

Developing the Knowledge Base of Family Practice

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Borrowed and adapted knowledge is insufficient to optimize the potential of a comprehensive, integrative, relationship-centered generalist approach to improve the health of individuals, families, and communities. The knowledge base for family practice must be expanded by integrating multiple ways of knowing. This involves (1) self-reflective practice by clinicians, (2) involving the patient voice in generating research questions and interpreting data, (3) inquiry into the systems affecting health care, and (4) investigation of disease phenomena and treatment effects in patients over time. A multimethod, transdisciplinary, participatory approach is needed to create knowledge that retains connections with its meaning and context and therefore is readily translated into practice. This research integrates quantitative and qualitative traditions and involves the active participation of both clinicians and patients. The generation of relevant knowledge should be supported through (a) developing a culture of reflective practice among clinicians, (b) expanding the infrastructure for practice-based research, (c) developing a multimethod, transdisciplinary, participatory research paradigm, (d) longitudinal study of the process and outcomes of broad, integrative, relationship-centered care, and (e) incorporating pursuit of new knowledge as a central feature of training programs and policy. The time has come for the generalist disciplines to commit to the generation of new knowledge based on the needs of patients, families, and communities for relationship-centered, integrated, prioritized health care. Development of a culture of learning and inquiry and the necessary research methods and skills will require a long-term commitment, creation of partnerships, and a focus on core principles by individuals and organizations.

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Family and General Practice: A Fundamental Way of Practicing

It is as though when he talks or listens to a patient, he is also touching them with his hands so as to be less likely to misunderstand: and it is as though, when he is physically examining a patient, they were also conversing.^{1(p77)}

John Berger describing Dr Sassall

It is easy to forget, in our hectic current environment of managed and disorganized care, nanotechnology, and human genome discoveries, that general practice has a long tradition of wisdom and pragmatic knowledge about patient care and healing in the context of family and community. This vocational tradition of the “day-

in, day-out, everyday work”^{2(p119)} of general practice is grounded in a fundamental way of practicing. For generations, general practitioners, in the context of their particular places, sat beside their patients—their neighbors, friends, and strangers—applying their clinical knowledge in hope of providing relief, repair, and meaning. This craft, rooted in personal, family, and community relationships, relied on core skills and scientific knowledge.

It was through the use of these same skills that general practitioners such as Will Pickles in Yorkshire, England; James MacKenzie in Burnley, Lancashire, England; Curtis Hames in Evans County, Ga; and Frans Huygens in Nijmegen, The Netherlands made their discoveries and prepared the ground for future family practice research. These early general practice researchers were there, with the patients, practicing the core skills of being mindfully present, observing, listening, touching, evoking, waiting, and recording. They recognized the poetry of life in the science of the ordinary and bore witness. As a result, we know much more about the prognosis and early diagnosis of chicken pox,³ the

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benign nature of sinus arrhythmia,⁴ the natural history of hypertension,⁵ and the clustering of illness in families.⁶ The science base of family practice emerges from the roots of this general practice tradition, this fundamental way of practicing and wondering.⁷

Family and General Practice Inquiry: Multiple Ways of Knowing

More recently, in this country and abroad, general practitioners, family physicians, and professional colleagues have carried on this tradition through individual inquiry, transdisciplinary teams, and practice-based research networks. In their quest to explore and understand the core issues of general practice, our colleagues have found it necessary to borrow from many disciplines,⁸ to challenge the traditional boundaries of science, and to use multiple methods and ways of knowing. The diverse and yet fundamentally coherent nature of this work may be understood within an integrative framework proposed by Wilber.^{9,10}

Wilber, who adapted his scheme from Schumacher,¹¹ represents human knowledge about the natural world in four quadrants (Table 1). The right-hand quadrants represent “outer reality” ie, the world as seen by materialist science: the view from outside. Outer reality is the domain of third person “it” knowledge based on detached, objective observation. The left-hand quadrants represent “inner reality”—the subjective aspects of reality: the domain of “I” and “we” knowledge. The left-hand quadrants are concerned with meaning, beauty, goodness, art, and morals. The right hand quadrants are concerned with physical laws, with nature.¹² The left is concerned with the meaning of experience; the right is concerned with the meaning of phenomena.

Wilber’s four quadrants, and the border regions between the quadrants, represent different lenses through which phenomena can be perceived. The quadrants provide a framework for understanding the multiple ways of knowing that inform generalist inquiry and practice (Figure 1). The upper-left corner (quadrant 1) represents physician self-knowledge. The lower-left corner (quadrant 2) represents knowledge of the patient, family, and community. The lower right corner (quadrant 3) represents knowing

