Chapter 6. Clinical Reasoning, Decisionmaking, and Action: Thinking Critically and Clinically

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Background

This chapter examines multiple thinking strategies that are needed for high-quality clinical practice. Clinical reasoning and judgment are examined in relation to other modes of thinking used by clinical nurses in providing quality health care to patients that avoids adverse events and patient harm. The clinician's ability to provide safe, high-quality care can be dependent upon their ability to reason, think, and judge, which can be limited by lack of experience. The expert performance of nurses is dependent upon continual learning and evaluation of performance.

Critical Thinking

Nursing education has emphasized critical thinking as an essential nursing skill for more than 50 years.[1] The definitions of critical thinking have evolved over the years. There are several key definitions for critical thinking to consider. The American Philosophical Association (APA) defined critical thinking as purposeful, self-regulatory judgment that uses cognitive tools such as interpretation, analysis, evaluation, inference, and explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations on which judgment is based.[2] A more expansive general definition of critical thinking is

> . . . in short, self-directed, self-disciplined, self-monitored, and self-corrective thinking. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem solving abilities and a commitment to overcome our native egocentrism and sociocentrism. Every clinician must develop rigorous habits of critical thinking, but they cannot escape completely the situatedness and structures of the clinical traditions and practices in which they must make decisions and act quickly in specific clinical situations.[3]

There are three key definitions for nursing, which differ slightly. Bittner and Tobin defined critical thinking as being "influenced by knowledge and experience, using strategies such as reflective thinking as a part of learning to identify the issues and opportunities, and holistically synthesize the information in nursing practice"[4] (p. 268). Scheffer and Rubenfeld[5] expanded on the APA definition for nurses through a consensus process, resulting in the following definition:

> Critical thinking in nursing is an essential component of professional accountability and quality nursing care. Critical thinkers in nursing exhibit these habits of the mind: confidence, contextual perspective, creativity, flexibility, inquisitiveness, intellectual integrity, intuition, openmindedness, perseverance, and reflection. Critical thinkers in nursing practice the cognitive skills of analyzing, applying standards, discriminating, information seeking, logical reasoning, predicting, and transforming knowledge[6] (Scheffer & Rubenfeld, p. 357).

The National League for Nursing Accreditation Commission (NLNAC) defined critical thinking as:

> the deliberate nonlinear process of collecting, interpreting, analyzing, drawing conclusions about, presenting, and evaluating information that is both factually and belief based. This is demonstrated in nursing by clinical judgment, which includes ethical, diagnostic, and therapeutic dimensions and research[7] (p. 8).

These concepts are furthered by the American Association of Colleges of Nurses' definition of critical thinking in their *Essentials of Baccalaureate Nursing*:

> Critical thinking underlies independent and interdependent decision making. Critical thinking includes questioning, analysis, synthesis, interpretation, inference, inductive and deductive reasoning, intuition, application, and creativity[8] (p. 9).
>
> Course work or ethical experiences should provide the graduate with the knowledge and skills to:
>
> - Use nursing and other appropriate theories and models, and an appropriate ethical framework;
> - Apply research-based knowledge from nursing and the sciences as the basis for practice;
> - Use clinical judgment and decision-making skills;
> - Engage in self-reflective and collegial dialogue about professional practice;
> - Evaluate nursing care outcomes through the acquisition of data and the questioning of inconsistencies, allowing for the revision of actions and goals;
> - Engage in creative problem solving[8] (p. 10).

Taken together, these definitions of critical thinking set forth the scope and key elements of thought processes involved in providing clinical care. Exactly how critical thinking is defined will influence how it is taught and to what standard of care nurses will be held accountable.

Professional and regulatory bodies in nursing education have required that critical thinking be central to all nursing curricula, but they have not adequately distinguished critical reflection from ethical, clinical, or even creative thinking for decisionmaking or actions required by the clinician. Other essential modes of thought such as clinical reasoning, evaluation of evidence, creative thinking, or the application of well-established standards of practice—all distinct from critical reflection—have been subsumed under the rubric of critical thinking. In the nursing education literature, clinical reasoning and judgment are often conflated with critical thinking. The accrediting bodies and nursing scholars have included decisionmaking and action-oriented, practical, ethical, and clinical reasoning in the rubric of critical reflection and thinking. One might say that this harmless semantic confusion is corrected by actual practices, except that students need to understand the distinctions between critical reflection and clinical reasoning, and they need to learn to discern when each is better suited, just as students need to also engage in applying standards, evidence-based practices, and creative thinking.

The growing body of research, patient acuity, and complexity of care demand higher-order thinking skills. Critical thinking involves the application of knowledge and experience to identify patient problems and to direct clinical judgments and actions that result in positive patient outcomes. These skills can be cultivated by educators who display the virtues of critical thinking, including independence of thought, intellectual curiosity, courage, humility, empathy, integrity, perseverance, and fair-mindedness.[9]

The process of critical thinking is stimulated by integrating the essential knowledge, experiences, and clinical reasoning that support professional practice. The emerging paradigm for clinical thinking and cognition is that it is social and dialogical rather than monological and individual.[10–12] Clinicians pool their wisdom and multiple perspectives, yet some clinical knowledge can be demonstrated only in the situation (e.g., how to suction an extremely fragile patient whose oxygen saturations sink too low). Early warnings of problematic situations are made possible by clinicians comparing their observations to that of other providers. Clinicians form practice communities that create styles of practice, including ways of doing things, communication styles and mechanisms, and shared expectations about performance and expertise of team members.

By holding up critical thinking as a large umbrella for different modes of thinking, students can easily misconstrue the logic and purposes of different modes of thinking. Clinicians and scientists alike need multiple thinking strategies, such as critical thinking, clinical judgment, diagnostic reasoning, deliberative rationality, scientific reasoning, dialogue, argument, creative thinking, and so on. In particular, clinicians need forethought and an ongoing grasp of a patient's health status and care needs trajectory, which requires an assessment of their own clarity and understanding of the situation at hand, critical reflection, critical reasoning, and clinical judgment.

