Advances in Nursing Science
Vol. 34, No. 1, pp. 29–38

An Introduction to the Multisystem Model of Knowledge Integration and Translation

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Many nurse researchers have designed strategies to assist health care practitioners to move evidence into practice. While many have been identified as "models," most do not have a conceptual framework. They are unidirectional, complex, and difficult for novice research users to understand. These models have focused on empirical knowledge and ignored the importance of practitioners' tacit knowledge. The Communities of Practice conceptual framework allows for the integration of tacit and explicit knowledge into practice. This article describes the development of a new translation model, the Multisystem Model of Knowledge Integration and Translation, supported by the Communities of Practice conceptual framework.
Key words: *communities of practice*, *conceptual framework*, *evidence-based practice*, *knowledge integration*, *knowledge translation*, *model*

MEMBERS of health care professions constantly develop and refine new knowledge for their colleagues to provide best practices to the communities they serve. Collective knowledge in science is rapidly accelerating with new data, evidence, and interventions being introduced almost on a daily basis. Practitioners must base patient care decisions on a variety of sources of knowledge including scientific evidence of best practices, patient preferences, and clinical experience and expertise.

Today, the practice of health care is deeply embedded within a complex adaptive system. Health care practitioners act independently albeit interconnectedly with multiple disciplines whose individual actions knowingly or unknowingly may change the context for other practitioners.[1] Failure to recognize these interdependencies has contributed to slow progress in implementing and delivering evidence-based care. Interdisciplinary partnerships may enhance communication, foster evidence-based practice (EBP), and give practitioners the needed resources to deliver quality health care.[2] The formation of partnerships across disciplinary boundaries is needed to build the knowledge capacity to the degree that it augments the skills, knowledge, and resources for individuals who are engaged in delivery of care.[3,4] Although these partnerships have not historically formed naturally, with the linkage of health care reimbursements to patient care outcomes, organizations looking for ways to reduce costs while improving quality outcomes need to create the culture where interdisciplinary collaboration is the expectation.[5]

Knowledge translation is defined as "the synthesis, exchange, and ethically sound application of knowledge within a complex system of interactions among researchers and users to accelerate the capture of the benefits of research. . . through improved health, more effective services and products, and a strengthened health care system."[6(p597)] Many models currently exist for knowledge translation that identify 2 strategies: those charged

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with producing research evidence and those charged with using the evidence.[7] For this reason, practitioners have differing viewpoints on how research evidence should be translated into practice. In addition, many current models are unidirectional, having a beginning and a finite ending. Effective knowledge transfer has no finite end but rather continues without end, and it is not passive, occurring naturally, and without effort. It needs to be an active, intentional transfer forming a strong link between processes and outcomes ultimately leading to improvements in patient care.[8]

There is a growing recognition that advances in health care are limited by the failure to translate research findings into practice.[9] The science to develop EBP programs has progressed, while the science to implement the new knowledge has lagged behind. The Institute of Medicine echoes this in its report, *Priority Areas for National Action*, "At no time in the history of medicine has the growth in knowledge and technologies been so profound. [But] research on the quality of care reveals a health care system that frequently falls short in its ability to translate knowledge into practice. . . ."[10(p29)] Studies from the US and Netherlands have concluded that approximately 30–40% of patients do not receive care based on current evidence.[11] Despite the resources devoted to research, the transfer of knowledge into practice consistently remains a slow, inconsistent process.[9]

Unfortunately, there are numerous barriers that must first be recognized and overcome to improve the implementation, diffusion, and sustainability of innovations that may improve patient care outcomes. Working within a troubled health care system that is experiencing decreased reimbursements and escalating costs without a corresponding improvement in outcomes has challenged the ability of some health care organizations to create a culture where EBP is the expectation. Professional development and educational resources have experienced cuts, choosing to direct more resources for the provision of direct care rather than provide resources for EBP and research opportunities.[12] Failure to justify the resources for the development of an EBP culture could negatively impact patient outcomes.[13] Research education, while a necessary first step, in and of itself is rarely sufficient to change behavior and is therefore an ineffective implementation method. An organizational culture that embraces EBP, financially supports and empowers nurses who think that they do not have the authority to make changes, and provides EBP educational resources will surely increase the ability to improve quality care outcomes.