Table 1

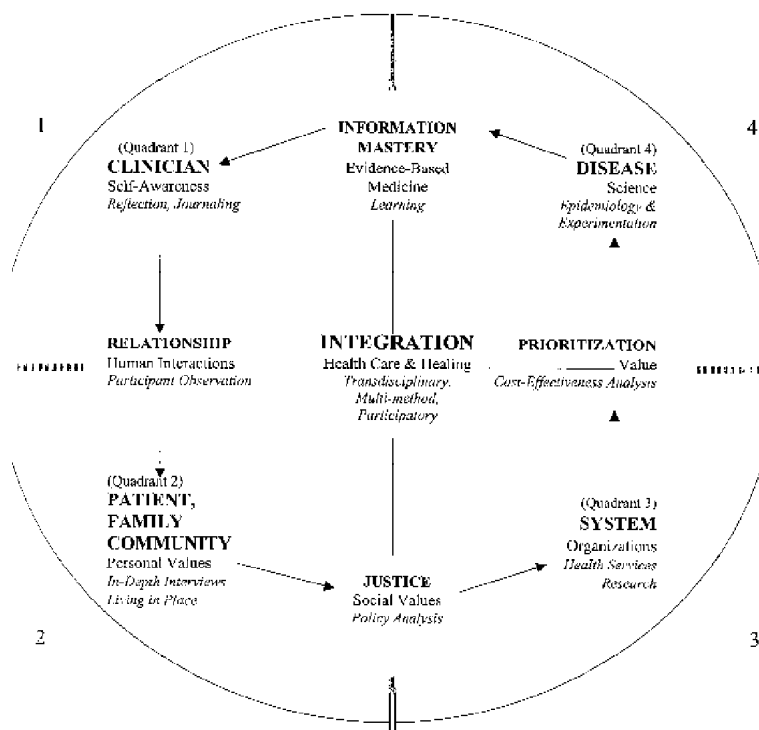
The Four Quadrants of Knowledge

	Inner Reality	Outer Reality
Individual	Quadrant 1: “I” knowledge	Quadrant 4: “It” knowledge
Collective	Quadrant 2: “We” knowledge	Quadrant 3: “It” knowledge

* Adapted from Ken Wilber^{9,10}

Figure 1

Generalist Wheel of Knowledge, Understanding, and Inquiry



For each item, bold capitalized words on the first line signify the “FOCUS OF KNOWLEDGE,” normal text on the second line signifies the “Task of Understanding,” and italicised words on the third line signify the “Mode of Inquiry.”

about systems. The upper-right corner (quadrant 4) represents knowledge of basic physics, chemistry, biology, genetics, and reductionistic understanding of medical processes. At the intersection of the four quadrants is the integrative function of family practice, informed by these different ways of knowing. The implications of this integration, seen at the borders between the four ways of knowing, is relationship-centered, prioritized health care based on justice and information mastery. All ways of knowing are valid and always present, although at times we focus on only a single aspect.

Gaining understanding in these different ways of knowing requires multiple methods. The right-hand corners (quadrants 4 and 3), which represent knowledge of external physical and systems realities, are studied using observational¹³ and clinical epidemiology,¹⁴ the experimental method, and social science survey methods. They are primarily based on the traditional biomedical paradigm and associated reductionist assumptions of materialist inquiry.¹⁵ More recently, complexity science¹⁶ and critical-ecological inquiry¹⁵ have expanded the methods and ways of thinking about these quadrants. This way of knowing has produced most of our clinical knowledge about the etiology, pathophysiology, natural history, diagnosis, and treatment of disease and is helping us understand more about health care services and systems and their effects on health.

Inquiry into the right-hand quadrants emphasizes objectivity by the *uninvolved* researcher. However, for the domains of information needed to provide personalized, prioritized, integrated primary care, knowledge based on *involvement* is required. Subjectivity and objectivity may be seen as complementary polarities—two aspects of the same reality, rather than separate dualities. In fact, Polanyi has demonstrated that personal knowledge is a requirement in all scientific work and that scientific detachment is an illusion.¹⁷ Either pole by itself is incomplete. Finding the right balance is the key, and self-knowledge is fundamental to attaining it.¹⁸

The left quadrants represent this complementary knowledge based on participation. Quadrant 1, “I” knowledge, refers to wisdom gained through “an acquaintance with the particulars,”—the individual accumulation of particular experiences¹⁹—the clinical wisdom of the reflective general practitioner. This way of knowing is close kin to the traditions of perennial philosophy and spiritual practice¹⁰ and more recently to the explorations and learnings on reflective practice,²⁰ mindfulness,²¹ and generalist ethics.²²

Quadrant 2, “we” knowledge, is based on personal experiences and relationships and seeks to find out how others perceive the world. This “connected knowing”^{23,24} is rooted in empathy and believability and is interested in context, relationship, and time. This way of knowing usually utilizes qualitative and participatory research

strategies.¹⁵ In a classic article published in 1988,²⁵ Lucy Candib, MD, demonstrated the connections among feminist literature on ways of knowing, the general practice traditions, and the emerging literature on qualitative research, especially naturalistic inquiry²⁶ and the narrative mode of thought.²⁷ She effectively argued for the importance of “connected knowing”²³ as a legitimate voice in scientific inquiry, especially family practice science.

This way of knowing opens the scientific door to include patients’ stories and experiences. Dr Candib proposes that the goal for family medicine should be the integration of connected knowing with the separate knowing of the right quadrants—a process she calls constructed knowing.

