Sustaining Change: Once Evidence-Based Practices Are Transferred, What Then?

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Healthcare has undergone many transformations over the past several decades including increased diagnostic sophistication, shorter in-hospital stays and day surgeries as well as greater home-based treatments such as intravenous therapy, dialysis and palliation. Despite their rigorous evidence-based underpinnings and the demonstrated benefits of these advances, the sustainability of new clinical practices in healthcare organizations continues to present a challenge to practitioners and researchers alike. Graham et al. (2006) summarized a number of shortfalls in the use of available evidence-based practices, including avoiding over-prescription of antibiotics and the underuse of statins in post-stroke patients. Many introductions of new practices have been fraught with difficulties in producing sustainable change beyond the initial pilot or introduction period. *Sustainable change* refers to the continual presence in an organization of all or most of the practices/activities of an intervention or program; these occur using the organization's allocated resources (Pluye et al. 2004). Examples of clinical practices that are predicated on sound evidence but have had difficulty becoming common practice include the following:

- The use of bed mattress with low interface pressure such as high-density foam for those patients who are at high risk for pressure ulcer development (Cullum et al. 2004; Registered Nurses' Association of Ontario 2005)
- The consistent promotion of exclusive breastfeeding as the most appropriate nutritional source for the first six months of an infant's life (World Health Organization 2000)
- Asking all patients about their smoking status as well as advising and assisting those who want to quit smoking (NHS Centre for Reviews and Dissemination – The University of York, 1998)
- Frequent handwashing among healthcare providers (Ejemot et al. 2008)

Factors contributing to poor sustainability have been highlighted in the literature. These include those associated with the initial adoption and implementation of the new clinical practice (e.g., adequate time for teaching new practices to staff) (Wallin et al. 2005), inadequate attention to barriers and facilitators to the acceptance of the new practice in the organization (e.g., adequate resources for ongoing supplies, equipment, training) (Hagedorn et al. 2006) and organizational factors (e.g., leadership support, evidence-based culture, infrastructure support) (Stetler 2003). At the individual healthcare provider level, Pathman et al. (1996) have identified four areas that need to be addressed to support knowledge translation leading to guideline sustainability: awareness of the practice (e.g., becoming aware of practice through attendance at an educational session), agreement with it (i.e., the practice is credible and fits with one's beliefs), adoption of it (trying out the practice, such as irregularly performing a screening test) and adherence (near-perfect compliance and continual use of practice).

This article provides a discussion of the importance of dedicating attention to sustainability of clinical practice changes in healthcare settings as well as strategies that managers and staff can use when introducing new practice improvements in their organizations. An organizational learning perspective is used to frame the discussion.

Significance of Sustaining Practice Knowledge

Healthcare leaders are greatly concerned about the difficulty in sustainability of research-based practices. Investments in new clinical practices do not stop with their developers; enormous effort and resources are directed to introducing new clinical knowledge to healthcare organizations. These investments include mobilizing human resources through the establishment of knowledge brokers, evidence-based practice committees or teams and identifying opinion leaders and champions who will support the practice excellence. Additionally, resources are spent developing educational programs and social marketing strategies to influence knowledge uptake; purchasing new equipment or supplies; setting up new work processes and approaches in caring for patients; and changing policies and procedures. It is therefore imperative that there be effective ways to ensure that these investments provide competitive advantage, long-term impact and cost-effective benefits.

Implementation of Improvements in Clinical Practices

Numerous clinical practice guidelines are released every year from various disciplinary and specialty associations such as the Registered Nurses' Association of Ontario, Canadian Diabetes Association and Canadian Wound Care Association; additionally, there is the establishment of various guideline databases such as those established by Guideline International Network, Canadian Medical Association and the National Clearinghouse in the United States. These are important for individual practitioners for the improvement and upgrading of their professional practices as well as aspirations of excellence in clinical practice for healthcare organizations.

Research on guideline implementation has indicated a recurring concern regarding continued use of guideline recommendations over time. A recent research study in Ontario healthcare organizations explored the extent of sustainability of 17 nursing best practice guidelines three years after initial implementation (Davies et al. 2006). The researchers concluded that 60% of the organizations were able to sustain guideline implementation, while 40% had difficulty continuing the use of the guidelines. The major factor attributed to success in sustainability was the support of nursing administrative leaders. National Health Service (NHS) (2002) in their research with Cancer Services Collaborative in the United Kingdom identified that team ownership, including the embedding of new practices as "normal" work, was a key factor associated with sustainable practices. Wallin et al. (2005) studied quality improvement initiatives involving nurses and found that sustainability was significantly related to supportive leadership, facilitative human resources (expertise) and research-seeking and implementation behaviours of nurses.