Critical Reflection, Critical Reasoning, and Judgment

Critical reflection requires that the thinker examine the underlying assumptions and radically question or doubt the validity of arguments, assertions, and even facts of the case. Critical reflective skills are essential for clinicians; however, these skills are not sufficient for the clinician who must decide how to act in particular situations and avoid patient injury. For example, in everyday practice, clinicians cannot afford to critically reflect on the well-established tenets of "normal" or "typical" human circulatory systems when trying to figure out a particular patient's alterations from that typical, well-grounded understanding that has existed since Harvey's work in 1628.[13] Yet critical reflection can generate new scientifically based ideas. For example, there is a lack of adequate research on the differences between women's and men's circulatory systems and the typical pathophysiology related to heart attacks. Available research is based upon multiple, taken-for-granted starting points about the general nature of the circulatory system. As such, critical reflection may not provide what is needed for a clinician to act in a situation. This idea can be considered reasonable since critical reflective thinking is not sufficient for good clinical reasoning and judgment. The clinician's development of skillful critical reflection depends upon being taught what to pay attention to, and thus gaining a sense of salience that informs the powers of perceptual grasp. The powers of noticing or perceptual grasp depend upon noticing what is salient and the capacity to respond to the situation.

Critical reflection is a crucial professional skill, but it is not the only reasoning skill or logic clinicians require. The ability to think critically uses reflection, induction, deduction, analysis, challenging assumptions, and evaluation of data and information to guide decisionmaking.[9, 14, 15] Critical reasoning is a process whereby knowledge and experience are applied in considering multiple possibilities to achieve the desired goals,[16] while considering the patient's situation.[14] It is a process where both inductive and deductive cognitive skills are used.[17] Sometimes clinical reasoning is presented as a form of evaluating scientific knowledge, sometimes even as a form of scientific reasoning. Critical thinking is inherent in making sound clinical reasoning.[18]

An essential point of tension and confusion exists in practice traditions such as nursing and medicine when clinical reasoning and critical reflection become entangled, because the clinician must have some established bases that are not questioned when engaging in clinical decisions and actions, such as standing orders. The clinician must act in the particular situation and time with the best clinical and scientific knowledge available. The clinician cannot afford to indulge in either ritualistic unexamined knowledge or diagnostic or therapeutic nihilism caused by radical doubt, as in critical reflection, because they must find an intelligent and effective way to think and act in particular clinical situations. Critical reflection skills are essential to assist practitioners to rethink outmoded or even wrong-headed approaches to health care, health promotion, and prevention of illness and complications, especially when new evidence is available. Breakdowns in practice, high failure rates in particular therapies, new diseases, new scientific discoveries, and societal changes call for critical reflection about past assumptions and no-longer-tenable beliefs.

Clinical reasoning stands out as a situated, practice-based form of reasoning that requires a background of scientific and technological research-based knowledge about general cases, more so than any particular instance. It also requires practical ability to discern the relevance of the evidence behind general scientific and technical knowledge and how it applies to a particular patient. In dong so, the clinician considers the patient's particular clinical trajectory, their concerns and preferences, and their particular vulnerabilities (e.g., having multiple comorbidities) and sensitivities to care interventions (e.g., known drug allergies, other conflicting comorbid conditions, incompatible therapies, and past responses to therapies) when forming clinical decisions or conclusions.

Situated in a practice setting, clinical reasoning occurs within social relationships or situations involving patient, family, community, and a team of health care providers. The expert clinician situates themselves within a nexus of relationships, with concerns that are bounded by the situation. Expert clinical reasoning is socially engaged with the relationships and concerns of those who are affected by the caregiving situation, and when certain circumstances are present, the adverse event. Halpern[19] has called excellent clinical ethical reasoning "emotional reasoning" in that the clinicians have emotional access to the patient/family concerns and their understanding of the particular care needs. Expert clinicians also seek an optimal perceptual grasp, one based on understanding and as undistorted as possible, based on an attuned emotional engagement and expert clinical knowledge.[19, 20]

Clergy educators[21] and nursing and medical educators have begun to recognize the wisdom of broadening their narrow vision of rationality beyond simple rational calculation (exemplified by cost-benefit analysis) to reconsider the need for character development—including emotional engagement, perception, habits of thought, and skill acquisition—as essential to the development of expert clinical reasoning, judgment, and action.[10, 22–24] Practitioners of engineering, law, medicine, and nursing, like the clergy, have to develop a place to stand in their discipline's tradition of knowledge and science in order to recognize and evaluate salient evidence in the moment. Diagnostic confusion and disciplinary nihilism are both threats to the clinician's ability to act in particular situations. However, the practice and practitioners will not be self-improving and vital if they cannot engage in critical reflection on what is not of value, what is outmoded, and what does not work. As evidence evolves and expands, so too must clinical thought.

Clinical judgment requires clinical reasoning across time about the particular, and because of the relevance of this immediate historical unfolding, clinical reasoning can be very different from the scientific reasoning used to formulate, conduct, and assess clinical experiments. While

scientific reasoning is also socially embedded in a nexus of social relationships and concerns, the goal of detached, critical objectivity used to conduct scientific experiments minimizes the interactive influence of the research on the experiment once it has begun. Scientific research in the natural and clinical sciences typically uses formal criteria to develop "yes" and "no" judgments at prespecified times. The scientist is always situated in past and immediate scientific history, preferring to evaluate static and predetermined points in time (e.g., snapshot reasoning), in contrast to a clinician who must always reason about transitions over time.[25, 26]

Techne and Phronesis

Distinctions between the mere scientific making of things and practice was first explored by Aristotle as distinctions between techne and phronesis.[27] Learning to be a good practitioner requires developing the requisite moral imagination for good practice. If, for example, patients exercise their rights and refuse treatments, practitioners are required to have the moral imagination to understand the probable basis for the patient's refusal. For example, was the refusal based upon catastrophic thinking, unrealistic fears, misunderstanding, or even clinical depression?

Techne, as defined by Aristotle, encompasses the notion of formation of character and habitus[28] as embodied beings. In Aristotle's terms, techne refers to the making of things or producing outcomes.[11] Joseph Dunne defines techne as "the activity of producing outcomes," and it "is governed by a means-ends rationality where the *maker or producer* governs the thing or outcomes produced or made through gaining mastery over the means of producing the outcomes, to the point of being able to separate means and ends"[11] (p. 54). While some aspects of medical and nursing practice fall into the category of techne, much of nursing and medical practice falls outside means-ends rationality and must be governed by concern for doing good or what is best for the patient in particular circumstances, where being in a relationship and discerning particular human concerns at stake guide action.