Family medicine, committed to both the personal and the scientific, can choose in our research to blend the visions, highlighting the importance of the knower and the relationship with the known. Using this standard, we can sift through all the voices we hear and words we read and find those to which we must listen.^{25(p136)}

The conventional metaphor of the “body as machine” loses too much of this clinical reality. A more robust metaphor, one that embraces all four quadrants of human knowledge, is the “body as organism” in ecological context. This is a seed from which the science of family medicine can grow.

Questions for Today

Trustworthy knowledge generation for family practice is considered in the following pages through asking and answering questions about the why, what, how, who, and where of new knowledge. The answers to these questions are discussed below and summarized in Table 2, which is an application of Wilber’s grid to medical knowledge.

WHY Do We Need New Knowledge?

There are six basic reasons why new knowledge is needed for family practice. These are outlined below.

1. A discipline needs a coherent and evolving body of knowledge in order to exist. To endure and advance, a discipline must be supported by knowledge that is shaped by and forms its core principles.²⁸

2. To teach new generations, our tacit knowledge must be made explicit. Family physicians and our generalist colleagues have gained tremendous knowledge through a long history of practice. This often tacit knowledge has traditionally been passed on through informal mentoring and individual teaching. While these are important, an explicit knowledge base is needed to foster this transmission.

Table 2
Ways of Knowing and Seeking Medical Knowledge

	INNER REALITY	OUTER REALITY
Individual	Quadrant 1	Quadrant 4
Type of knowledge	“I” knowledge	“It” knowledge
Why	Understanding the clinician is essential to family practice, since in part “the doctor is the drug.”	Understanding natural phenomena and interventions to affect them is the biological basis of medical practice.
What	Knowledge of the clinician	Disease-specific knowledge of clinical phenomena
How	Self-reflection, journaling	Observation, epidemiology, experimentation
Who	Reflective clinicians	Detached observers
Where	Practice	People or parts of people
Collective	Quadrant 2	Quadrant 3
Type of knowledge	“We” knowledge	“It” knowledge
Why	The voices of patients, families, and communities are central to the goals and effectiveness of family practice.	Family practice operates within a systems context, which must be understood to enhance its effectiveness.
What	Knowledge of the patient in context	Systems knowledge
How	Participatory research	Health services research
Who	Participant observers	Health services researchers
Where	Community or practice	Health care systems

3. Information is needed to improve patient care in ways that optimize the valued roles and life course of individuals, families, and communities. Despite the long history of general and family practice, many aspects of the broad, integrative, relationship-centered, generalist approach have not been defined, and much of their effect on outcomes remain to be elucidated.^{29,30} This knowledge is needed to improve the quality of patient care that is focused not on maximizing the state of molecules, organs, or separate diseases but on optimizing the value- and context-laden function and life course of individuals, families, and communities.

The small, vastly underfunded research efforts of generalists seek to answer questions that emerge from caring for individuals and families with diverse illnesses. Often, these questions do not fit within the categorical research paradigm but examine the fundamental features of primary care, including:

- (1) *breadth* of care that is not limited by the patient’s age, the organ system of the patient’s problem, or the location at which care is provided, (2) *depth* of knowledge of the patient, family, and community over time

as a critical context for the provision of care and for choosing the timing and content of care, (3) *bridging* of the boundaries between health and illness, focusing on enhancing the patient’s overall functional health status, and (4) *guiding* access to more narrowly focused care when needed.^{29(p363)}

4. The current knowledge base and conceptualization of information needs are incomplete.³¹ The current knowledge base and prevailing research infrastructure, which value specialized knowledge over general, synthesized, or prioritized knowledge, are inadequate to meet the discipline’s knowledge needs. Currently, the generation of new disease (Quadrant 4) information dominates research, driven by ever-greater specialization among researchers who reduce their focus to ever-smaller elements.³² This paradigm seeks to isolate a phenomenon from its context, so that it can be understood in its purest, most singular form. As a result, biomedical science, funded by the National Institutes of Health and others, has advanced understanding of basic biological processes and treatment for tightly defined diseases.³³ At the same time, the nation’s standing in population health status continues to decline in comparison with other countries with much less expenditure on health care and medical research,³⁴⁻³⁶ and public confidence in the health care system continues to decline.^{37,38}

The rapidly emerging field of health services (Quadrant 3) research³⁹ often takes a broader perspective by examining the effect of systems on the structure, process, and outcomes of health care but often suffers from remoteness from the actual experience of the subjects under study and from a focus on what can be learned from survey methods or analysis of existing data collected for other purposes. Conversely, qualitative research in Quadrants 1 and 2 has often suffered from limited attention to how study participants and findings relate to other groups and bodies of knowledge.⁴⁰

