

Clinical Reasoning Strategies in Physical Therapy

Background and Purpose. Clinical reasoning remains a relatively under-researched subject in physical therapy. The purpose of this qualitative study was to examine the clinical reasoning of expert physical therapists in 3 different fields of physical therapy: orthopedic (manual) physical therapy, neurological physical therapy, and domiciliary care (home health) physical therapy. **Subjects.** The subjects were 6 peer-designated expert physical therapists (2 from each field) nominated by leaders within the Australian Physiotherapy Association and 6 other interviewed experts representing each of the same 3 fields. **Methods.** Guided by a grounded theory method, a multiple case study approach was used to study the clinical practice of the 6 physical therapists in the 3 fields. **Results.** A model of clinical reasoning in physical therapy characterized by the notion of “clinical reasoning strategies” is proposed by the authors. Within these clinical reasoning strategies, the application of different paradigms of knowledge and their interplay within reasoning is termed “dialectical reasoning.” **Discussion and Conclusion.** The findings of this study provide a potential clinical reasoning framework for the adoption of emerging models of impairment and disability in physical therapy. [Edwards I, Jones M, Carr J, et al. Clinical reasoning strategies in physical therapy. *Phys Ther.* 2004;84:312–335.]

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Clinical reasoning refers to the thinking and decision-making processes that are used in clinical practice. Higgs and Jones¹ have defined clinical reasoning as a process in which the therapist, interacting with the patient and others (such as family members or others providing care), helps patients structure meaning, goals, and health management strategies based on clinical data, patient choices, and professional judgment and knowledge. Over the last decade, clinical reasoning has come to prominence as a subject for study. This has occurred, in part, because of the skills expected of physical therapists and development of the profession in a changing health care climate that requires increasing accountability in decision making as part of the process of providing desirable outcomes.¹ Another reason for the rising importance of clinical reasoning is that independent and responsible decision making is now regarded as one of the characteristics of an autonomous profession.^{2,3} In addition to

these reasons to justify the importance of clinical reasoning, clinical reasoning is relevant because every physical therapist has to make a wide variety of decisions in his or her daily clinical practice. All clinicians, therefore, have an interest in improving their decision making. Reflecting on decision making is part of a sound clinical reasoning process and is an important source of learning in practice.¹

The Development of Clinical Reasoning in Physical Therapy

Early studies and models of clinical reasoning in physical therapy provided explanations of clinical reasoning that were similar to those of physicians and were mainly concerned with “diagnosis.”^{4–9} The common factor was support of the hypothetico-deductive model of reasoning. The hypothetico-deductive model remains the most enduring clinical reasoning model in medicine and was derived from a cognitive science perspective.¹⁰ In the

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hypothetico-deductive method, the clinicians attend to initial cues (information) from or about the patient. From these cues, tentative hypotheses are generated. This generation of hypotheses is followed by ongoing analysis of patient information in which further data are collected and interpreted. Continued hypothesis creation and evaluation take place as examination and management are continued and the various hypotheses are confirmed or negated.

The hypothetico-deductive reasoning model, although derived from cognitive science, has its roots in the empirico-analytical research paradigm.¹¹ The empirico-analytical research paradigm, which is also known as the scientific or positivist paradigm, holds that truth or reality (ie, knowledge) is objective and measurable, thereby utilizing observation and experiment to produce a result that, in turn, can be generalized and also leads to prediction. For example, randomized controlled trials are carried out within this paradigm of research. In clinical practice in physical therapy (as in medicine), hypothetico-deductive reasoning aims, within the limitations of available standards, to validate information or data acquired from the patient through measurement in a reliable fashion.

Other models of clinical reasoning from this same cognitive science (empirico-analytical) perspective have focused less on the processes and more on the organization and accessibility of knowledge stored in the clinician's memory. Examples of knowledge organization used in clinical reasoning include "illness scripts"¹¹ and "pattern recognition."^{12,13} In making use of illness scripts or pattern recognition, the clinician recognizes certain features of a case almost instantly, and this recognition leads to the use of other relevant information, including "if-then" rules of production, in the clinician's stored knowledge network.¹⁴ This form of reasoning moves from a set of specific observations toward a generalization and is known as "forward reasoning."¹² Forward reasoning contrasts with hypothetico-deductive reasoning where a person moves from a generalization (multiple hypotheses) toward a specific conclusion.¹⁴ Experts generally agree that both forms of this cognitively oriented reasoning are used at different times.^{10,15} Pattern recognition is faster and more efficient and is used by expert and experienced practitioners in their domain.¹⁴ Hypothetico-deductive reasoning is used by more inexperienced practitioners and by experts when faced with an unfamiliar problem or a more complex presentation.^{10,15} These 2 cognitively oriented methods taken together are often referred to as "diagnostic reasoning."^{4,5,16,17}