Phronesis, in contrast to techne, includes reasoning about the particular, across time, through changes or transitions in the patient's and/or the clinician's understanding. As noted by Dunne, phronesis is "characterized at least as much by a perceptiveness with regard to concrete particulars as by a knowledge of universal principles"[11] (p. 273). This type of practical reasoning often takes the form of puzzle solving or the evaluation of immediate past "hot" history of the patient's situation. Such a particular clinical situation is necessarily particular, even though many commonalities and similarities with other disease syndromes can be recognized through signs and symptoms and laboratory tests.[11, 29, 30] Pointing to knowledge embedded in a practice makes no claim for infallibility or "correctness." Individual practitioners can be mistaken in their judgments because practices such as medicine and nursing are inherently underdetermined.[31]

While phronetic knowledge must remain open to correction and improvement, real events, and consequences, it cannot consistently transcend the institutional setting's capacities and supports for good practice. Phronesis is also dependent on ongoing experiential learning of the practitioner, where knowledge is refined, corrected, or refuted. The Western tradition, with the notable exception of Aristotle, valued knowledge that could be made universal and devalued practical know-how and experiential learning. Descartes codified this preference for formal logic and rational calculation.

Aristotle recognized that when knowledge is underdetermined, changeable, and particular, it cannot be turned into the universal or standardized. It must be perceived, discerned, and judged, all of which require experiential learning. In nursing and medicine, perceptual acuity in physical

assessment and clinical judgment (i.e., reasoning across time about changes in the particular patient or the clinician's understanding of the patient's condition) fall into the Greek Aristotelian category of phronesis. Dewey[32] sought to rescue knowledge gained by practical activity in the world. He identified three flaws in the understanding of experience in Greek philosophy: (1) empirical knowing is the opposite of experience with science; (2) practice is reduced to techne or the application of rational thought or technique; and (3) action and skilled know-how are considered temporary and capricious as compared to reason, which the Greeks considered as ultimate reality.

In practice, nursing and medicine require both techne and phronesis. The clinician standardizes and routinizes what can be standardized and routinized, as exemplified by standardized blood pressure measurements, diagnoses, and even charting about the patient's condition and treatment.[27] Procedural and scientific knowledge can often be formalized and standardized (e.g., practice guidelines), or at least made explicit and certain in practice, except for the necessary timing and adjustments made for particular patients.[11, 22]

Rational calculations available to techne—population trends and statistics, algorithms—are created as decision support structures and can improve accuracy when used as a stance of inquiry in making clinical judgments about particular patients. Aggregated evidence from clinical trials and ongoing working knowledge of pathophysiology, biochemistry, and genomics are essential. In addition, the skills of phronesis (clinical judgment that reasons across time, taking into account the transitions of the particular patient/family/community and transitions in the clinician's understanding of the clinical situation) will be required for nursing, medicine, or any helping profession.

Thinking Critically

Being able to think critically enables nurses to meet the needs of patients within their context and considering their preferences; meet the needs of patients within the context of uncertainty; consider alternatives, resulting in higher-quality care;[33] and think reflectively, rather than simply accepting statements and performing tasks without significant understanding and evaluation.[34] Skillful practitioners can think critically because they have the following cognitive skills: information seeking, discriminating, analyzing, transforming knowledge, predicating, applying standards, and logical reasoning.[5] One's ability to think critically can be affected by age, length of education (e.g., an associate vs. a baccalaureate decree in nursing), and completion of philosophy or logic subjects.[35–37] The skillful practitioner can think critically because of having the following characteristics: motivation, perseverance, fair-mindedness, and deliberate and careful attention to thinking.[5, 9]

Thinking critically implies that one has a knowledge base from which to reason and the ability to analyze and evaluate evidence.[38] Knowledge can be manifest by the logic and rational implications of decisionmaking. Clinical decisionmaking is particularly influenced by interpersonal relationships with colleagues,[39] patient conditions, availability of resources,[40] knowledge, and experience.[41] Of these, experience has been shown to enhance nurses' abilities to make quick decisions[42] and fewer decision errors,[43] support the identification of salient cues, and foster the recognition and action on patterns of information.[44, 45]

Clinicians must develop the character and relational skills that enable them to perceive and understand their patient's needs and concerns. This requires accurate interpretation of patient data that is relevant to the specific patient and situation. In nursing, this formation of moral agency focuses on learning to be responsible in particular ways demanded by the practice, and to

pay attention and intelligently discern changes in patients' concerns and/or clinical condition that require action on the part of the nurse or other health care workers to avert potential compromises to quality care.

Formation of the clinician's character, skills, and habits are developed in schools and particular practice communities within a larger practice tradition. As Dunne notes,

> A practice is not just a surface on which one can display instant virtuosity. It grounds one in a tradition that has been formed through an elaborate development and that exists at any juncture only in the dispositions (slowly and perhaps painfully acquired) of its recognized practitioners. The question may of course be asked whether there are *any* such practices in the contemporary world, whether the wholesale encroachment of Technique has not obliterated them—and whether this is not the whole point of MacIntyre's recipe of withdrawal, as well as of the post-modern story of dispossession[11] (p. 378).

Clearly Dunne is engaging in critical reflection about the conditions for developing character, skills, and habits for skillful and ethical comportment of practitioners, as well as to act as moral agents for patients so that they and their families receive safe, effective, and compassionate care.

Professional socialization or professional values, while necessary, do not adequately address character and skill formation that transform the way the practitioner exists in his or her world, what the practitioner is capable of noticing and responding to, based upon well-established patterns of emotional responses, skills, dispositions to act, and the skills to respond, decide, and act.[46] The need for character and skill formation of the clinician is what makes a practice stand out from a mere technical, repetitious manufacturing process.[11, 30, 47]

In nursing and medicine, many have questioned whether current health care institutions are designed to promote or hinder enlightened, compassionate practice, or whether they have deteriorated into commercial institutional models that focus primarily on efficiency and profit. MacIntyre points out the links between the ongoing development and improvement of practice traditions and the institutions that house them:

> Lack of justice, lack of truthfulness, lack of courage, lack of the relevant intellectual virtues—these corrupt traditions, just as they do those institutions and practices which derive their life from the traditions of which they are the contemporary embodiments. To recognize this is of course also to recognize the existence of an additional virtue, one whose importance is perhaps most obvious when it is least present, the virtue of having an adequate sense of the traditions to which one belongs or which confront one. This virtue is not to be confused with any form of conservative antiquarianism; I am not praising those who choose the conventional conservative role of *laudator temporis acti.* It is rather the case that an adequate sense of tradition manifests itself in a grasp of those future possibilities which the past has made available to the present. Living traditions, just because they continue a not-yet-completed narrative, confront a future whose determinate and determinable character, so far as it possesses any, derives from the past[30] (p. 207).