Disease-focused and health services research have produced an immense body of knowledge that is potentially applicable to family practice. However, the lack of a generalist and patient perspective often creates a

chasm in its translation into practice.⁴¹⁻⁴⁸ Since the knowledge wasn't generated from the perspective or setting in which it is needed and applied, the generalist clinician is left to reintegrate this large body of knowledge in practice at the level of whole people who often have multiple and less well-specified illnesses and preventive needs.²⁹

In actuality, we not only need to translate narrowly defined research into practice, we also need to translate the broad, integrative, relationship-centered perspective of generalist practice into research. The generation of knowledge from the perspective of reflective clinicians, patients, and communities is needed to eliminate the gap between research and practice.⁴³ For example, based on a taxonomy of depressive illness derived from the experience of psychiatrists, generalist physicians are said to "miss" depression in large numbers of their patients.^{49,50} Unless we have our own taxonomy of emotional distress as it presents in primary care over time, validated by clinical observation, we are not in a position to challenge the prevailing assumptions or to improve our practices based on a knowledge base that fits patients' needs as they present in primary care.⁵¹

The generation of knowledge at the integrative level of practice has been limited by the reductionistic focus of research theories and methods and by a lack of funding for generalist lines of inquiry and community- and practice-based research laboratories.⁵² In addition, the almost exclusive focus of the generalist disciplines on practice and the focus of family practice academic units on teaching and service, while important and admirable, have created a culture in which the generation of new knowledge is not seen as a core mission.

5. There are new challenges for which we need answers. New challenges include health care system and societal trends that are diminishing the longitudinal relationship context that is critically important to the effectiveness of family practice.⁵³⁻⁵⁵ In addition, the rapid advances in narrowly defined disease knowledge, including the Human Genome Project,⁵⁶ create a need for complementary knowledge on how emerging technologies can be integrated into a personal, family, societal, relationship, and ecological context.⁵⁷

6. Knowledge is needed to achieve a healthy sustainability of the health care system, within the context of society's other systems and needs. Driven by efforts to optimize parts rather than the whole, the US health care system spins out of control, with rising costs and declining value,⁵⁸ despite rapid technological advances. The current problems stem, in part, from physicians' abdication of our larger perspective and responsibilities and from an imbalance in specialized versus integrative health care. Increasing knowledge

based on an integrative, generalist, and ecological perspective is needed to help restore balance.

The essence of our discipline is the application of a broad range of disease-specific and sociocultural knowledge integrated with understanding of the unique values and needs of individuals, families, and communities. We can no longer allow others to be solely responsible for knowledge that we will apply. It is time to make the generation of relevant new knowledge a central feature of the culture of family practice.

About WHAT Do We Need New Knowledge?

Many excellent schemes and rationales for defining family practice and primary care research have been presented over the past 30 years.⁵⁹⁻⁶⁸ Our proposed "Generalist Wheel of Knowledge, Understanding, and Inquiry" in Figure 1 is, in part, an effort to integrate many of these efforts.

Wilber's typology provides a useful framework for considering the perspectives from which new knowledge is needed. In Quadrant 1, knowledge is needed about the clinician and involves the task of self-awareness, including reflective practice, professional socialization, and medical education. A Quadrant 2 lens is required to understand the personal values and perspectives of patients, families, and communities, including illness behavior, social roles, and life plans. In Quadrant 3, greater understanding of the complex adaptive systems^{69,70} and organizations⁷¹⁻⁷² that affect health and health care is necessary. This way of knowing health and health care can also involve collaborative care models, family systems, and health systems research. In Quadrant 4, relevant taxonomies and ways of thinking are particularly needed for the multiple or undifferentiated problems that are cared for simultaneously over time in family practice.

Integrated knowledge can also emerge from the junctions between the four ways of knowing. As seen in Figure 1, the connection between Quadrants 1 and 2 is about the relationship between the doctor and the patient and family in a community context. This includes research about human interactions. The junction between Quadrants 2 and 3 includes the actualization of social values through the health care and other societal systems. The intersection of Quadrants 3 and 4 involves using a systems perspective to prioritize the application of disease knowledge. The confluence of Quadrants 4 and 1 includes information mastery⁷³ and evidence-based medicine.⁷⁴ The intersection between Quadrants 1 and 3 involves the collaborative process in which clinicians advocate for patients within the health care system, and systems are established to guide care. The connection between Quadrants 2 and 4 includes illness phenomena—that is, how diseases are manifested in different types of people, families, and communities.

In addition to categorical knowledge, new information is also needed about health care and healing within a relationship context.^{29,75} Figure 1 depicts the centrality of this integrative knowledge, which represents a way of knowing that is more than the sum of its parts. This synthetic information can come from research that simultaneously or sequentially incorporates more than one of the different ways of knowing into a single research initiative or in multiple projects over time.⁷⁶

The horizontal junction between individual and collective knowledge is where the core generalist functions of integration and prioritization of care in a relationship context operate. This is relatively uncharted territory from a research perspective, in part because it represents the challenging integration of diverse ways of knowing. Yet, since this intersection delineates the essence of the unique value of family practice,²⁹ we cannot shy away from the challenges of generating knowledge in this integrative domain. The vertical border between inner and outer reality involves uniting personal and scientific knowledge. This polarity also requires consideration of fundamental issues of social justice as the values of individuals and groups are blended at the level of social systems.