Clinical Reasoning Research Using Alternative Methods to Cognitive Science

Until the mid-1990s, the forms of clinical reasoning discussed were the main forms of reasoning described in the physical therapy literature. Researchers of expertise and clinical reasoning in physical therapy,^{18–20} nursing,^{21–26} and occupational therapy^{27–31} then began to consider alternative methods for studying the development of expertise and the nature of clinical reasoning. In each field, engagement with the patient and family, as compared with the emphasis on the initial diagnosis, in our opinion, led clinicians to ask different kinds of questions regarding the nature of patients' experiences of pain, illness, and disability. That is, many of the clinical tasks in these health care professions required an understanding of the person as well as the disease.^{25,27} This understanding raises a "world" for the patient that has both biomedical and lived experience. This polarity has been described in the medical, adult learning, and sociological literature.^{32–36}

Most of the clinical reasoning research carried out up to this point had been in the laboratory rather than at the actual site of practice.³⁷ Researching clinical practice from the site of clinical practice, by including the perspectives of clinicians and patients, would require a paradigm of research that could include many variables over most of which the researcher would have little control.^{38,39} In contrast to the empirico-analytical research paradigm, an interpretive research approach recognizes that truth or knowledge is related to meaning and the context in which it is produced and, therefore, concedes that in any given situation there may be multiple realities, truths, or perspectives.¹¹

The explanations of clinical reasoning emanating from this collective research in the interpretive paradigm in the health care professions are said, by their various proponents, to stand in contrast to hypothetico-deductive or diagnostic reasoning. One such example is narrative reasoning.²⁷ Narrative reasoning seeks to understand the unique lived experience of patients—a reasoning activity that could be termed "the construction of meaning." In patients' (or therapists' for that matter) telling of stories or narratives, there is a choice in which some elements are expressed, some elements are emphasized over others, and still other elements may not find expression.⁴⁰ For example, the particular "telling" of a story or history by patients represents their interpretation of events over time. Such interpretations (albeit not necessarily consciously constructed) may not be neutral in their effects on the teller.^{40,41} In the context of clinical practice in physical therapy, narrative reasoning concerns the understanding of patients' stories in order to gain insight into their experiences of disability or pain and their subsequent beliefs, feelings,

and health behaviors.^{27,40} This includes the patients' ability to make choices and learn new perspectives.³⁵ Patients' narratives, therefore, may provide insights for intervention and its outcomes.⁴¹ Narrative reasoning is distinguished from hypothetico-deductive reasoning in that "hypotheses" concerning patients' interpretations of their experiences are not validated by testing but by consensus between therapists and patients.²⁷

Influenced by the critical social theory of the German philosopher Habermas,³³ Mezirow³⁵ distinguished between different forms of learning: instrumental learning and action, and communicative learning and action. *Instrumental* learning and action (like hypothetico-deductive reasoning) has as its purpose the determination of cause-effect relationships, which lead to predictions about observable events that are either correct or incorrect. The aim of *communicative* learning and action, however, is not to establish cause-effect relationships but to increase insight and a common understanding of a situation through a mutual learning process between the therapist and the patient.

In communicative learning and action, the learner (either therapist or patient) when confronted by an unfamiliar experience or dilemma (eg, in a patient's case, ongoing pain, disability) becomes aware through critical reflection of the underlying assumptions or perspectives that he or she holds about particular situations (eg, past experience and beliefs concerning injury or physical therapy intervention).³⁵ The capacity to first understand the perspectives a person currently holds, then reflect on the adequacy of these perspectives, and finally adopt newer, more constructive or reliable perspectives is called "transformatory learning."³⁵

The Scope of Early Studies in Clinical Reasoning in Physical Therapy

Not only were the early studies of clinical reasoning in physical therapy more concerned with the diagnostic process, the majority of these studies were carried out in orthopedic settings.^{4,5,18,41-45} Physical therapist practice, however, occurs across a wide spectrum of health care and, as a profession, requires solving complex and poorly defined practice problems.³⁶ In an Australian setting alone, a person could consider the range of skills needed, to do rehabilitation among aboriginal people in remote areas, cardiothoracic physical therapy in an acute hospital, orthopedic (manual) physical therapy in a private practice, physical therapy for children with orthopedic problems, or physical therapy aimed at helping retrain motor skills in adults following a stroke. The breadth and variation in the skills required, as the demands of each area are considered, is vast.

