these data consumes a significant part of the budget of every research project. A systematic approach to data capture, which would reduce this cost and improve the accuracy of the collected data, would therefore be welcomed by our research community.

To this end, we conducted a study to investigate the advantages and disadvantages of using a PDA during a typical clinical research study. This was developed as an adjunct to a pilot study of the distribution of waiting times experienced by patients at our emergency department (ED). This is a key entry point to the healthcare system at our institution, and having patients wait for excessive periods of time prior to treatment may negatively color their perception of the care provided by KFSHRC. The specific objective of this study was to compare the data-collection efficiency of the PDA-based method with the more traditional approach comprising standard paper forms and subsequent computer data entry. To our knowledge, this was the first research study at this hospital to be conducted using a PDA-based data-entry system.

Methods

Medical charts were randomly selected for those patients who had been recently triaged in the ED during the period of the study. In addition to patient identification and demography, five principal variables were collected: day of arrival, registration time, triage level, room assignment time, and MD time. The triage nurse and the evaluating physician(s) recorded the various times required by the study in the charts.

A trained research assistant captured the data for each patient in two different ways: (1) entering data directly into a PDA database and (2) manually recording data on case report forms and subsequently typing these data into a PC-based Microsoft Access database. These methods were applied "one-after-the-other," so that each patient's data were recorded twice. To avoid observer bias, the order of the methods was randomly changed between patients. For a given patient the same research assistant was responsible for applying both methods. For each method, the time spent in collecting data for every chart was also recorded. A Palm Pilot (Compaq Inc., Houston, Texas) was selected as the PDA for this study. The PDA database application was developed using the Data-on-the-Run database system (Biomobility Inc.). This permits databases

to be developed directly on the PDA and is designed to integrate seamlessly with Microsoft Access on the PC; when the PDA was connected to a PC, the databases were automatically synchronized. We further replicated the database on an SQL server so that multiple users via the hospital's intranet could access it.

The difference in the time taken for data capture between the two methods was assessed using the paired t-test within the SPSS statistics package (SPPS Inc.). This study was approved by the Research Advisory Council (Institutional Review Board) of our hospital.

Results

During the period of the study, charts were randomly selected from the medical records for those patients who were triaged in our emergency department. Using the traditional method, the average time for data capture was 226 seconds, whereas using the PDA approach, the average time was significantly reduced to only 78 seconds ($p < 0.0001$); this difference is illustrated in Figure RB1.1.

Discussion

The application of PDAs within clinical research studies can lead to substantial cost savings by directly reducing the duration of the data-capture period. Based on our results (and depending on the specific study design) a PDA-based approach can reduce the duration of the data-capture phase by as much as 60 to 70 percent in comparison with paper-based alternatives.

Using a PDA may also improve the quality of the data because it eliminates the need for a paper intermediary between the recording of the data from the patient's interview or medical chart and the final entry of these data into a database. Further gains in usability and efficiency (Table RB1.1) can also be found through the easy data-storage and downloading capabilities in

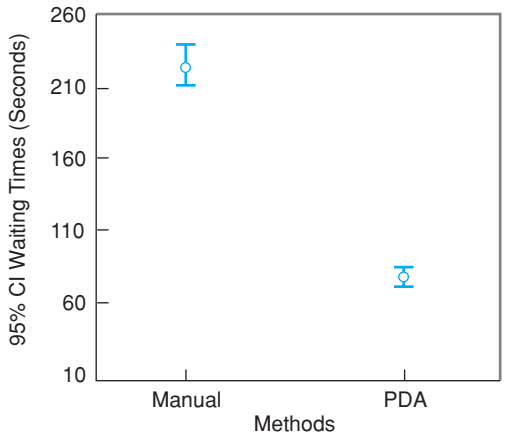

FIGURE RB1.1 Comparison of Mean Waiting Times (with Their 95% CIs) between the Two Different Methods Used in the Study.

Table RB1.1 Comparison of Data Collection Methodologies

	Paper Forms	Mark Sense Forms	Optical Character Recognition	PDA Forms
No manual data-entry cost	–	+	+	+
Multicenter trials: No shipping/faxing	–	–	–	+
Tracks response times	–	–	–	+
Easily handles complex skip patterns	–	–	–	+
Prevents incorrect responses	–	–	–	+
Images, videos easily incorporated	–	–	–	+
Speed of completion	–	–	–	+
No computer skills required	+	+	+	–
Automatic desktop synchronization	–	–	–	+

combination with fast data processing; these enable the researcher to more easily perform analyses while the study is in progress. Furthermore, the ability of the PDA to create electronic documents eliminates printing, binding, and shipping costs and provides a reduction in storage space at research locations.

The choice of a database system is crucial to the effectiveness of the PDA in the clinical research context. Using the data-on-the-run package, we were guaranteed a user-friendly, networked environment, which provided frequent data backups and which could make use of the SQL databases on our Windows servers.

Increasing responsibilities and other demands on researchers' time necessitate more and more reliance on technology. The personal data assistant provides an effective answer to the problem of efficiently capturing, storing, and retrieving large volumes of medical research information within reduced timescales. PDAs offer a superior alternative to traditional methods for data collection in clinical research studies.

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