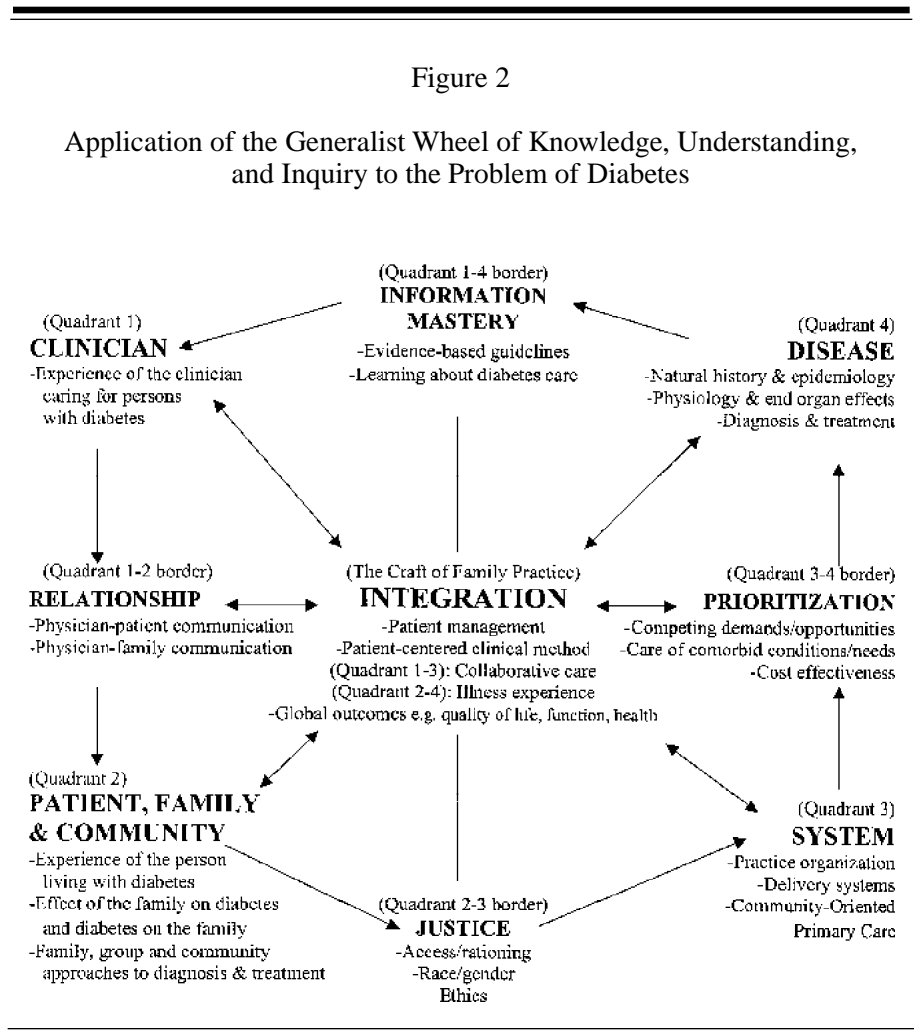
The many questions within and between these diverse ways of knowing will not be answered with single studies within one domain of knowledge but with a series of investigations by multiple investigators in different settings using diverse methods. A body of knowledge is needed. This is the body of knowledge that defines our discipline.

For example, Quadrant 1 includes the highly self-reflective work of David Loxterkamp, MD, in journaling his experience as a country doctor closely connected with patients, family, community, and self.⁷⁷ Such contemplative observations of people in place can lead to insights in other domains⁷⁸⁻⁸² (including Dr Loxterkamp's article in this issue of *Family Medicine* on pages 244-7.) that are highly relevant for the relationship-centered context of family practice. Other anthologies and personal analyses⁸³ of physicians' experiences fit within this tradition of knowledge.

Quadrant 2 research is exemplified by the highly participatory work of New Zealander Harriet Denze-Penny, whose interactive group of patients with chronic fatigue syndrome and their families transformed the goals and the process of care and the way that doctor and patients related to one another. The establishment of a patient advisory council⁸⁴ by Milton Seifert is another example of involving the patient voice in participatory, action research in family practice.