It would be impossible to capture all the situated and distributed knowledge outside of actual practice situations and particular patients. Simulations are powerful as teaching tools to enable nurses' ability to think critically because they give students the opportunity to practice in a simplified environment. However, students can be limited in their inability to convey underdetermined situations where much of the information is based on perceptions of many

aspects of the patient and changes that have occurred over time. Simulations cannot have the sub-cultures formed in practice settings that set the social mood of trust, distrust, competency, limited resources, or other forms of situated possibilities.

Experience

One of the hallmark studies in nursing providing keen insight into understanding the influence of experience was a qualitative study of adult, pediatric, and neonatal intensive care unit (ICU) nurses, where the nurses were clustered into advanced beginner, intermediate, and expert level of practice categories. The advanced beginner (having up to 6 months of work experience) used procedures and protocols to determine which clinical actions were needed. When confronted with a complex patient situation, the advanced beginner felt their practice was unsafe because of a knowledge deficit or because of a knowledge application confusion. The transition from advanced beginners to competent practitioners began when they first had experience with actual clinical situations and could benefit from the knowledge gained from the mistakes of their colleagues. Competent nurses continuously questioned what they saw and heard, feeling an obligation to know more about clinical situations. In doing do, they moved from only using care plans and following the physicians' orders to analyzing and interpreting patient situations. Beyond that, the proficient nurse acknowledged the changing relevance of clinical situations requiring action beyond what was planned or anticipated. The proficient nurse learned to acknowledge the changing needs of patient care and situation, and could organize interventions "by the situation as it unfolds rather than by preset goals[48] (p. 24). Both competent and proficient nurses (that is, intermediate level of practice) had at least two years of ICU experience.[48] Finally, the expert nurse had a more fully developed grasp of a clinical situation, a sense of confidence in what is known about the situation, and could differentiate the precise clinical problem in little time.[48]

Expertise is acquired through professional experience and is indicative of a nurse who has moved beyond mere proficiency. As Gadamer[29] points out, experience involves a turning around of preconceived notions, preunderstandings, and extends or adds nuances to understanding. Dewey[49] notes that experience requires a prepared "creature" and an enriched environment. The opportunity to reflect and narrate one's experiential learning can clarify, extend, or even refute experiential learning.

Experiential learning requires time and nurturing, but time alone does not ensure experiential learning. Aristotle linked experiential learning to the development of character and moral sensitivities of a person learning a practice.[50] New nurses/new graduates have limited work experience and must experience continuing learning until they have reached an acceptable level of performance.[51] After that, further improvements are not predictable, and years of experience are an inadequate predictor of expertise.[52]

The most effective knower and developer of practical knowledge creates an ongoing dialogue and connection between lessons of the day and experiential learning over time. Gadamer, in a late life interview, highlighted the open-endedness and ongoing nature of experiential learning in the following interview response:

> Being experienced does not mean that one now knows something once and for all and becomes rigid in this knowledge; rather, one becomes more open to new experiences. A person who is experienced is undogmatic. Experience has the effect of freeing one to be open to new experience … In our experience we bring

> nothing to a close; we are constantly learning new things from our experience … this I call the interminability of all experience[32] (p. 403).

Practical endeavor, supported by scientific knowledge, requires experiential learning, the development of skilled know-how, and perceptual acuity in order to make the scientific knowledge relevant to the situation. Clinical perceptual and skilled know-how helps the practitioner discern when particular scientific findings might be relevant.[53]

Often experience and knowledge, confirmed by experimentation, are treated as oppositions, an either-or choice. However, in practice it is readily acknowledged that experiential knowledge fuels scientific investigation, and scientific investigation fuels further experiential learning. Experiential learning from particular clinical cases can help the clinician recognize future similar cases and fuel new scientific questions and study. For example, less experienced nurses—and it could be argued experienced as well—can use nursing diagnoses practice guidelines as part of their professional advancement. Guidelines are used to reflect their interpretation of patients' needs, responses, and situation,[54] a process that requires critical thinking and decisionmaking.[55, 56] Using guidelines also reflects one's problem identification and problem-solving abilities.[56] Conversely, the ability to proficiently conduct a series of tasks without nursing diagnoses is the hallmark of expertise.[39, 57]

Experience precedes expertise. As expertise develops from experience and gaining knowledge and transitions to the proficiency stage, the nurses' thinking moves from steps and procedures (i.e., task-oriented care) toward "chunks" or patterns[39] (i.e., patient-specific care). In doing so, the nurse thinks reflectively, rather than merely accepting statements and performing procedures without significant understanding and evaluation.[34] Expert nurses do not rely on rules and logical thought processes in problem-solving and decisionmaking.[39] Instead, they use abstract principles, can see the situation as a complex whole, perceive situations comprehensively, and can be fully involved in the situation.[48] Expert nurses can perform high-level care without conscious awareness of the knowledge they are using,[39, 58] and they are able to provide that care with flexibility and speed. Through a combination of knowledge and skills gained from a range of theoretical and experiential sources, expert nurses also provide holistic care.[39] Thus, the best care comes from the combination of theoretical, tacit, and experiential knowledge.[59, 60]

Experts are thought to eventually develop the ability to intuitively know what to do and to quickly recognize critical aspects of the situation.[22] Some have proposed that expert nurses provide high-quality patient care,[61, 62] but that is not consistently documented—particularly in consideration of patient outcomes—and a full understanding between the differential impact of care rendered by an "expert" nurse is not fully understood. In fact, several studies have found that length of professional experience is often unrelated and even negatively related to performance measures and outcomes.[63, 64]

In a review of the literature on expertise in nursing, Ericsson and colleagues[65] found that focusing on challenging, less-frequent situations would reveal individual performance differences on tasks that require speed and flexibility, such as that experienced during a code or an adverse event. Superior performance was associated with extensive training and immediate feedback about outcomes, which can be obtained through continual training, simulation, and processes such as root-cause analysis following an adverse event. Therefore, efforts to improve performance benefited from continual monitoring, planning, and retrospective evaluation. Even then, the nurse's ability to perform as an expert is dependent upon their ability to use intuition or insights gained through interactions with patients.[39]