Such patient- and context-specific perspectives for knowledge translation require a model to integrate explicit knowledge from research with tacit knowledge from clinicians' experience. A knowledge translation model that is circular and ongoing emphasizes objective and explicit knowledge that allows health care practitioners to simplify complex systems into understandable and practical steps for improving outcomes. Knowledge translation is a powerful social process dependent on energetic partnerships, collaboration, and, above all, individual contact between research doers and research users to facilitate change. Without this social relationship, it is unlikely that any EBP initiatives will have the degree of support that is necessary to sustain practice changes.

THE COMMUNITIES OF PRACTICE CONCEPTUAL FRAMEWORK

The application of a conceptual framework to a translation process allows for a more detailed analysis of not just whether or not an intervention works, but also raises the recognition of how and why it was or was not effective.[14] The Communities of Practice (CoP) provides the ideal conceptual framework for a knowledge integration and translation model. The origin and primary use of the concept of CoP were in learning theory. Anthropologists Lave and Wenger coined the term, while studying apprenticeship as a learning model.[15] They defined *Communities of Practice* as "Groups of people

who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis."[15(p4)] A CoP begins when a group of people who are committed to a common domain of interest focuses on sharing best practices and creating knowledge and resources to advance their practice.

Membership in a CoP implies a commitment to the domain and therefore a shared competence that distinguishes members from other people. Communities of Practice involve more than informal interaction, passive sharing of information, and networking. They are dynamic in nature and require a social structure that must be cultivated to emerge and grow. Therefore, they must also include the 3 elements that are essential for a CoP: domain, community, and practice.[15]

To pursue the *domain* of research, members engage in joint activities, network with one another, share knowledge, and build relationships. Members may not necessarily work together but come together as a *community.* Members of a CoP are practitioners who develop and share resources, experiences, stories, tools, and ways of addressing recurring problems. In short, they have a shared *practice.* This takes time and sustained interaction. The development of a shared practice may be more or less self-conscious. For example, nurses who confer with their colleagues may not realize that these informal discussions are one of the main sources for sharing both explicit knowledge and expertise and tacit knowledge about how to care for patients. Still, in the course of all these conversations, they have developed a set of stories and cases that have become a shared repertoire for their practice. It is when all 3 of these elements—domain, community, and practice—are combined that a CoP is cultivated.

Communities of Practice are not called that in all organizations. While they all have the 3 elements of a domain, a community, and a practice, they come in a variety of forms and sizes. They may exist with a core group and many peripheral members. Meetings may take place face-to-face or online. Some are within an organization and some include members from various organizations. Some are formally recognized, often supported with a budget, and some are completely informal and even invisible.

Business organizations have readily adopted CoP recognizing that knowledge is a valuable commodity that needs to be managed strategically. For organizations to be competitive, systematic problem solving must be utilized to make decisions using data rather than tradition or assumptions. Experimenting with new approaches by searching for and testing new knowledge will allow organizations to learn from the experiences and practices of others by benchmarking best practices in the industry. This, in turn, facilitates the transfer of knowledge quickly and efficiently throughout the organization.[16]

The *Harvard Business Review* describes CoP as a novel form for networking in companies that run on knowledge.[17] The authors explain that members of a CoP are connected by shared expertise and a passion for a joint enterprise. The ability to share, exchange, and disseminate information is a powerful tool for keeping pace with challenges and changes in health care today.[18]

Communities of Practice provide a new approach that focuses on people and the social structures that enable them to learn with and from each other. The following are characteristics of CoP that allow them to act as a vehicle for developing strategic capabilities in organizations:

- Enable practitioners to take collective responsibility for managing the knowledge they need, recognizing that, given the proper structure, they are in the best position to do this.
- Create a direct link between learning and performance, with the same people participating in CoP and on teams that administer direct patient care.
- Clinicians can address the tacit and dynamic aspects of knowledge creation and sharing, as well as the more explicit aspects from their formal education.