Quadrant 3 health services³⁹ and health systems research can demonstrate the important health effects of access to care^{85,86} and the effects of health care policy on access to care.⁸⁷ Kerr White's classic work on the ecology of medical care shows how this way of knowing can provide a theoretical underpinning for the primary care disciplines.⁸⁸

Quadrant 4 includes the work of the great generalist researchers Sir James MacKenzie,⁸⁹ Will Pickles,³ and Jack Medalie,⁹⁰ who advanced understanding of disease and illness phenomenon through observing their patients over time. The taxonomic work of Lemberts, Wood, and others⁹¹ also help to create this type of knowledge. More recent examples include the ongoing clinical



inquiries of family physicians such as David Hahn, who is testing the hypothesis that *Chlamydia pneumoniae* has a causative role in adult-onset asthma.^{92,93} Similarly, Michael Livingston has used observations of patients in his British Columbia practice to challenge conventional wisdom about the management of whiplash injury.⁹⁴ Robert Blankfield, in investigating the causes of peripheral leg edema in primary care practice, discovered that while venous insufficiency is the most common clinical diagnosis assigned by family physicians, on further evaluation, the majority of patients actually have pulmonary hypertension.⁹⁵ Additional investigations have shown that many people with bilateral leg edema and pulmonary hypertension may actually have sleep apnea as the cause.⁹⁶ These inquiries use the traditional scientific method to elucidate natural phenomena and begin to answer Kerr White's challenge⁹⁷ to carry out "serious investigation of important clinical problems" from a primary care perspective, particularly using longitudinal study of the natural history of illnesses over time.⁹⁸

For clinicians, descriptive clinical investigations are often the most practical and most rewarding approach to research. Although such research does need careful thought and advanced planning, it does not call for complicated research designs or complex statistical maneuvers. Therefore, it can often be integrated into the clinicians' practice, using their knowledge of so many facets of their patients' lives and accurate recording.⁹⁹

Generalist inquiry often combines perspectives of multiple quadrants in the same investigation or in multiple inquiries over time. For example, the Headache Study Group at the University of Western Ontario involved both Quadrant 1 and 2 knowledge by incorporating patient participation in determining the natural history of headache and physician reflection on dealing with patients who have headaches. It turned out that the physician's report of liking the patient was a strong predictor of a good outcome at 12 months. However, an even stronger predictor was the patient's statement after the first visit that he/she had a good opportunity to discuss the problem during the first visit with the physician. These observations contributed to the development of the patient-centered clinical method⁷⁶ and to studies that have shown that patient centeredness, as assessed by the patient, is associated with better health outcomes.¹⁰⁰

Since all quadrants of knowledge represent different ways of knowing the same whole, they are always present in the clinical phenomena being experienced or studied. Figure 2 exemplifies inquiry into multiple aspects of the care of people with diabetes. This figure depicts that knowledge of the clinician, patient, family and community, system, and disease are all important in understanding the clinical phenomenon of diabetes. The boundaries between the four quadrants are also

important ways of knowing and legitimate areas for inquiry. These include the clinician-patient relationship, justice, prioritizing care of comorbid conditions, information mastery, collaborative care, the illness experience, and integration of care.

HOW Do We Go About Seeking This Knowledge?

Examples of methods appropriate for each quadrant of inquiry are outlined in both Table 2 and Figure 1. To generate Quadrant 1 knowledge, methods that facilitate self-awareness, including reflective practice and journaling, are needed.^{21,101} Quadrant 2 knowledge is typically based on depth interviews.^{102,103} Participant observation¹⁰⁴ and case studies¹⁰⁵ are used at the interface between Quadrants 1 and 2 because these methods are particularly good for understanding meaning and context from the viewpoint of the study participants. Health services research methods, often applying epidemiological techniques to secondary data sources, are most often used to generate Quadrant 3 knowledge.¹⁰⁶ Policy and economic analyses¹⁰⁷ are used at the interface of Quadrant 3 with Quadrants 2 and 4, respectively. Quadrant 4 knowledge is generated with descriptive epidemiological and experimental methods,^{74,108} and evidence synthesis and active learning methods are used at the interface with Quadrant 1. The interface between Quadrants 1 and 3 can be studied with stakeholder evaluation, whereas understanding the intersection between Quadrant 2 and 4 knowledge may involve narrative analysis or ethnography.

The North American Primary Care Research Group (NAPCRG) has been a breeding ground for a new research paradigm that integrates qualitative and quantitative methods to create a multimethod approach.^{109,110} This approach combines the strengths of well-specified designs, measures, and hypothesis testing from the quantitative tradition with the flexible, grounded, meaning-oriented approaches of the qualitative tradition.^{76,111} When multiple participants bring diverse expertise and perspectives and begin to work together to create a new space, language, and approach, a transdisciplinary process has begun.¹¹² When this transdisciplinary process and multimethod approach involves the active collaboration of individuals and communities at multiple stages of the inquiry, a participatory process results.¹¹³⁻¹¹⁵ The involvement of both clinicians and patients as active participants in multiple stages of the process is key. The result is a process that uses the most relevant design, sample, measures, and analysis to answer questions that are, by the nature of the process, relevant to the participants.

An example of this transdisciplinary, multimethod, participatory approach is a series of studies being conducted by the Center for Research in Family Practice and Primary Care, one of the American Academy of Family Physicians Family Practice Research Centers.

In one study that began with recognition of a performance gap in the delivery of evidence-based preventive services, epidemiological methods with some participant observation were used to identify fundamental structures and processes of family practice and of the clinician-patient relationship.¹¹⁶ Interpretation of the data by practicing clinicians, academicians, and methodologists led to additional investigations emphasizing ethnographic study of practice cultures and organizations and system, community, and patient context.^{105,117,118} This approach integrated quantitative and qualitative methods and the perspectives of diverse participants over time to create new knowledge that is both transportable and locally applicable because isolated phenomena are studied in context.