Intuition and Perception

Intuition is the instant understanding of knowledge without evidence of sensible thought.[66] According to Young,[67] intuition in clinical practice is a process whereby the nurse recognizes something about a patient that is difficult to verbalize. Intuition is characterized by factual knowledge, "immediate possession of knowledge, and knowledge independent of the linear reasoning process"[68] (p. 23). When intuition is used, one filters information initially triggered by the imagination, leading to the integration of all knowledge and information to problem solve.[69] Clinicians use their interactions with patients and intuition, drawing on tacit or experiential knowledge,[70, 71] to apply the correct knowledge to make the correct decisions to address patient needs. Yet there is a "conflated belief in the nurses' ability to know what is best for the patient"[72] (p. 251) because the nurses' and patients' identification of the patients' needs can vary.[73]

A review of research and rhetoric involving intuition by King and Appleton[62] found that all nurses, including students, used intuition (i.e., gut feelings). They found evidence, predominately in critical care units, that intuition was triggered in response to knowledge and as a trigger for action and/or reflection with a direct bearing on the analytical process involved in patient care. The challenge for nurses was that rigid adherence to checklists, guidelines, and standardized documentation,[62] ignored the benefits of intuition. This view was furthered by Rew and Barrow[68, 74] in their reviews of the literature, where they found that intuition was imperative to complex decisionmaking,[68] difficult to measure and assess in a quantitative manner, and was not linked to physiologic measures.[74]

Intuition is a way of explaining professional expertise.[75] Expert nurses rely on their intuitive judgment that has been developed over time.[39, 76] Intuition is an informal, nonanalytically based, unstructured, deliberate calculation that facilitates problem solving,[77] a process of arriving at salient conclusions based on relatively small amounts of knowledge and/or information.[78] Experts can have rapid insight into a situation by using intuition to recognize patterns and similarities, achieve commonsense understanding, and sense the salient information combined with deliberative rationality.[10] Intuitive recognition of similarities and commonalities between patients are often the first diagnostic clue or early warning, which must then be followed up with critical evaluation of evidence among the competing conditions. This situation calls for intuitive judgment that can distinguish "expert human judgment from the decisions" made by a novice[79] (p. 23).

Shaw[80] equates intuition with direct perception. Direct perception is dependent upon being able to detect complex patterns and relationships that one has learned through experience are important. Recognizing these patterns and relationships generally occurs rapidly and is complex, making it difficult to articulate or describe. Perceptual skills, like those of the expert nurse, are essential to recognizing current and changing clinical conditions. Perception requires attentiveness and the development of a sense of what is salient. Often in nursing and medicine, means and ends are fused, as is the case for a "good enough" birth experience and a peaceful death.

Applying Practice Evidence

Research continues to find that using evidence-based guidelines in practice, informed through research evidence, improves patients' outcomes.[81–83] Research-based guidelines are

intended to provide guidance for specific areas of health care delivery.[84] The clinician—both the novice and expert—is expected to use the best available evidence for the most efficacious therapies and interventions in particular instances, to ensure the highest-quality care, especially when deviations from the evidence-based norm may heighten risks to patient safety. Otherwise, if nursing and medicine were exact sciences, or consisted only of techne, then a 1:1 relationship could be established between results of aggregated evidence-based research and the best path for all patients.

Evaluating Evidence

Before research should be used in practice, it must be evaluated. There are many complexities and nuances in evaluating the research evidence for clinical practice. Evaluation of research behind evidence-based medicine requires critical thinking and good clinical judgment. Sometimes the research findings are mixed or even conflicting. As such, the validity, reliability, and generalizability of available research are fundamental to evaluating whether evidence can be applied in practice. To do so, clinicians must select the best scientific evidence relevant to particular patients—a complex process that involves intuition to apply the evidence. Critical thinking is required for evaluating the best available scientific evidence for the treatment and care of a particular patient.

Good clinical judgment is required to select the most relevant research evidence. The best clinical judgment, that is, reasoning across time about the particular patient through changes in the patient's concerns and condition and/or the clinician's understanding, are also required. This type of judgment requires clinicians to make careful observations and evaluations of the patient over time, as well as know the patient's concerns and social circumstances. To evolve to this level of judgment, additional education beyond clinical preparation if often required.

Sources of Evidence

Evidence that can be used in clinical practice has different sources and can be derived from research, patient's preferences, and work-related experience.[85, 86] Nurses have been found to obtain evidence from experienced colleagues believed to have clinical expertise and research-based knowledge[87] as well as other sources.

For many years now, randomized controlled trials (RCTs) have often been considered the best standard for evaluating clinical practice. Yet, unless the common threats to the validity (e.g., representativeness of the study population) and reliability (e.g., consistency in interventions and responses of study participants) of RCTs are addressed, the meaningfulness and generalizability of the study outcomes are very limited. Relevant patient populations may be excluded, such as women, children, minorities, the elderly, and patients with multiple chronic illnesses. The dropout rate of the trial may confound the results. And it is easier to get positive results published than it is to get negative results published. Thus, RCTs are generalizable (i.e., applicable) only to the population studied—which may not reflect the needs of the patient under the clinicians care. In instances such as these, clinicians need to also consider applied research using prospective or retrospective populations with case control to guide decisionmaking, yet this too requires critical thinking and good clinical judgment.

Another source of available evidence may come from the gold standard of aggregated systematic evaluation of clinical trial outcomes for the therapy and clinical condition in question, be generated by basic and clinical science relevant to the patient's particular pathophysiology or

care need situation, or stem from personal clinical experience. The clinician then takes all of the available evidence and considers the particular patient's known clinical responses to past therapies, their clinical condition and history, the progression or stages of the patient's illness and recovery, and available resources.

In clinical practice, the particular is examined in relation to the established generalizations of science. With readily available summaries of scientific evidence (e.g., systematic reviews and practice guidelines) available to nurses and physicians, one might wonder whether deep background understanding is still advantageous. Might it not be expendable, since it is likely to be out of date given the current scientific evidence? But this assumption is a false opposition and false choice because without a deep background understanding, the clinician does not know how to best find and evaluate scientific evidence for the particular case in hand. The clinician's sense of salience in any given situation depends on past clinical experience and current scientific evidence.