The above studies point to the need for proactive effort on the part of change managers or guideline implementers. Such efforts, if not addressed systematically, can result in a "hit and miss" approach to sustaining practice changes and improvements. Additionally, "concern exists that intervention effects may diminish over time once the stimulus for change is gone and once competing demands and inertia divert time and energy toward other activities. Initial implementation success does not predict the institutionalization of outcome changes. If changes are due to an outside stimulus, usual patterns of activity will result in pressures to return to previous ways of operating once the intervention inducement for change is gone" (Strange et al. 2003: 296).
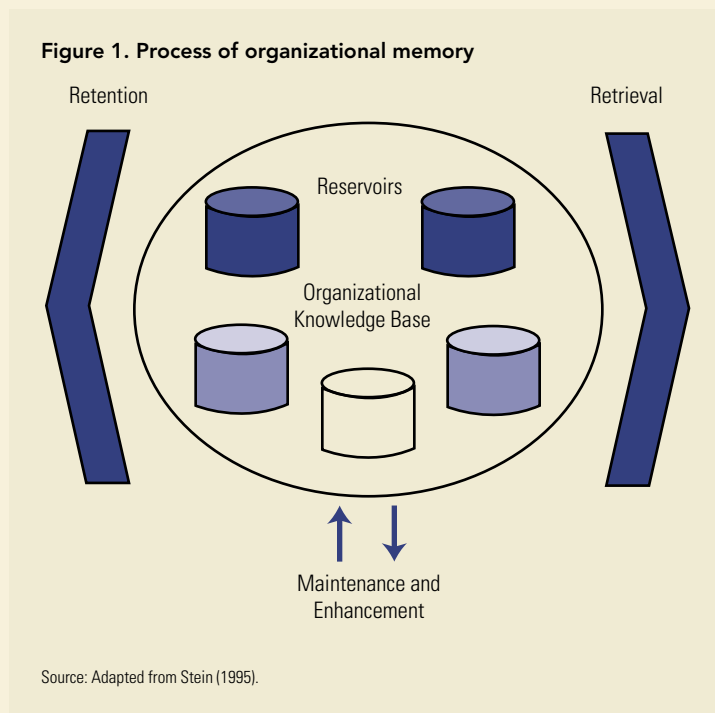
What Do We Know about Organizational Memory?

Organizational learning theory provides an alternative perspective in understanding the uptake and sustainability of practice changes, such as those that result from the implementation of clinical practice guidelines in healthcare organizations. *Organizational learning theory* refers to the acquisition, interpretation, storage, retrieval and use of knowledge within the organizational setting with the view to satisfy one or more organizational objectives (Argote 1999; Huber 1991).

One key element espoused by organizational learning theory is the notion of "organizational memory," the ability of an organization to retain knowledge, in various ways, in order to facilitate its access when needed at a later time (Walsh and Ungson 1991). *Organizational memory* refers to the storage or embodiment of knowledge in various knowledge reservoirs within the organization. Moreover, it can be thought of as the ability of an organization to sustain new initiatives, to institutionalize the initiatives in the organization's standard operating procedures and to "routinize" the initiatives to make them a permanent component of the organization. The essence of organizational memory lies in the ability of organizations to retain memory in a *distributed manner* for reuse at a later point in time by multiple users (Lehr and Rice 2002). Knowledge that is distributed in various knowledge reservoirs is sometimes referred as "distributed knowledge" (Chou 2005).

Sustainability of practice changes therefore requires systematic, thoughtful planning and action to ensure that the changes are embedded into the various knowledge reservoirs in the organization. Exploring how healthcare organizations use knowledge reservoirs to contextualize, retain and transfer clinical practice guideline knowledge can further our understanding of why variation may exist in sustaining clinical practice change and patient care outcomes and how differences in organizational memory may contribute to these differences. Understanding these variations may lead

us to establish better methods for introducing and transferring clinical practice guidelines to patient care settings and facilitate organizational learning that leads to better, sustainable practices and patient outcomes. The following section provides a detailed discussion of the processes involved in the formation and use of organizational memory as shown in Figure 1.

Retention of Clinical Practice Knowledge in Organizational Memory

Figure 1. Process of organizational memory

Retention   Retrieval

Reservoirs

Organizational Knowledge Base

Maintenance and Enhancement

Source: Adapted from Stein (1995).