The nature of the phenomenon under study to inform family practice requires longitudinal inquiry and relevant taxonomies. Time is an essential ingredient in the natural phenomenon of health and illness and is necessary to understanding patient and system outcomes of a generalist practice. Therefore, despite the logistical challenges, study of practices, patients, and communities over time is essential to further develop a relevant knowledge base for family practice. We must refine our methods for maintaining observation of our patient populations for the prolonged periods needed to understand complex interrelated clinical phenomena. This is a particular challenge in the current fragmented US health care system.

If we take these multiple ways of knowing seriously, we will incorporate them into the development and application of knowledge. This can be accomplished by bringing together the perspectives and methods of each quadrant within the same inquiry or by pursuing and integrating the multiple ways of understanding phenomena over many inquiries over time. Even when focusing primarily on one way of knowing, the other ways should be considered. For example, a clinical trial of a new diabetes treatment might focus the majority of its energy on testing the effect of the treatment on biological endpoints (Quadrant 4) but also incorporate methods that allow characterization of the other relevant quadrants of knowledge. Journals publishing the findings might ask the investigators to briefly describe their own perspective and reflections in starting and conducting the trial (Quadrant 1), the perspective and values of participants and the culture that develops among clinical trial participants (Quadrant 2), and the systems required to achieve the treatment effects (Quadrant 3). In addition to generating knowledge in all four domains, the translation of study findings into practice could be enhanced by considering the implications for the boundary regions of knowledge. For example, the study implications could be discussed for the clinician-patient relationship (Quadrant 1-2 border), access to care for subgroups (Quadrant 2-3), priority of this

treatment in the context of resource allocation for other existing treatments for this disease and co-morbid conditions (Quadrant 3-4), information mastery (Quadrant 1-4), illness experience (Quadrant 2-4), and collaborative care (Quadrant 2-4).

WHO Must Participate?

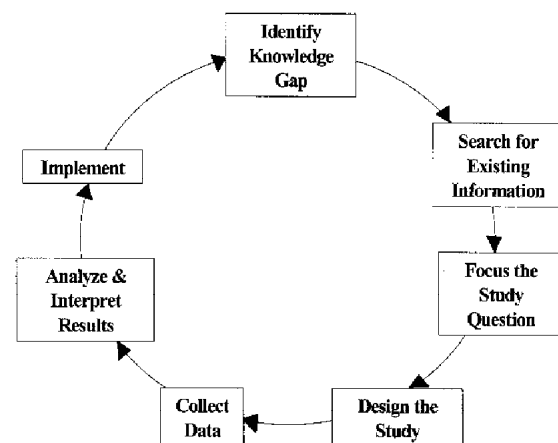
Our discipline's laudable focus on practical approaches to caring for patients in context has at times led us to shun research as something that the other disciplines do.¹¹⁹ We have taken pride in being pragmatists who apply knowledge to take care of patients, rather than generating new knowledge. While continuing to embrace our practical focus in caring for patients, it is time for us to give up our reactionary stance against research.

Every individual and organization involved in practicing, teaching, administering, researching, or certifying generalist practice should participate in creating a culture that fosters the generation of new knowledge. We can no longer blame others for not valuing or providing the information base for what we do, if we do not take the initiative to generate relevant knowledge. Each corner of the discipline has a different perspective, access to different parts of the phenomenon, and skills to bring to the inquiry.

This is not to say that generalist research is easy or that every individual or organization has the skills or interest to make the generation of new knowledge their

Figure 3

The Research Process



Adapted from Nutting PA, Stange KC. Practice-based research: the opportunity to create a learning discipline. In: Rakel RE, ed. The textbook of family practice, sixth edition. New York: W.B. Saunders Company, 2000.

major focus. Rather, it is to challenge us to take responsibility and examine our strengths, weaknesses, and situational opportunities as they relate to the generation of knowledge and to find a way to contribute. It is to challenge us to establish collaborations that generate new knowledge to advance the health of our patients.

Likewise, family practice organizations that espouse a goal of improving the health of the population have a responsibility to develop the people, attitudes, skills, or infrastructure that will advance a culture of inquiry. Our professional organizations are already starting to make this transition but need the confidence to focus our fledgling research efforts on understanding and improving phenomena that are uniquely in our domain, rather than performing “me too” research that models itself on the current approaches that have left us with a knowledge gap. It will take time and diverse efforts at multiple levels to change our culture to one that not only values systematically generated new knowledge but feels obligated to participate in its creation. Advocacy for non-categorical funding sources to support generalist inquiry and perseverance in pursuing inquiry amidst competing demands are necessary from both individuals and organizations.