Besides technical skills, cultural, social, and personal knowledge and understanding together with diagnostic, teaching, negotiating, listening, and counseling skills might all play a greater or lesser role in the clinical reasoning process. A different mix of clinical reasoning skills may be needed for therapists working in the same settings according to their own particular interests, beliefs, or clinical and life experiences. Perhaps the same therapists use different combinations of clinical reasoning skills at different times and occasions according to the particular patient or client and the context of care.

We believe there is a need, therefore, for identification of the range of clinical reasoning skills or strategies being utilized by experts in different aspects of physical therapy care. This process of identification, we contend, is important as the profession considers the variety and scope of its activities and seeks to answer questions such as, "How will physical therapy define itself and its role(s) in the community in an increasingly competitive health care market?" and "How can future practitioners be best educated and prepared to function in the various fields of health care in which physical therapists practice?"

The aim of our study was to examine the nature and scope of clinical reasoning and knowledge used by expert clinicians in 3 different fields of physical therapy: orthopedic (manual) physical therapy, neurological physical therapy, and domiciliary care (or home health) physical therapy. Our objective was to generate further theory concerning clinical reasoning in physical therapy. We also sought to develop a new model to explain the clinical reasoning already in use among physical therapist clinicians. Due to the large body of data generated by our study, we will concentrate on reporting the findings in terms of the nature, scope, and manifestation of the clinical reasoning skills of the therapists. We will refer only briefly as to how the knowledge for these skills is acquired.

Method

Design

The research approach we used follows that of Jensen et al.¹⁸ Using a grounded theory, case study approach within an interpretive research paradigm (explained in the "Method" section), Jensen and colleagues were the first researchers to systematically study the clinical work of physical therapists in order to differentiate novice practitioners from their expert counterparts. One of their early explanations (or conceptual frameworks) of the differences among orthopedic physical therapists in outpatient settings was that expert clinicians exhibited clinical qualities that differed from those of their novice counterparts. Jensen et al identified the following as

- A good deal of area-specific knowledge is demonstrated in their clinical work
 - They are able to recognize and identify a large variety of patient presentations in their work
 - They perform work skills and solve problems related to patient management in a generally fast and efficient manner
 - They develop a deep understanding of the complexities and ambiguities that may exist in a patient's case
 - They spend time, especially at the outset, analyzing and considering the wider dimensions and implications of a patient's problem(s)
 - They combine good self-monitoring skills with an ability to accurately prioritize intervention(s) to identified problems and adjust them as necessary
 - They have a depth of understanding of a clinical problem that includes the patient's view
- (adapted from Higgs and Jones¹)

Figure 1. Criteria of expertise.

1. What are your central skills in clinical practice?
2. How do you regard the activity of teaching in your practice?
3. What is your underlying philosophy of practice?
4. How do you think that you have grown as a therapist over the last 10 years?
5. Do you find that you remember or talk about some patients (from either recent or past treatments) in the form of stories?
6. What are the main factors, external to treatment, that affect your clinical practice?

Figure 2. Interview guide questions.

attribute dimensions that distinguish between master and novice clinicians: (1) ability to control the treatment environment, (2) wide use of patient illness and disease data in a context-rich evaluation, (3) focused verbal and nonverbal connection with the patient, (4) equal importance of teaching to hands-on care, and (5) confidence in predicting patient outcomes.

The grounded theory approach and case study work are both methods that seek to understand human behavior within a natural context and from the participants' point of view.^{38,39,46} The phenomenon studied is clinical decision making, and the context is the clinical practice in which this decision making takes place. Each of the 6 physical therapists in the primary sample, together with their clinical practices, constitutes a "case" for study.

Grounded theory is a field-based research technique that seeks to generate theory.⁴⁶ Although there is a debate among proponents of grounded theory concerning the level of preconceived theory with which a researcher enters the field, there is general support for the idea that theory that is generated from the data should be compared with or contrasted to existing theories (if they exist).⁴⁶⁻⁴⁸ An important feature of grounded theory, therefore, is the iterative relationship among data collection, data analysis, and review of the literature. This iterative process means that the findings of the study are progressive and represent the development of a series of conceptual frameworks (or interim explanations of the data). Each conceptual framework is the result of a continued refinement of data collection, data analysis, and reference to existing theories in various fields of relevant literature.