Evidence-Based Practice

The concept of evidence-based practice is dependent upon synthesizing evidence from the variety of sources and applying it appropriately to the care needs of populations and individuals. This implies that evidence-based practice, indicative of expertise in practice, appropriately applies evidence to the specific situations and unique needs of patients.[88, 89] Unfortunately, even though providing evidence-based care is an essential component of health care quality, it is well known that evidence-based practices are not used consistently.

Conceptually, evidence used in practice advances clinical knowledge, and that knowledge supports independent clinical decisions in the best interest of the patient.[90, 91] Decisions must prudently consider the factors not necessarily addressed in the guideline, such as the patient's lifestyle, drug sensitivities and allergies, and comorbidities. Nurses who want to improve the quality and safety of care can do so though improving the consistency of data and information interpretation inherent in evidence-based practice.

Initially, before evidence-based practice can begin, there needs to be an accurate clinical judgment of patient responses and needs. In the course of providing care, with careful consideration of patient safety and quality care, clinicians must give attention to the patient's condition, their responses to health care interventions, and potential adverse reactions or events that could harm the patient. Nonetheless, there is wide variation in the ability of nurses to accurately interpret patient responses[92] and their risks.[93] Even though variance in interpretation is expected, nurses are obligated to continually improve their skills to ensure that patients receive quality care safely.[94] Patients are vulnerable to the actions and experience of their clinicians, which are inextricably linked to the quality of care patients have access to and subsequently receive.

The judgment of the patient's condition determines subsequent interventions and patient outcomes. Attaining accurate and consistent interpretations of patient data and information is difficult because each piece can have different meanings, and interpretations are influenced by previous experiences.[95] Nurses use knowledge from clinical experience[96, 97] and—although infrequently—research.[98–100]

Once a problem has been identified, using a process that utilizes critical thinking to recognize the problem, the clinician then searches for and evaluates the research evidence[101] and evaluates potential discrepancies. The process of using evidence in practice involves "a problem-solving approach that incorporates the best available scientific evidence, clinicians' expertise, and

patient's preferences and values"[102] (p. 28). Yet many nurses do not perceive that they have the education, tools, or resources to use evidence appropriately in practice.[103]

Reported barriers to using research in practice have included difficulty in understanding the applicability and the complexity of research findings, failure of researchers to put findings into the clinical context, lack of skills in how to use research in practice,[104, 105] amount of time required to access information and determine practice implications,[105–107] lack of organizational support to make changes and/or use in practice,[104, 97, 105, 107] and lack of confidence in one's ability to critically evaluate clinical evidence.[108]

When Evidence Is Missing

In many clinical situations, there may be no clear guidelines and few or even no relevant clinical trials to guide decisionmaking. In these cases, the latest basic science about cellular and genomic functioning may be the most relevant science, or by default, guestimation. Consequently, good patient care requires more than a straightforward, unequivocal application of scientific evidence. The clinician must be able to draw on a good understanding of basic sciences, as well as guidelines derived from aggregated data and information from research investigations.

Practical knowledge is shaped by one's practice discipline and the science and technology relevant to the situation at hand. But scientific, formal, discipline-specific knowledge are not sufficient for good clinical practice, whether the discipline be law, medicine, nursing, teaching, or social work. Practitioners still have to learn how to discern generalizable scientific knowledge, know how to use scientific knowledge in practical situations, discern what scientific evidence/knowledge is relevant, assess how the particular patient's situation differs from the general scientific understanding, and recognize the complexity of care delivery—a process that is complex, ongoing, and changing, as new evidence can overturn old.

Practice communities like individual practitioners may also be mistaken, as is illustrated by variability in practice styles and practice outcomes across hospitals and regions in the United States. This variability in practice is why practitioners must learn to critically evaluate their practice and continually improve their practice over time. The goal is to create a living self-improving tradition.

Within health care, students, scientists, and practitioners are challenged to learn and use different modes of thinking when they are conflated under one term or rubric, using the best-suited thinking strategies for taking into consideration the purposes and the ends of the reasoning. Learning to be an effective, safe nurse or physician requires not only technical expertise, but also the ability to form helping relationships and engage in practical ethical and clinical reasoning.[50] Good ethical comportment requires that both the clinician and the scientist take into account the notions of good inherent in clinical and scientific practices. The notions of good clinical practice must include the relevant significance and the human concerns involved in decisionmaking in particular situations, centered on clinical grasp and clinical forethought.

The Three Apprenticeships of Professional Education

We have much to learn in comparing the pedagogies of formation across the professions, such as is being done currently by the Carnegie Foundation for the Advancement of Teaching. The Carnegie Foundation's broad research program on the educational preparation of the profession focuses on three essential apprenticeships:

> To capture the full range of crucial dimensions in professional education, we developed the idea of a three-fold apprenticeship: (1) intellectual training to learn the academic knowledge base and the capacity to think in ways important to the profession; (2) a skill-based apprenticeship of practice; and (3) an apprenticeship to the ethical standards, social roles, and responsibilities of the profession, through which the novice is introduced to the meaning of an integrated practice of all dimensions of the profession, grounded in the profession's fundamental purposes.[109]

This framework has allowed the investigators to describe tensions and shortfalls as well as strengths of widespread teaching practices, especially at articulation points among these dimensions of professional training.

Research has demonstrated that these three apprenticeships are taught best when they are integrated so that the intellectual training includes skilled know-how, clinical judgment, and ethical comportment. In the study of nursing, exemplary classroom and clinical teachers were found who do integrate the three apprenticeships in all of their teaching, as exemplified by the following anonymous student's comments:

> With that as well, I enjoyed the class just because I do have clinical experience in my background and I enjoyed it because it took those practical applications and the knowledge from pathophysiology and pharmacology, and all the other classes, and it tied it into the actual aspects of like what is going to happen at work. For example, I work in the emergency room and question: Why am I doing this procedure for this particular patient? Beforehand, when I was just a tech and I wasn't going to school, I'd be doing it because I was told to be doing it—or I'd be doing CPR because, you know, the doc said, start CPR. I really enjoy the Care and Illness because now I know the process, the pathophysiological process of why I'm doing it and the clinical reasons of why they're making the decisions, and the prioritization that goes on behind it. I think that's the biggest point. Clinical experience is good, but not everybody has it. Yet when these students transition from school and clinicals to their job as a nurse, they will understand what's going on and why.