As shown in Figure 3, individuals can become involved at multiple entry points in the generation of knowledge.³¹ Starting at the top of Figure 3, everyone can be involved in identifying knowledge gaps, which exist in each quadrant of knowledge and are particularly acute at the junctions among the four ways of knowing and caring. Often, we can find and implement an adequate answer to a question from existing information sources; this is evidence-based practice. But sometimes we are going to have questions for which the answer is not known, or it is not known from a generalist perspective or in a primary care setting.⁵² In this case, the process proceeds to focusing a research question; designing a study; collecting, analyzing, and interpreting data; implementing findings; and identifying new knowledge needs. These steps require training and experience that is often best pursued among colleagues. Not everyone will be expert in the needed methods, but many can be involved in collaborating with people who know how to design and conduct studies. We can also be involved in practice-based research networks where people both identify knowledge gaps and questions and collect and interpret the data.

This process shortens the loop of translating research into practice by treating prospective clinicians and patients not as subjects but as active agents. This participatory research paradigm, espoused at NAPCRG,¹¹³ is a tremendous opportunity to assure the relevance of our knowledge base to those we serve.¹¹⁴

WHERE Should This Inquiry Take Place?

Primary care research has been defined as the generation of new knowledge from the primary care perspective in primary care settings.⁵² The generation of new generalist practice knowledge must occur in context.¹⁹ This involves studying people, illness, and healing where they occur—in the home and community, outpatient practice settings, the hospital, and nursing home. Many, but not all, generalist inquiries will connect these places by crossing and integrating across boundaries.⁴⁰

Practice-based research networks are the logical and critically important laboratories for much of this research.^{42,120-124} Despite a lack of infrastructure support,^{120,125,126} they have begun to generate important knowledge in a way that diminishes the barriers to translation into practice,^{41,42,121} because the research is done in practice, from the perspective of practice. The involvement of a large proportion of family physicians and collaborating academicians in practice-based research networks has the potential to create a learning discipline³¹ and a culture of self-reflective practice.

Creating a Culture of Generalist Inquiry—A Call to Action

Advancement of the knowledge base for generalist practice is important and feasible. We cannot let the competing demands and threats of the current environment dissuade us; they make the need and opportunity even stronger.

Knowledge is power—power to care for patients based on understanding the connections between physician, patient, family, community, system, natural laws, health care services, and outcomes—power to advocate for a sustainable health care system that provides accessible, relationship-centered care for all people.

We challenge each reader to consider the quadrants and junctions of knowledge in light of your unique opportunities to participate in the generation of new knowledge. Think about yourself as an individual, and consider the organizations and groups in which you have a voice. Reflect on the role that you could play at the boundaries between the quadrants and at its synthetic center—the heart of our craft.

This knowledge can be developed by (1) affirming the need for domain-specific and integrative knowledge generated from a generalist perspective in the settings in which general practitioners and family physicians interact with patients, families, and communities, (2) evolving ways of thinking about developing knowledge that are relevant to the needs of patients for integrated, prioritized, relationship-centered care, (3) refining and applying transdisciplinary, multimethod, participatory research approaches to answering important questions, (4) accepting responsibility as individuals and organizations for participating in portions of the process of

knowledge generation, (5) committing resources to this research effort, including practice-based research network infrastructure, personal and professional time, training multimethodologists grounded in general practice and local understanding, advocating for noncategorical funding for generalist research, and working toward a participatory culture of reflection and inquiry.

Together, we can create a culture of learning and inquiry that develops the knowledge base and enhances the healing power of the broad, integrative, relationship-centered primary care discipline of family medicine.

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The knowledge base for family practice must be expanded by integrating multiple ways of knowing. This involves (1) self-reflective practice by clinicians, (2) involving the patient voice in generating research questions and interpreting data, (3) inquiry into the systems affecting health care, and (4) investigation of disease phenomena and treatment effects in patients over time. Family practice and the primary care disciplines need a forum to develop an integrated body of knowledge and a generalist paradigm that is grounded in science, practice and different ways of knowing. The Annals aims to be such a forum. Welcome to the Annals of Family Medicine. Article. May 2003. It is a channel to develop family participation in educational process and has various benefits for students, teachers and parents. (Abdulla, Seeded & Alzaidiyeen, 2011). It reduces students' dropout rates and behavioral issues, develops school-community association and helps parents to understand the school work (Rockwell, Andre & Hawley (1996). Relationship between perceptions and practices regarding parent involvement. Table 1 indicates a relationship between teachers' perceptions and practices. This also suggests administration of schools to design a need based responsibility chart for teachers. Teachers should be communicated to develop a culture in government schools to work with motivation to attain the target to get cooperation of parents. Daily practices of agents develop specialized language, frameworks, and conventions as codes of communication and rules of interaction by which individually, organizationally, and regionally embedded knowledge can be mobilized and cross-fertilized in continuous codification and internalization processes (Amin & Cohendet, 2004; Bathelt & Glückler, 2011; Malmberg & Maskell, 2006; Saxenian, 2007). Through family and friendship bridges, this knowledge can quickly spread across the whole local community (through eight steps in Fig. Family-based localized learning can be paramount in the development of industrial clusters in developing economies.