The 3 fields of orthopedic (manual) physical therapy, neurological physical therapy, and domiciliary care (home health) physical therapy were chosen for our study because they represent quite diverse areas of physical therapist practice from which we could investigate the formation of potentially different domains of knowledge and reasoning skills. The determination of the sample size of 6 primary informants (2 clinicians from each field) rested on Kluzel's argument that, "[t]he validity, meaningfulness and insights generated from qualitative inquiry have more to

do with the information richness of the cases selected and the observations/analytical capabilities of the research than the sample size."⁴⁹

The research panel (consisting of an orthopedic physical therapist who was the primary researcher; 3 other physical therapists with various expertise in qualitative research, adult learning, and teaching; and one other member, a lecturer in ethics) agreed that 6 cases would yield a large and sufficient amount of data. The 6 physical therapists were selected by a purposive⁵⁰ or critical case sampling method.⁴⁷

Australian Physiotherapy Association (APA) consultants are prominent physical therapists appointed to act as public spokespeople for the profession on account of

Table 1.Abridged Résumés of Participating Physical Therapists^a

	Years Since Graduation	Work Setting	Teaching Experience	Qualifications
Denise*	14	Domiciliary care/senior PT	Supervision of final-year students	BAppSc, MAppSc candidate
Danielle*	13	Domiciliary care/senior PT	Supervision of final-year students	BAppSc Grad Dip Health Counseling
Dianne	31	Community health center	Supervision of final-year students	Dip PT
Dorothy	30	Community health center	Supervision of final-year students	Dip PT
Neve*	33	Neurophysiotherapy/private practice principal	Clinical tutor–undergraduate course	Dip PT, Dip Psychosynthesis
Narelle*	12	Neurophysiotherapy/private practice principal	Clinical tutor–undergraduate course	BAppSc, MAppSc
Nancy	28	Associate professor	Lecturing, research	Dip PT, BA, PhD
Nicole	14	Senior lecturer	Lecturing, research	BAppSc, PhD
Michael*	22	Manipulative PT/principal private practice	Lecturer–postgraduate courses	Dip PT, Grad Dip Manip Ther, MAppSc (physio)
Monica*	15	Manipulative PT/principal private practice	Tutor postgraduate course in manipulative therapy	BAppSc, Grad Dip Manip Ther
Meredith	16	Manipulative PT/principal private practice	Tutor postgraduate course in manipulative therapy	BAppSc, Grad Dip Manip Ther
Marion	14	Manipulative PT/principal private practice	Tutor postgraduate course in manipulative therapy	BAppSc, MAppSc, PhD candidate

^a Asterisk denotes participant in primary sample. PT=physical therapist.**Table 2.**

Observed Number of Treatments and Hours Spent With Each Physical Therapist

	No. of Treatments	Hours Observed
Orthopedic (manual) therapist Michael	22	12
Orthopedic (manual) therapist Monica	19	15
Domiciliary care therapist Denise	6	14.5
Domiciliary care therapist Danielle	7	12
Neurological therapist Neve	12	13
Neurological therapist Narelle	13	13
Total	79	79.5

their current standing and expertise in their respective fields. The APA consultants for each field were contacted and asked to nominate, based on criteria of expertise (Fig. 1), a short list of physical therapists regarded by their peers as experts in their particular fields. Not all of the characteristics described in Figure 1, however, are operationally defined. The consultants were asked to nominate only physical therapists whom they felt possessed at least 5 of the 7 criteria. Two physical therapists from each list were selected at ran-

dom, and all therapists agreed to participate in the study. An information sheet was sent to each therapist before confirming his or her participation and signing consent forms. These 6 primary informants had clinical practice experience ranging from 13 to 33 years (Tab. 1). All therapists had current or past teaching experience and either held postgraduate qualifications or were engaged in formal postgraduate study.

In this article, the physical therapists are identified by pseudonyms, with the first letter of these pseudonyms also being the first letter of the field in which they work (eg, Neve is a neurological therapist). None of the therapists in this primary sample had formal training in clinical reasoning theory. Data collection commenced following approval of the study by the Human Research Ethics Committee of the University of South Australia.

Data Collection

Data collection took place, in the manner of grounded theory, in 3 “waves” over the course of approximately 1 year. The first data collection consisted of observation of treatment sessions and semistructured and unstructured interviews (see Fig. 2 for sample questions). Each physical therapist was “shadowed”⁵¹ over the course of 2 or 3 days of their usual work. The orthopedic and neurological physical therapists were all observed in the rooms of their private practices. The domiciliary care (home

health) physical therapists were observed during visits to the homes of their patients.