The three apprenticeships are equally relevant and intertwined. In the Carnegie *National Study of Nursing Education* and the companion study on medical education as well as in cross-professional comparisons, teaching that gives an integrated access to professional practice is being examined. Once the three apprenticeships are separated, it is difficult to reintegrate them. The investigators are encouraged by teaching strategies that integrate the latest scientific knowledge and relevant clinical evidence with clinical reasoning about particular patients in unfolding rather than static cases, while keeping the patient and family experience and concerns relevant to clinical concerns and reasoning.

Clinical judgment or phronesis is required to evaluate and integrate techne and scientific evidence.

Within nursing, professional practice is wise and effective usually to the extent that the professional creates relational and communication contexts where clients/patients can be open and trusting. Effectiveness depends upon mutual influence between patient and practitioner, student and learner. This is another way in which clinical knowledge is dialogical and socially distributed. The following articulation of practical reasoning in nursing illustrates the social,

dialogical nature of clinical reasoning and addresses the centrality of perception and understanding to good clinical reasoning, judgment and intervention.

Clinical Grasp*

Clinical grasp describes clinical inquiry in action. Clinical grasp begins with perception and includes problem identification and clinical judgment across time about the particular transitions of particular patients. Garrett Chan[20] described the clinician's attempt at finding an "optimal grasp" or vantage point of understanding. Four aspects of clinical grasp, which are described in the following paragraphs, include (1) making qualitative distinctions, (2) engaging in detective work, (3) recognizing changing relevance, and (4) developing clinical knowledge in specific patient populations.

Making Qualitative Distinctions

Qualitative distinctions refer to those distinctions that can be made only in a particular contextual or historical situation. The context and sequence of events are essential for making qualitative distinctions; therefore, the clinician must pay attention to transitions in the situation and judgment. Many qualitative distinctions can be made only by observing differences through touch, sound, or sight, such as the qualities of a wound, skin turgor, color, capillary refill, or the engagement and energy level of the patient. Another example is assessing whether the patient was more fatigued after ambulating to the bathroom or from lack of sleep. Likewise the quality of the clinician's touch is distinct as in offering reassurance, putting pressure on a bleeding wound, and so on.[110]

Engaging in Detective Work, Modus Operandi Thinking, and Clinical Puzzle Solving

Clinical situations are open ended and underdetermined. Modus operandi thinking keeps track of the particular patient, the way the illness unfolds, the meanings of the patient's responses as they have occurred in the particular time sequence. Modus operandi thinking requires keeping track of what has been tried and what has or has not worked with the patient. In this kind of reasoning-in-transition, gains and losses of understanding are noticed and adjustments in the problem approach are made.

We found that teachers in a medical surgical unit at the University of Washington deliberately teach their students to engage in "detective work." Students are given the daily clinical assignment of "sleuthing" for undetected drug incompatibilities, questionable drug dosages, and unnoticed signs and symptoms. For example, one student noted that an unusual dosage of a heart medication was being given to a patient who did not have heart disease. The student first asked her teacher about the unusually high dosage. The teacher, in turn, asked the

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* This section of the paper was condensed and paraphrased from Benner, Hooper-Kyriakidis, and Stannard.[23] Patricia Hooper-Kyriakidis wrote the section on clinical grasp, and Patricia Benner wrote the section on clinical forethought.

student whether she had asked the nurse or the patient about the dosage. Upon the student's questioning, the nurse did not know why the patient was receiving the high dosage and assumed the drug was for heart disease. The patient's staff nurse had not questioned the order. When the student asked the patient, the student found that the medication was being given for tremors and that the patient and the doctor had titrated the dosage for control of the tremors. This deliberate approach to teaching detective work, or modus operandi thinking, has characteristics of "critical reflection," but stays situated and engaged, ferreting out the immediate history and unfolding of events.

Recognizing Changing Clinical Relevance

The meanings of signs and symptoms are changed by sequencing and history. The patient's mental status, color, or pain level may continue to deteriorate or get better. The direction, implication, and consequences for the changes alter the relevance of the particular facts in the situation. The changing relevance entailed in a patient transitioning from primarily curative care to primarily palliative care is a dramatic example, where symptoms literally take on new meanings and require new treatments.

Developing Clinical Knowledge in Specific Patient Populations

Extensive experience with a specific patient population or patients with particular injuries or diseases allows the clinician to develop comparisons, distinctions, and nuanced differences within the population. The comparisons between many specific patients create a matrix of comparisons for clinicians, as well as a tacit, background set of expectations that create population- and patient-specific detective work if a patient does not meet the usual, predictable transitions in recovery. What is in the background and foreground of the clinician's attention shifts as predictable changes in the patient's condition occurs, such as is seen in recovering from heart surgery or progressing through the predictable stages of labor and delivery. Over time, the clinician develops a deep background understanding that allows for expert diagnostic and interventions skills.

Clinical Forethought

Clinical forethought is intertwined with clinical grasp, but it is much more deliberate and even routinized than clinical grasp. Clinical forethought is a pervasive habit of thought and action in nursing practice, and also in medicine, as clinicians think about disease and recovery trajectories and the implications of these changes for treatment. Clinical forethought plays a role in clinical grasp because it structures the practical logic of clinicians. At least four habits of thought and action are evident in what we are calling clinical forethought: (1) future think, (2) clinical forethought about specific patient populations, (3) anticipation of risks for particular patients, and (4) seeing the unexpected.

Future think. Future think is the broadest category of this logic of practice. Anticipating likely immediate futures helps the clinician make good plans and decisions about preparing the environment so that responding rapidly to changes in the patient is possible. Without a sense of salience about anticipated signs and symptoms and preparing the environment, essential clinical judgments and timely interventions would be impossible in the typically fast pace of acute and intensive patient care. Future think governs the style and content of the nurse's attentiveness to

the patient. Whether in a fast-paced care environment or a slower-paced rehabilitation setting, thinking and acting with anticipated futures guide clinical thinking and judgment. Future think captures the way judgment is suspended in a predictive net of anticipation and preparing oneself and the environment for a range of potential events.