Retaining clinical practice knowledge in the organizational memory is intimately tied to how the new practices or improvement in practices are introduced in the organization. These decisions determine where the knowledge of these practices is distributed. Quick introductions of new practices through in-service education sessions result in most information being retained through the staff; a more rigorous implementation plan could include education of staff, preparation of an orientation manual for new staff, embedding specific knowledge in workflow process or activities, developing prompts or reminders through documentation systems, scheduling discussions of care elements at specific times in the care pathway and making formal structural changes in role expectations and performance. The more rigorous implementation plan leads to retention of practice knowledge in a number of diverse knowledge reservoirs,

beyond just the people.

One of the weaknesses in organizational memory systems, however, is that it is not possible to anticipate how best to store knowledge in all possible knowledge reservoirs. For example, an organization could develop rules or procedures in gathering, recording and disseminating knowledge about patients (e.g., through the patient health record). However, other knowledge that is stored in areas such as organizational culture or interpersonal relationships is less prone to deliberate action. Hence, the level of control an organization can have on the organizational memory varies depending on what knowledge reservoirs it tends to optimize. Van der Bent, Paauwe and Williams warns about a dark side to organizational memory: "Just as organizational memory provides stability, it can also serve to block change. Change managers must be familiar with organizational memory carriers (reservoirs) they are facing and those that might have a negative impact on the desired intervention … should pay attention not just to individual memory carriers but also to their interrelationships. This can facilitate a more effective development of possible levers for change … change mangers must realize that not all organizational memory carriers lead to organizational learning" (1999: 394).

In addition to location, design and retrieval concerns, incomplete knowledge transfer (Argote, 1999), infrequent use of clinical practices (Wexler 2002) and lack of rationale on why a practice needs to occur (Lehr and Rice 2002) can lead to rapid decay, obsolescence and a false sense of confidence of availability of the new knowledge in the practice setting. Incomplete knowledge transfer may occur if inadequate numbers of staff receive training or if training was rushed and ineffective. A long time lag between training and use or any of the myriad issues that cause incomplete knowledge transfer puts the organization at risk for rapid knowledge loss and, hence, creates difficulty in retention. Infrequent use of a clinical practice, such as the use of hip protectors, may result in forgetfulness – for example, of how to use the hip protector and where to find/order the hip protector – and the loss of the overall confidence in its use. Lastly, rationale of why organizations continue with specific practices needs to be refreshed frequently. Staff may revert back to old habits if they forget why a practice is necessary, for example, that keeping the bed at the lowest level and leaving the side rail down will prevent a patient from climbing over the side rail, falling and seriously getting hurt. In his study of inter-unit knowledge transfer, Szulanski (2000) found that causal ambiguity regarding the rationale for a practice can pose difficulty in all phases of knowledge transfer, including

sustainability.

Implications for Healthcare Organization Leaders and Managers and Knowledge Transfer Staff

Change leaders must address which knowledge reservoirs to use and where to put greater emphasis. This will depend on a number of factors:

- The nature of knowledge from the clinical practice guideline
- The value of the knowledge to the organization
- The changing nature of the clinical practice
- The nature of consequences if knowledge is lost/not sustained
- The use of knowledge reservoirs in the setting – there is no point in spending too much time with policies and procedures if they will never be reviewed; on the other hand, training manuals may be a frequently used source of knowledge, particularly for orienting new staff

Change leaders should conduct process mapping of the practice in question to see where knowledge can be embedded. The following should be addressed:

- How can the practice become part of routine practice?
- What reminders, cues and motivators can be built into the process of work in order to stimulate the use of the practice?

Organizational Knowledge Base and Knowledge Reservoirs

The distribution of knowledge of new clinical practices in various appropriate knowledge reservoirs can result in greater institutionalization of the practice and, thereby, the ability to sustain it over time. Various conceptualizations of knowledge reservoirs have been put forward (Argote 1999; Karsten 1999; Van der Bent et al. 1999; Walsh and Ungson 1991). Knowledge reservoirs are commonly conceptualized as repositories or mechanisms that serve to retain knowledge within the organization's memory. Reservoirs serve a critical function as conduits for knowledge transfer within and between organizations, as well as provide platforms within which unique bundles of knowledge are formed when combined with existing organizational or context-specific knowledge, thereby creating a competitive advantage for the organization. Examples of knowledge reservoirs include individuals with expertise (people), standard admission processes (routines), policies and procedure documents (artifacts), one person prompting another (relationships), bulletin boards (organizational information space), water cooler conversations (culture) and formal role expectations (structure).