The treatment sessions and interviews were audiotaped to enable the researcher to focus on the more subtle exchanges (such as nonverbal interaction) between physical therapist and patient, while still permitting detailed analysis of the overall dialogue on later occasions. A microcassette recorder with a very small omnidirectional microphone was used. The cassette recorder was attached by Velcro* to the inside of a folder. Also within the folder was a notepad to write down field notes about nonverbal interactions, techniques, positions, or actions that the therapist (and the patient or caregiver) were engaged in and that would not have been obvious from listening to the audiotape itself. Such observations were recorded against the reading of the audiotape counter. This meant that when listening to the audiotapes later, there was a written commentary supplying both contextual information and a workable “index” to material on the audiotapes—an important factor for coding and the later construction of case studies. Seventy-nine treatment sessions were observed across the 3 fields (Tab. 2).

The second wave of data collection consisted of written material from each of the 6 physical therapists. The purpose of this data collection was to identify potential sources of knowledge (eg, mentors, clinical and life experiences) that may have influenced the therapists’ professional development in a manner expressed in their clinical practices. The need for these data had been identified by the research panel in the process of the initial coding and data analysis about 4 months after the first data collection period and was based on a preliminary identification of diverse sources of knowledge being used in practice. At that time, the therapists were asked to write down on a “timeline” those factors and people whom they considered important influences on their professional lives. The therapists were told that this was not meant to be a curriculum vitae but rather a personal reflection on those influences, which could include people and events outside the profession.

The third wave of data collection took the form of semistructured interviews with 6 other physical therapists (2 therapists from each of the same 3 fields) 12 months after the initial fieldwork. These therapists were a convenience sample⁵⁰ of expert therapists who were involved in teaching in one of the relevant 3 practice areas through the University of South Australia. The therapists were asked the same sample questions regarding issues of practice as those that the therapists in the primary sample were asked. Before this process started,

the 6 individual case studies had been written and sent to the relevant therapist in the primary sample for corroboration. The aim of this third wave of data collection were to see whether data in the form of responses and themes began to recur.⁵² The data from the second sample were incorporated in the composite case studies representing each field to provide further commentary or corroboration of the data from the primary sample. These data were clearly distinguished in the composite case studies from the data of the primary sample and also kept appropriately proportionate to the data from the primary sample. That is, data from this secondary sample were used to support data from the primary sample and not to provide the main evidence for theme identification or development within the case studies.

Data Analysis

Data analysis for a study such as ours can be considered having 4 stages: coding, individual case studies, composite case studies (cross-case analysis within settings), and comparative analysis (cross-case analysis across settings). The data reduction and analysis for the study was organized around a set of cognitive processes identified by Morse^{53(p27)}: (1) comprehending, (2) synthesizing, (3) theorizing, and (4) recontextualizing. *Comprehending* is the cognitive process in which the researcher in the field gains both insight and sensitivity concerning both the setting and the data. This process includes not only data collection but also the initial processes of coding. *Synthesizing* refers to the process of data reduction—a merging of stories, experiences, or cases to describe a typical pattern of behavior or response. *Theorizing* is a process whereby alternative explanations or models are considered. *Recontextualizing* refers to the process in which the emerging theory is considered in relation to other settings or groups. This process involves comparing findings with existing or established theory. In a grounded theory approach, these steps are repeated several times with each subsequent analysis of data.^{39,46}

A panel of 3 coders examined transcripts reflecting what occurred during treatments and interviews and coded them for clinical reasoning strategies, knowledge frameworks, and sources of knowledge. Ascertaining intercoder agreement was based on the method of Miles and Huberman,⁵⁴ and, as a result, we produced intercoder agreement among the 3 coders at over 90% for each of the 3 coding definitions.

The clinical reasoning strategy codes were developed by the panel based on Jensen and colleagues’ attribute dimensions¹⁸ and other described clinical reasoning methods used in health care such as narrative reasoning.²⁷ That is, alongside the existing descriptions of clinical reasoning used in fields such as nursing and occupational therapy, the attribute dimensions provided

* Velcro USA Inc, 406 Brown Ave, Manchester, NH 03103.