Although CoP may occur naturally, like all living things, they require cultivation. A coordinator who organizes events and space where members can meet and who maintains contact with members helps to foster the development of CoP.[15] Key facilitators are accessible, share information, network, have a shared understanding of common practice issues, are in a leadership role, and have a commitment to interprofessional learning. Knowledge generation, acquisition, and dissemination are vital in today's complex health care environment. A CoP is an optimal way of managing the conceptual, instrumental, and strategic use of knowledge. Innovations (such as knowledge translation) diffuse through social networks. These networks include strong partnerships with opinion leaders and subgroups in the microsystems (frontline units) who all work cooperatively to bridge networks that would otherwise remain unconnected.[19]

Several governmental organizations are recognizing the importance of the CoP framework for advancing research translation. The National Institute of Clinical Studies, Australia's leading agency regarding best evidence and current clinical practice, has established the Community of Practice Program to generate momentum for ongoing partnerships to improve patient care.[20] Utilizing the CoP framework, the National Institute of Clinical Studies has organized a voluntary network of people who share information, build on existing knowledge, and close evidence-practice gaps, which contribute to better outcomes for patients. The Canadian Institute of Health Research has also successfully employed CoP in human health program development.[21]

THE MULTISYSTEM MODEL OF KNOWLEDGE INTEGRATION AND TRANSLATION

Recognizing the need for a model to translate knowledge into practice, the authors formed a research translation CoP. The organization's culture was already one of inquiry and supportive of EBP. Several nurses had already engaged in mentoring colleagues in and conducting EBP and research projects. They conducted an extensive literature search with CINAHL, PubMed, and Ovid databases, using the following key words: evidence-based practice, conceptual framework, model, knowledge translation, knowledge integration, research utilization, and research translation. Eight translation models were critically appraised (Table 1)[22-29] and research mentors and protégées were interviewed with common themes identified (Tables 2 and 3). The institutional environment was carefully examined for structures that would support sustained change. The themes from the qualitative studies and the empirical evidence from the

Table 1. Models[a] Critically Appraised by the Research Translation Task Force

Model	Author	Year	References
ACE Star	Stevens K	2004	22
CURN	Horsley J et al	1983	23
Iowa	Titler M et al	2001	24
John Hopkins	Newhouse R et al	2005	25
Ottawa	Logan J & Graham I	1998	26
PARIHS	Rycroft-Malone J et al	2004	27
Rosswurm & Larrabee	Rosswurm M & Larrabee J	1999	28
Stetler	Stetler C	2001	29

[a]See the reference list for full citation.

Table 2. Nurses' Experiences Mentoring the Conduct of Research, Common Themes Identified

Theme	Supporting Quote
Mentoring occurs as an informal process, not by assignment or schedule	It is not the mentor who identifies the protégé or has a protégé assigned to them. . .. I feel like I can coach the novice nurses that are assigned to me but not necessarily mentor them because they haven't identified me as their mentor.
Mentors had a strong sense to "pay it forward" after having received positive mentoring in their professional careers	I've always had wonderful mentors and I just am glad that I can have the opportunity to do that in return.
Mentors strongly believed mentoring to be a bidirectional relationship with both mentors and protégés receiving benefits of the relationship	I'm loving it because I'm learning a lot. You're teaching them and they're teaching you.

literature were integrated into a new knowledge translation model.

The Multisystem Model of Knowledge Integration and Translation (MKIT) (Figure 1) is a model embedded within the organization, designed to take health care practitioners through the innovation and implementation stages of knowledge generation, integration, and translation. Given the networking and sharing of tacit knowledge that CoP foster in the microsystem, this is the conceptual framework chosen to support the MKIT. The MKIT is a circular process rather than a unidirectional one. Beginning with reflective inquiry, practitioners progress through the steps of the model that include knowledge seeking/generation, integration, implementation, evaluation, mentoring, and additional reflective inquiry.

The clinical microsystem is a concept of health care defined as a place where patients, families, and care teams meet and frontline workers deliver care.[30] Issues may be simple or complex and professionals share explicit and tacit knowledge through socialization in small groups or communities.[31] The micro and macro (organization) relationships are needed for effective translation strategies.[32] The basic structure of a clinical system consists of the microsystem, which is the

Table 3. An Understanding of Nurses' Learning Perceptions, Common Themes Identified

Theme	Supporting Quote
Nurses wanted to change their practice but were unsure how to begin.	Looking to get involved in research but didn't know what direction to go.
The participants voiced loud and clear that the mentors and mentoring was a strong positive component to the program.	There was a lot of mentoring and they really helped you through the process.
Nurses developed a greater appreciation of research and how it could be incorporated into their practice.	It's given me a very different understanding for research. . .before taking that program, I really had no understanding for where research really fit into nursing. . .opened my eyes. . ..