These knowledge reservoirs are described along with healthcare examples in Table 1. Each knowledge reservoir has advantages and disadvantages in supporting the sustainability of clinical practices; therefore, an over-reliance on any one reservoir adds to the risk for knowledge loss from the practice setting. Strategies to counteract knowledge loss and to enhance or update the knowledge within the appropriate knowledge reservoirs are important for sustainability.

The value of knowledge retention in knowledge reservoirs such as routines and equipment was clearly evident in a study conducted in a manufacturing organization (Epple et al. 1996). The researchers found that adding a second work shift with the same equipment and routines allowed the work shift to get to full production much quicker than the time required by the original shift. This was demonstrated by calculations of decreased learning time and emphasized the value of the embedded knowledge in equipment and routines (and possibly leadership) that allowed the transfer of knowledge from the first- to the second-shift production line.

Implications for Healthcare Organization Leaders and Managers and Knowledge Transfer Staff

Change leaders must address strategies to retain knowledge in knowledge reservoirs to sustain the clinical practices in the organization. Examples include the following:

- Use of a diverse set of knowledge reservoirs that have the best chance of preventing the loss of knowledge but also allow easy access to the information for knowledge users
- Incorporation of booster sessions to refresh the knowledge reservoirs – these could include refresher training sessions, regular reviews of policies and procedures, incorporation of the information in orientation sessions for new staff etc.

Maintenance and Enhancement of Clinical Practice Knowledge

Depending on the strategies used to implement clinical practice guidelines, the information from the guidelines may be distributed within the healthcare setting as well as the healthcare sector in general. Additionally, depending on the implementation strategies of an organization, the information can be carried or positioned within specific knowledge reservoirs. Sustainability of the clinical practice guidelines is at risk if the knowledge becomes lost, decays or is not stored appropriately. For example, investing all guideline implementation resources in training and development results in an over-reliance of organizational memory in people. This is risky, particularly in environments where there is a high turnover of staff (Simon 1991). On the other hand, embedding knowledge in information systems, such as electronic

Table 1. Knowledge reservoirs in organizational memory

Knowledge Reservoir	Description	Example	Advantages (A)/ Disadvantages (D)
People	Organizational members carry information about organizational best practices, who knows what, past experiences, knowledge from social network etc.	Professionals and other staff required to remember information. In-service education and other information is passed on to staff, who are required to remember the content (e.g., how to assess patients' pain levels, screening patients who may require referral for specialized assessments etc.).	A: People can carry a lot of detailed information and tacit knowledge*. They add value by combining new information with past information etc. D: Risk of loss with turnover or refusal to share. They may face difficulty transferring information to others. Need time and opportunity for transfer of tacit knowledge.
Routines	Sometimes referred as standard operating procedures	In a clinical setting, standard routines are instituted, such as requiring all new patients to have a falls risk assessment. Routine addition of the falls risk assessment form in the admission package becomes a reminder in the routine.	A: Works without spending additional efforts – routines can be automated. D: Over time, routines may evolve and lose their causal link – that is, why the practice is necessary.
Artifacts	Documents such as policies and procedures, documenting systems, information technology, reports, educational manuals etc.	Establishing a documented or automated decision-support tool to aid in deciding the need for a specialty pressure relieving mattress is an example of an institutionalized artifact.	A: Codified and available to all. D: If documents are not revised and kept up to date, they lose credibility; artifacts may be ignored and lose meaning over time or not be used as they were originally intended.
Relationships	Relationships between people	More recently, the use of patients as a way to cue staff in certain behaviours is a practice enhancement strategy. Educating patients and the public about the importance of handwashing and prompting them to remind their caregivers is an example of a relational knowledge reservoir.	A: Ability to use relationships to motivate knowledge uptake and use. D: Time, space and effort are needed to develop trust, respect and credibility.
Organizational information space	Physical and temporal space that allows for organizational members to share information with each other (e.g., client rounds, conference room, hallway conversations, e-mails, scribbled notes etc.)	Having defined space to access certain types of knowledge (e.g., bulletin board or use of an evidence-based cart at a patient care conference will prompt the use of specific practice knowledge).	A: Ability to pass on both immediately relevant information (just in time) and new information that may be of benefit downstream. D: Need to consciously plan such opportunities and encourage a culture of sharing. Over-reliance may be detrimental if opportunities are decreased.
Culture	Values, beliefs and attitudes that get reflected in stories, language, behaviour and interactions	The sharing of positive experiences through informal sharing of successes regarding a patient's difficult wound healing can promote strategies for other patients.	A: Once culture is supportive of a particular practice, there is an ability to have it stay for a very long time. D: Knowledge does evolve in a culture, but slowly. May pose a challenge when needing to update practice – difficult to "unglue" elements out of the culture (e.g., cultural change).
Structure	Roles (expectations of individuals, correct behaviours), reporting relationships and departmental or project responsibilities	Practice expectations are included in performance appraisal process. For example, a requirement for the demonstration of a specific use of best practices such as the routine use of pain assessment and documentation using an adopted pain analogue tool.	A: Established as part of performance expectations. D: Where structures evolve, conscious attention to embedded knowledge is required – these become invisible at times and therefore forgotten. Decay commences when new structures do not enact previous practice.