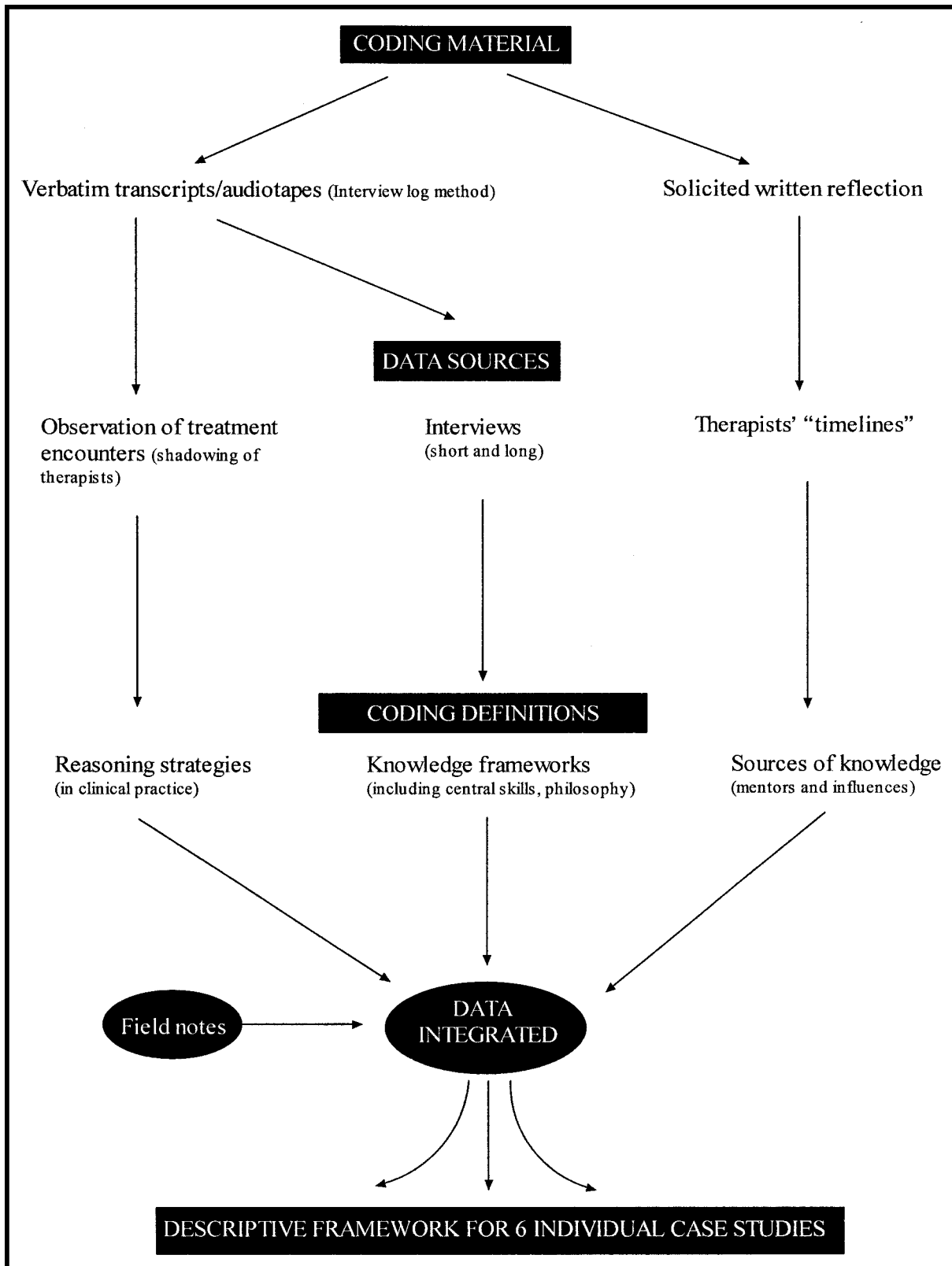


Figure 3. Overview of case study formation.

areas of clinical practice (eg, teaching, psychosocial focus, prognostic ability) among expert practitioners in which to examine foci of clinical reasoning.

The knowledge frameworks and sources of knowledge coding definitions were adapted from Jensen et al.^{19(p71)} The knowledge framework codes included physical therapists' content knowledge of their field or speciality, their knowledge of patients (including of human behavior), a knowledge of teaching, a knowledge of self (including evidence of reflective ability, confidence, and growth as a person and as a professional), and a knowledge of context (relating more to understanding the larger picture and the role of their work, the work environment, and the workings of the health care system). The sources of knowledge codes included perceived influences from mentors, patients, colleagues, friends and others, professional education (outside of that received during formal training), self-education, reading, life events (happenings in life outside practice that cause reflection on a clinician's own clinical work), and research in which the therapist had personally been engaged.