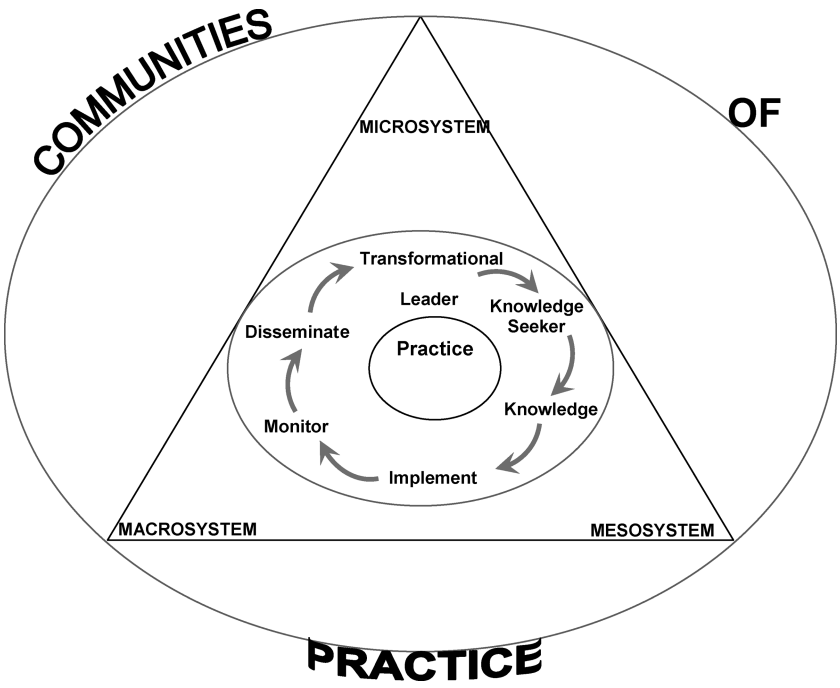

Figure 1. The multisystem model of knowledge integration and translation (MKIT).

small functional unit that provides direct care; the mesosystem or the intermediate divisions that provide direct leadership to the microsystems; and the macrosystem, the highest level of an organization.[33] Senior leadership in a macrosystem has the responsibility for the provision of resources to facilitate the success of the micro- and mesosystem as they strive to improve patient outcomes. Direct care providers working in the microsystem can deliver the best services when they are supported with resources and authority to make change.

Producers of research evidence in health care organizations should identify areas that are of particular interest to them and that they are passionate about. At the same time, new innovations that improve quality outcomes in their clinical arena may have additional support from organizational leaders when these innovations are also in alignment with the organizational strategic plan.[9] The MKIT addresses this early in the process by directing clinicians to examine innovations from a macrosystem level. Historically, research has been judged on the quality of the scientific design, not on the research utility.[4] The current focus is shifting, demanding assessment of the outcomes (utility) of research as well as the rigor of the study. It is imperative that knowledge seekers engage leadership early in the process to assess the value of the innovation to the organization prior to the application of time and resources.

To maximize success, an organization must have transformational leaders with the vision, influence, clinical knowledge, and expertise to act as catalysts for change.[34] Transformational leaders motivate and energize staff and support an empowering culture where practitioners are eager to and have the authority to implement EBP, are part of the decision-making process, and are highly motivated, well informed, and committed to the organization's goals.[35] Leaders within organizations who do not demonstrate the qualities of a transformational leader must have competencies identified and educational resources provided to achieve this leadership style. By networking with and being mentored by

transformational leaders, an environment of respect and understanding from both the research and clinical arenas will be promoted. This is fundamental to translating research-based knowledge into tangible changes in practice. Networking offers opportunities for knowledge exchange between CoP members and builds a sense of value for the community.[32,36]

PRACTICAL APPLICATION OF THE MKIT

In our organization, clinical nurses have been engaged in research, quality improvement, and EBP projects for a number of years through a series of formal workshops led by nurse research mentors. A frustration expressed by many of the nurses was the lack of a structure to support full implementation and sustainability of practice changes. The MKIT was used to guide the development and implementation of a guideline for family presence during resuscitation by a staff nurse researcher in the critical care unit to support families during the resuscitation of their loved one.

Step 1: The knowledge seeker

The staff nurse researcher began the process as a knowledge seeker. Through reflective inquiry of practice and personal experience, this nurse was concerned with the lack of a formal structure and support for families who wished to remain present during resuscitation of their loved one. Such requests had been handled by staff on an individual basis, resulting in confusion, anxiety, and ambivalence for all involved. Inconsistencies in practice and unplanned occurrences of family presence often led to a lack of appropriate support staff for the family and health care providers, further contributing to negative experiences. At the microsystem level, at least, there was a desire to have a guideline in place to address these concerns; it was significant enough of a concern to support further inquiry. The staff nurse researcher then proceeded to step 2, a search for the internal and external evidence on family presence during resuscitation to support practice change.