*Tacit knowledge is based on knowledge that is difficult to codify in verbal and written methods; therefore, there are more challenges to its transfer (Argote 1999).

documentation, without the appropriate engagement of people to negotiate the informational elements to include in the system or to provide the necessary orientation to end users, may leave the system inadequately used and result in knowledge that is not accessible to end users. Careful consideration of the interaction between knowledge reservoirs (e.g., people and information systems) can help address such problems and create greater maintenance of clinical practices in the organization.

The departure of key staff, such as nurse educators, managers or other resource staff, may also lead to a knowledge base that is not updated, linked with experiential knowledge or refreshed through booster sessions, leading to knowledge loss. This issue was made evident in the 1990s when large layoffs occurred in the healthcare industry as a result of restructuring efforts. Patient care units left with little professional support staff found it difficult to keep up with new information or to maintain the standards on the unit.

Other factors that influence knowledge loss include staff turnover, movement of staff to new areas where they do not use their specialized knowledge and the introduction of new employees who may not have received adequate orientation and training (Argote 1999; Huber 1991; Simon 1991). Additionally, employees hired who do not have the prerequisite knowledge with which to assimilate new knowledge may also have difficulty maintaining the new practices in the organization. Argote (1999) provides an example of the hiring of low-skilled labour (no high-school education) in the aircraft industry that created extensive difficulty in the airline company's learning curve.

It can also be argued that knowledge concentrated in a policy or procedure that is not reviewed with staff on a regular basis may lead to a lack of use and eventual knowledge loss. In some healthcare sectors, there is an over-reliance on policies and procedures, with little regard to keeping them updated and linked to organizational workflows and processes. Generally, a lack of knowledge use leads to knowledge loss; ongoing experience may not only ensure retention but may also add new experiential knowledge to guideline use over time. Companies where production is interrupted due to inadequate supplies or union strikes have demonstrated knowledge loss – it takes time to regain the level of production that existed prior to the interruption (Argote 1999).

It is not enough to maintain practice knowledge in knowledge reservoirs. Knowledge must be continuously improved, for example, as a result of the availability of new research evidence. The active process of continuous quality improvement becomes therefore an additional strategy for sustaining practice change. Often this is referred as "double-loop learning," where norms and assumptions are challenged and conflicting requirements are addressed (Argyris 1993). If an

organization is able to address the tension between stability (resistance to change its organizational memory) and flexibility (through efforts such as continuous improvement), this ensures that practice knowledge not only sustains but gets better over time. For example, clinical recommendations regarding the assessment of residents' risk for falls in a long-term care home may start with the implementation of a large set of risk indicators. Over time, the risk indicators may be streamlined for specific subpopulations if continuous learning is embraced, as opposed to the abandonment of the risk assessment tool if it is not meaningful for a subpopulation of residents or is too time consuming to conduct.

Implications for Healthcare Organization Leaders and Managers and Knowledge Transfer Staff
Change leaders should address strategies to continuously enhance practice change in order to prevent knowledge from becoming redundant. These strategies include the following:

- Performance of a regular review of research literature and updated clinical practice guidelines to ensure that the most current evidence-based practices are used
- Establishment of a culture of inquiry in the clinical teams to challenge assumptions and to provide impetus for quality improvement

Retrieval of Clinical Practice Knowledge from Organizational Memory
Storing information in organizational memory must be accompanied by attention to how that information will be retrieved and used. The appropriate balance in the choice of location and design of organizational memory accompanied by salient cues to motivate its retrieval and use will determine its long-term sustainability (Chou 2005). Retrieval success and use depends on how the knowledge was originally stored, the level of detail, the perceived importance by user, ease of retrieval, timing of retrieval etc. An example of poor organizational memory storage is the storage of patient history information. Patients often complain that they have to repeat their story several times to different care providers. Information collected by first care provider is not stored appropriately (e.g., the handwriting is illegible), not retrieved by subsequent care providers (e.g., there is no time to read the history) or not relied upon by subsequent care providers (e.g., there is a lack of trust in information collected). For example, the lack of communication of a patient's risk for falls could create a vulnerable situation for the patient as staff would not be alert to increase the level of monitoring required and to institute falls-prevention interventions. Overall, there is little empirical research on the comparative effectiveness of the various knowledge reservoirs.