A typology of knowledge proposed by Higgs and Titchen,¹¹ which represents 3 types of knowledge used in clinical practice (propositional, professional, and personal), was later adopted as a conceptual framework to characterize the dimensions of knowledge described. *Propositional knowledge* refers to public or declarative knowledge in a particular field or part of the external world. *Professional knowledge* refers to forms of practice knowledge, often tacit or intuitive, that also reflect a practitioner's practical and technical expertise. *Personal knowledge* is experiential knowledge that comes about through the practitioner's reflection on experience (both work and non-work related) and helps form a practitioner's frame of reference or worldview with its particular values.

In our study, individual case studies describing the clinical practice of each therapist from the primary sample, particularly in terms of the scope of clinical reasoning, were constructed drawing on the data obtained through the observations, interviews, and timelines (Fig. 3). Impressions from the field notes were added to these data sources. Each case study was sent, on completion, to the respective therapist from the primary sample for his or her comments, a process known as "member checks."⁵² On follow-up, which was done via a telephone conversation, each therapist responded very positively to the question, "Was the case study a fair and accurate interpretation of their clinical work with its particular characteristics, emphases, and values?"

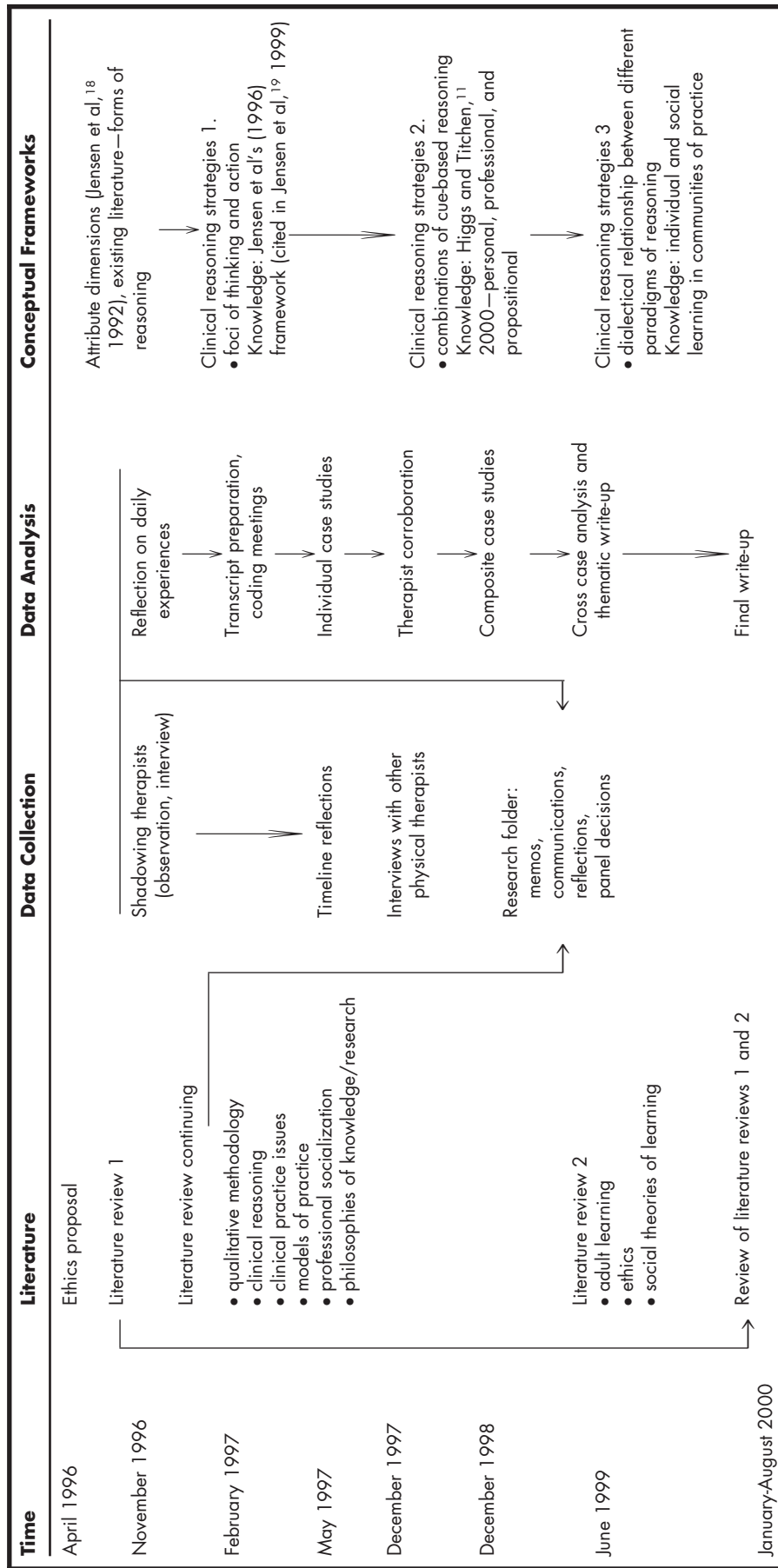
The process of case study analysis was done in the following sequence. Individual case studies for each area were combined with the coded material from the interviews of the secondary sample of physical therapist experts to form 3 composite case studies. From these composite case studies, cross-case analysis, first within settings and then across settings, was performed. Table 3 illustrates how conceptual frameworks (explanations building on previous understandings) were developed iteratively with this data collection and analysis process.