Clinical forethought about specific diagnoses and injuries. This habit of thought and action is so second nature to the experienced nurse that the new or inexperienced nurse may have difficulty finding out about what seems to other colleagues as "obvious" preparation for particular patients and situations. Clinical forethought involves much local specific knowledge about who is a good resource and how to marshal support services and equipment for particular patients.

Examples of preparing for specific patient populations are pervasive, such as anticipating the need for a pacemaker during surgery and having the equipment assembled ready for use to save essential time. Another example includes forecasting an accident victim's potential injuries, and recognizing that intubation might be needed.

Anticipation of crises, risks, and vulnerabilities for particular patients. This aspect of clinical forethought is central to knowing the particular patient, family, or community. Nurses situate the patient's problems almost like a topography of possibilities. This vital clinical knowledge needs to be communicated to other caregivers and across care borders. Clinical teaching could be improved by enriching curricula with narrative examples from actual practice, and by helping students recognize commonly occurring clinical situations in the simulation and clinical setting. For example, if a patient is hemodynamically unstable, then managing life-sustaining physiologic functions will be a main orienting goal. If the patient is agitated and uncomfortable, then attending to comfort needs in relation to hemodynamics will be a priority. Providing comfort measures turns out to be a central background practice for making clinical judgments and contains within it much judgment and experiential learning.

When clinical teaching is too removed from typical contingencies and strong clinical situations in practice, students will lack practice in active thinking-in-action in ambiguous clinical situations. In the following example, an anonymous student recounted her experiences of meeting a patient:

> I was used to different equipment and didn't know how things went, didn't know their routine, really. You can explain all you want in class, this is how it's going to be, but when you get there … . Kim was my first instructor and my patient that she assigned me to—I walked into the room and he had every tube imaginable. And so I was a little overwhelmed. It's not necessarily even that he was that critical … . She asked what tubes here have you seen? Well, I know peripheral lines. You taught me PICC [peripherally inserted central catheter] lines, and we just had that, but I don't really feel comfortable doing it by myself, without you watching to make sure that I'm flushing it right and how to assess it. He had a chest tube and I had seen chest tubes, but never really knew the depth of what you had to assess and how you make sure that it's all kosher and whatever. So she went through the chest tube and explained, it's just bubbling a little bit and that's okay. The site, check the site. The site looked okay and that she'd say if it wasn't okay, this is what it might look like … . He had a feeding tube. I had done feeding tubes but that was like a long time ago in my LPN experiences schooling. So I hadn't really done too much with the feeding stuff either … . He had a [nasogastric] tube, and knew pretty much about that and I think at the time it was

> clamped. So there were no issues with the suction or whatever. He had a Foley catheter. He had a feeding tube, a chest tube. I can't even remember but there were a lot.

As noted earlier, a central characteristic of a practice discipline is that a self-improving practice requires ongoing experiential learning. One way nurse educators can enhance clinical inquiry is by increasing pedagogies of experiential learning. Current pedagogies for experiential learning in nursing include extensive preclinical study, care planning, and shared postclinical debriefings where students share their experiential learning with their classmates. Experiential learning requires open learning climates where students can discuss and examine transitions in understanding, including their false starts, or their misconceptions in actual clinical situations. Nursing educators typically develop open and interactive clinical learning communities, so that students seem committed to helping their classmates learn from their experiences that may have been difficult or even unsafe. One anonymous nurse educator described how students extend their experiential learning to their classmates during a postclinical conference:

> So for example, the patient had difficulty breathing and the student wanted to give the meds instead of addressing the difficulty of breathing. Well, while we were sharing information about their patients, what they did that day, I didn't tell the student to say this, but she said, 'I just want to tell you what I did today in clinical so you don't do the same thing, and here's what happened.' Everybody's listening very attentively and they were asking her some questions. But she shared that. She didn't have to. I didn't tell her, you must share that in postconference or anything like that, but she just went ahead and shared that, I guess, to reinforce what she had learned that day but also to benefit her fellow students in case that thing comes up with them.

The teacher's response to this student's honesty and generosity exemplifies her own approach to developing an open community of learning. Focusing *only* on performance and on "being correct" prevents learning from breakdown or error and can dampen students' curiosity and courage to learn experientially.

Seeing the unexpected. One of the keys to becoming an expert practitioner lies in how the person holds past experiential learning and background habitual skills and practices. This is a skill of foregrounding attention accurately and effectively in response to the nature of situational demands. Bourdieu[29] calls the recognition of the situation central to practical reasoning. If nothing is routinized as a habitual response pattern, then practitioners will not function effectively in emergencies. Unexpected occurrences may be overlooked. However, if expectations are held rigidly, then subtle changes from the usual will be missed, and habitual, rote responses will inappropriately rule. The clinician must be flexible in shifting between what is in background and foreground. This is accomplished by staying curious and open. The clinical "certainty" associated with perceptual grasp is distinct from the kind of "certainty" achievable in scientific experiments and through measurements. Recognition of similar or paradigmatic clinical situations is similar to "face recognition" or recognition of "family resemblances." This concept is subject to faulty memory, false associative memories, and mistaken identities; therefore, such perceptual grasp is the beginning of curiosity and inquiry and not the end. Assessment and validation are required. In rapidly moving clinical situations, perceptual grasp is the starting point for clarification, confirmation, and action. Having the clinician say out loud how he or she is understanding the situation gives an opportunity for confirmation and disconfirmation from other clinicians present.[111] The relationship between foreground and

background of attention needs to be fluid, so that missed expectations allow the nurse to *see* the unexpected. For example, when the background rhythm of a cardiac monitor changes, the nurse notices, and what had been background tacit awareness becomes the foreground of attention. A hallmark of expertise is the ability to notice the unexpected.[20] Background expectations of usual patient trajectories form with experience. Tacit expectations for patient trajectories form that enable the nurse to notice subtle failed expectations and pay attention to early signs of unexpected changes in the patient's condition. Clinical expectations gained from caring for similar patient populations form a tacit clinical forethought that enable the experienced clinician to notice missed expectations. Alterations from implicit or explicit expectations set the stage for experiential learning, depending on the openness of the learner.

Conclusion

Learning to provide safe and quality health care requires technical expertise, the ability to think critically, experience, and clinical judgment. The high-performance expectation of nurses is dependent upon the nurses' continual learning, professional accountability, independent and interdependent decisionmaking, and creative problem-solving abilities.

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