Distributed knowledge is usually linked by the social network in the organization and has interpersonal dependencies. This is often made evident in how organizational members rely on each other to point to specific information (Olivera 2000). In fact, a key attribute of organizations with high organizational learning capacity is the ability to know who has what information or where to find certain information and how to access this information to get work goals achieved (Szulanski 1996). This is a particularly important activity in an organization that engineers work processes in which people can cue, remind and motivate each other in the use of particular practices. For example, discussing patient care at care conferences can cue certain evidence-based practices that a practitioner could use; remind a provider to conduct a specialized assessment if he or she has a similar patient to the one discussed; or motivate a nurse to establish a falls-prevention plan, upon hearing another nurse discusses how a falls-prevention plan used resulted in positive outcomes. It is important to ensure that organizational workflow allows for team members to collaborate and have opportunities to discuss cases and observe each other's work. These are valuable, not only for providing good patient care but also for sustaining practices in the organization. Practice settings where healthcare providers conduct their practice in a "silo" fashion – where they hand over activities without the appropriate opportunities for dialogue – lose the opportunity for organizational learning to take place.

Other retrieval strategies that are linked to sustainability are the use of issue or topic champions who provide regular reminders and motivation for sustaining clinical practice change. Those who are passionate about evidence-based practice, for example, advanced practice nurses, could champion the use of specific clinical practices and help integrate these practices in other healthcare providers' daily operations (Debourgh 2001).

Educating patients and their families and the use of social marketing strategies prepare the receivers of care to act as cues to their healthcare providers. Studies have shown this to be an effective strategy with certain types of healthcare practices (Grol and Grinshaw 2003). More and more, clinical guideline implementation strategies are advocating the use of patient-mediated reminders (Bero et al. 1998) (e.g., asking their care providers if they have washed their hands).

Lipshitz and Popplar (2000) conducted a case study on internal medicine and cardiac surgery units to identify organizational learning mechanisms (OLMs). OLMs are "institutionalized structural and procedural arrangements and informal systematic practices for collecting, analyzing, storing and disseminating information that is relevant to the performance of the organization and its members" (Lipshitz and Popplar 2000: 347). They found various OLMs, such as reflection in and after surgery, clinical pathological conferences, morbidity-mortality conferences, video demonstrations, review of medical records, periodic review, research reports, journal clubs and staff meetings. All of these structured activities serve as knowledge retrieval mechanisms and support the ongoing sustainability of clinical practices.

Sustained availability of knowledge is not to say that the knowledge will remain intact as it was first stored. The retrieval and reinterpretation of knowledge each time it is used may lead to its re-definition. For example, stories available in the organizational culture undergo various reiterations and have various meanings attached to them over time. Therefore, organizations that pay heed to the potential of memory decay, obsolescence and distortion by replenishing or preventing memory loss as well as updating the information in organizational memory have better sustainability of knowledge.

Studying Sustainability Using Organizational Memory Framework

Although the concepts of organizational learning and organizational memory are being studied by organizational scientists, their use in the healthcare sector is limited. Much still needs to be understood on the value of organizational memory in the context of healthcare settings. A range of possible research questions can be studied. Initially, descriptive studies are warranted to apply the organizational memory framework as a lens to understand sustainability of clinical practices. These may be followed later with studies that aim to explain whether interventions based on organizational memory framework can lead to sustainability of clinical practices.

Conclusion

Sustaining the efforts of practice change in healthcare organizations, such as those from the implementation of clinical practice guidelines, are noted to not only ensure that patients receive the best care possible but also to ensure that investments made in knowledge acquisition and transfer are not wasted. The organizational memory framework, based on organizational learning theory, provides both practical strategies and opportunities to better understand sustainability through research conduct. The organizational memory framework lends a process for a systematic and thoughtful approach to planning and ensuring knowledge retention while preventing knowledge loss or decay. Having a framework for thoughtful decisions about sustainability can allow for more successful outcomes resulting from practice improvements.

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