Step 2: Knowledge and integration of the evidence

The literature was replete with qualitative and quantitative evidence to support the benefits of family presence to patients, families, and health care professionals as well as the advantages of having a formal guideline and experienced staff to support the process.[37-46] The staff nurse researcher was aware of the emotional reactions precipitated by this subject and thus she recognized the importance of taking a methodical approach to development and implementation of a practice guideline to support families and practitioners during the resuscitation of a patient. A multidisciplinary CoP was formed to engage the stakeholders at the microsystem, mesosystem, and macrosystem levels of the organization as well as family members who had experienced resuscitation of their loved one.

A series of individual and group meetings was held to gauge the level of interest in and support for development of the guideline. The concerns expressed by participants reflected those found in the literature: the potential effect of witnessing the event on family members; family interference with the resuscitation process; lack of support for family members; increased levels of stress on health care providers; interference with the process of resident education; and risk of increased medical-legal litigation.[43] Studies have disproved all of those concerns; in fact, research has shown that family presence can enhance the grieving process; families can provide information about and support for the patient; families are able to witness the efforts being made rather than sit and speculate in a separate room; and there have been no documented cases of litigation related to family presence.[45] Family presence during resuscitation has been shown to increase the professional demeanor displayed and personalizes the patient for health care practitioners. Families have been reported to request that

further attempts at futile care and procedures be terminated.[43]

Senior leadership (the mesosystem) believed that it was important to base any practice change on internal evidence and not just on the findings of other studies. Therefore, a survey was distributed to health care professionals of all levels, including nurses, physicians, respiratory therapists, clergy, social workers, support staff, and leadership, to further assess the degree of knowledge and attitudes regarding family presence during resuscitation. Family members who had experienced resuscitation of their loved one were interviewed to gain a better understanding of their needs; data saturation was reached after 6 interviews. The findings mirrored those found in the literature. Both studies were approved by the hospital's institutional review board. These data were used to inform the development of the guideline by the CoP.

The CoP, facilitated by the staff nurse researcher, used the toolkit published by the Emergency Nurses Association[46] as a template for development of the guideline. Biweekly meetings focused on integration of survey and interview results with the format suggested by the Emergency Nurses Association. Time was allotted at the beginning of each meeting for individuals to express their concerns regarding specific provisions in the guideline. For example, the title of the guideline was changed from "Family Presence" to "Family Support," because staff believed that families should receive support regardless of their desire or option to be present at the bedside during the resuscitation. Over the course of 4 months, the language of the guideline was carefully revised until all members of the CoP were satisfied with it and it was found to be acceptable by all: micro, meso, and macro levels of the institution.

Steps 3 and 4: Implementation and monitoring

Through live in-service and electronic programming, extensive staff education on implementation of the guideline was conducted. The staff nurse researcher attended staff meetings, sent numerous e-mail messages, posted information on bulletin boards and the institutional Web site, and offered in-services for 3 months prior to implementation date. The guideline was then pilot tested in the microsystem of the critical care areas. In the first 6 months, 94 resuscitations ("codes") occurred; 35% included family presence at the bedside. Only 1 request for family presence was denied because of the graphic nature of the event and the remainder of the codes occurred when no family members were visiting. Data collection included cardiopulmonary resuscitation records and narrative summaries provided by the family and support staff as well as unsolicited informal reports. Data showed no negative occurrences during the pilot test; for all resuscitations where the family was present, support was provided; and anecdotal reports from staff and family were positive. Staff from the noncritical care areas began requesting implementation of the guideline throughout the institution. Several minor revisions to the guideline were needed, including the process for notification of the family support person.

Steps 5 and 6: Dissemination and transformational leadership

Full implementation of the guideline was accomplished throughout the macrosystem within a year of the pilot study and it is now a part of the institutional culture. Staff from other campuses, as well as institutions within the larger health care system, requested training on the guideline. The guideline development and implementation process have been disseminated through poster and podium presentations and publication on an international nursing scholarship Web site. This awareness has resulted in requests for the guideline from institutions nationally. The staff nurse researcher through the application of MKIT to this project evolved from knowledge seeker to transformational leader, coming full circle, and now serves as a consultant on this topic. She also serves as a mentor for new

knowledge seekers, guiding them through the MKIT process in their scholarly pursuits.

CONCLUSION

Managed care environments, rapid changes in technology, the explosion of new information, and complex health care environments necessitate the use of translation models by practitioners to efficiently operationalize EBP in their organizations. The MKIT is both an individual and organizational model for the generation, integration, and implementation of knowledge into practice. Operating with concepts embedded in CoP, the generation and synthesis of research, knowledge, and evidence into practice will occur at a more rapid rate than has been historically recognized. Members of the community exchange, interpret, share, and retain tacit knowledge, a powerful yet undervalued resource that is intrinsic in aiding the translation of evidence into practice.

Translating new knowledge into practice is fraught with challenges. For that reason, a clear, distinct model is needed to assist with this process in today's complex health care environment. Although the unidirectional translation models include the steps of knowledge generation, dissemination, and application, they are often too complicated for frontline health care providers to understand and operationalize. These models have focused on empirical knowledge and ignored the importance of practitioners' tacit knowledge.

The MKIT incorporates research translational aspects that have demonstrated evidence of successful implementation, discovered by an extensive literature search as well as the experience of one institution's utilization of the microsystems approach. Acquired and nurtured through relationships and community building, the MKIT is an innovative approach for health care practitioners to improve patient outcomes within their communities.

REFERENCES

1. Plsek P, Greenhalgh T. Complexity science: the challenge of complexity in health care. *BMJ*. 2001;323:625-628.
2. Wiggins M. The partnership care delivery model. *JONA*. 2006;36(7/8):629-638.
3. St. Onge H, Wallace D. *Leveraging Communities of Practice for Strategic Advantage.* Boston, MA: Butterworth-Heinemann; 2003.
4. Gordon W, Brown M. Building research capacity: the role of partnerships. *Am J Phys Med Rehabil*. 2005;84(12):999-1004.
5. Grossman S, Bautista C. Collaboration yields cost-effective, evidence-based nursing protocols. *Orthop Nurs*. 2002;21(3):30-36.
6. Landry R, Amara N, Palos-Mendes A, Shademani R, Gold I. The knowledge-value chain: a conceptual framework for knowledge translation in healthcare. *Bull World Health Organ*. 2006;84(8):597-602.
7. McDonald P, Viehbeck S. From evidence-based practice making to practice-based evidence making: creating communities of (research) and practice. *Health Promot Pract*. 2007;8(2):140-144.
8. Donaldson N, Horn S, Edwards J, et al. Evaluating the impact of partnerships to improve clinical quality. *Jt Comm J Qual Patient Saf*. 2007;33(12): 27-36.
9. Graham I, Logan J, Harrison M, et al. Lost in knowledge translation: time for a map? *J Contin Edu Health Prof*. 2006;26:13-24.
10. Institute of Medicine. Priority areas for national action. In: Greiner A, Knebel E, eds. *Health Professions Education: A Bridge to Quality*. Washington, DC: National Academy Press; 2003:29.
11. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patient care. *Lancet*. 2003;362:1225-1230.
12. Scott-Findlay S, Golden-Biddle K. Understanding how organizational culture shapes research use. *JONA*. 2005;35(7-8):359-365.
13. Wurmser T. The financial case for EBP. *Nurs Manag*. 2009;40(2):12-14.
14. Leeuw E, McNess A, Crisp B, Stagnitti K. Theoretical reflections on the nexus between research, policy, and practice. *Crit Care Health.* 2008;18(1):5-20.
15. Wenger E, McDermott R, Snyder W. *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Boston, MA: Harvard Business School Press; 2002.
16. Zwarenstein M, Reeves S. Knowledge translation and interprofessional collaboration: where the rubber of evidence-based care hits the road of teamwork. *J Contin Edu Health Prof*. 2006;26:46-54.

17. Wenger E, Snyder W. Communities of practice: the organizational frontier. *Harv Bus Rev*. 2000:Jan-Feb;139-145.
18. Lane L. Communities of practice: harnessing the power of knowledge. *JAHIMA*. 2002;73(6):24-27.
19. Rogers E, Medina U, Rivera M, Wiley C. Complex adaptive systems and the diffusion of innovations. *Innov J: Public Sector Innov J*. 2005;10(3):2-26.
20. National Institute of Clinical Studies. http://www.nhmrc.gov.au/nics/programs/emergency/index.htm. Accessed July 17, 2009.
21. Canadian Institutes of Health Research. http://www.cihr.irsc.gc.ca. Accessed May 20, 2009.
22. Stevens K. Academic Center for Evidence-Based Practice. http://www.acestar.uthscsa.edu/Learn_model.htm. Accessed December 20, 2007.
23. Horsley J, Crane J, Crabtree M, Wood D. *Using Research to Improve Nursing Practice: A Guide*. New York, NY: W. B. Saunders; 1983.
24. Titler M, Kleiber C, Steelman V, et al. The Iowa Model of Evidence-Based practice to promote quality care. *Crit Care Nurs Clin N Am*. 2001;13(4):497-509.
25. Newhouse R, Dearholt S, Poe S, Pugh L, White K. Evidence-based practice, a practical approach to implementation. *JONA*. 2005;35(1):35-40.
26. Logan J, Graham I. Toward a comprehensive interdisciplinary model of health care research use. *Sci Commun*. 1998;20(2):227-246.
27. Rycroft-Malone J. The PARISH framework: a framework for guiding the implementation of evidence-based practice. *J Nurs Care Qual.* 2004;19(4):297-304.
28. Rosswurm M, Larrabee J. A model for change to evidence-based practice. *Image J Nurs Scholarsh*. 1999;31:317-322.
29. Stetler C. Updating the Stetler model of research utilization to facilitate evidence-based practice. *Nurs Outlook*. 2001;49:272-278.
30. Nelson E, Bataldon P, Godfrey M. *Quality by Design: A Clinical Microsytems Approach.* San Francisco, CA: Jossey-Bass; 2007.
31. Von Krogh G, Ichijo K, Nonaka I. *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. New York, NY: Oxford University Press; 2000.
32. Newton M, Hofmeyer J, Scott C, Angus D, Harstall C. More than mingling: the potential of networks in facilitating knowledge translation in health care. *J Contin Edu Health Prof*. 2009;29(3):192-193.
33. Nelson E, Godfrey M, Batalden P, Berry S, Bothe A, McKinley K. Clinical microsystems, part 1. the building blocks of health systems. *Jt Comm J Qual Patient Saf*. 2008;34(7):367-378.
34. Wolf G, Triolo P, Reid Ponte P. Magnet recognition program: the next generation. *J Nurs Adm*. 2008;38(4):200-204.
35. Murphy L. Transformational leadership: a cascading chain reaction. *J Nurs Manag*. 2005;13:128-136.
36. Sanders J. Knowledge management: sharing knowledge. *Work Based Learn Prim Care*. 2004;2:111-117.
37. Clark AP, Aldridge MD, Guzzetta CE, Nyquist-Heise P, Norris M. Family presence during cardiopulmonary resuscitation. *Crit Care Nurs Clin North Am*. 2005;17:23-32.
38. Ellison S. Nurses' attitudes toward family presence during resuscitative efforts and invasive procedures. *J Emerg Nur*. 2003;29(6):515-521.
39. Halm MA. Family presence during resuscitation: a critical review of the literature. *Am J Crit Care.* 2005;14(6):494-511.
40. MacLean SL, Guzzetta CE, White C, Fontaine D, Eichhorn DJ. Family presence during cardiopulmonary resuscitation and invasive procedures: practices of critical care and emergency nurses. *J Emerg Nurs.* 2003;29(3):208-221.
41. Meyers TA, Eichhorn DJ, Guzzetta CE, et al. Family presence during invasive procedures and resuscitation: the experience of family members, nurses, and physicians. *Top Emerg Med.* 2004;26(1):61-73.
42. Mian P, Warchal S, Whitney S, Fitzmaurice J, Tancredi D. Impact of a multifaceted intervention on nurses' and physicians' attitudes and behaviors toward family presence during resuscitation. *Crit Care Nurs.* 2007;27(1):52-60.
43. Moreland P. Family presence during invasive procedures and resuscitation in the emergency department: a review of the literature. *J Emerg Nurs.* 2005;31(1):58-72.
44. Redley B, Botti M, Duke M. Family member presence during resuscitation in the emergency department: an Australian perspective. *Emerg Med Aust*. 2004;16:295-308.
45. York NL. Implementing a family presence protocol option. *Dimens Crit Care Nurs*. 2004;23(2):84-88.
46. Emergency Nurses Association. *Presenting the Option for Family Presence.* 2nd ed. Des Plaines, IL: Emergency Nurses Association; 2003.