Ensuring Rigor

There is much debate concerning rigor in qualitative research.⁴⁷ In our study, a range of strategies were used to strengthen the integrity of the study's findings. One of these strategies, member checks,⁵⁴ has already been mentioned in relation to the primary sample. Other strategies used in the study include negative case analysis,^{39,54} an audit trail,⁵⁵ thick description,⁵⁶ and triangulation.⁵⁰

Negative case analysis occurs where incidences of data that deviate from the overall patterns of data are pursued as an opportunity to refine and review a conceptual framework under development. One example in our study was where the physical therapists expressed regret or failure. These feelings were pursued and explicated in the case studies. An *audit trail* is a record of decision making (either of the primary investigator or of the coding panel), of turning points in the research, of correspondence with various stakeholders, and of cognitive "road maps" summarizing researcher understanding of the project at different points. *Thick description* is an anthropological term⁵⁶ referring to an in-depth description of particular and multiple characteristics of a case (ie, a particular therapist's clinical practice) in order to induct the reader into an experience of the situation. This in-depth description reduces the chance that identified elements of observed treatment sessions or interview comments from informants are "taken out of context" to suit the purposes of the researcher. Examples of thick description are provided in the "Findings" section. *Triangulation* is an important tool used in an effort to ensure rigor and involves the use of several data sources, methodological approaches, multiple analysts, and the consideration of diverse theories to explain findings in order to reduce systematic bias in the data.^{50,54} In our study, the different data sources were observation, interview, and written reflection. There were positivistic methods (eg, coding reliability) juxtaposed with naturalistic methods (eg, thick description). Multiple analysts considered coding definitions and identified the resulting constructs from the data. Finally, multiple perspectives were considered: the constructed case studies, which were the interpretations of each therapist's clinical practice by the researchers, the corroboration of those case studies by each therapist in the primary

Table 3.
The Iterative Nature of Grounded Theory and Case Study Work



sample, together with the views of the second sample of therapists (incorporated in the composite case studies) were all compared with existing models of reasoning from the relevant literature.

Findings

We used 3 stages in the conceptualization of the clinical reasoning: (1) identification of different clinical reasoning strategies, (2) cue-based combining of reasoning strategies, and (3) interplay of reasoning strategies in different paradigms of knowledge leading to the final proposed model of clinical reasoning—dialectic reasoning.

First Conceptual Framework— Clinical Reasoning Strategies

Clinical reasoning strategies can be thought of as a way of thinking and taking action within clinical practice. A number of different reasoning strategies were evident within the expert case studies and identified as being common to the practice of all of the physical therapists across the 3 fields. We considered these strategies under the broad headings of “diagnosis” and “management”:

Diagnosis

- *Diagnostic reasoning* is the formation of a diagnosis related to physical disability and impairment with consideration of associated pain mechanisms, tissue pathology, and the broad scope of potential contributing factors.
- *Narrative reasoning* involves the apprehension and understanding of patients’ “stories,” illness experiences, meaning perspectives, contexts, beliefs, and cultures.

Management

- *Reasoning about procedure* is the decision making behind the determination and carrying out of treatment procedures.
- *Interactive reasoning* is the purposeful establishment and ongoing management of therapist-patient rapport.
- *Collaborative reasoning* is the nurturing of a consensual approach toward the interpretation of examination findings, the setting of goals and priorities, and the implementation and progression of intervention.
- *Reasoning about teaching* is thinking directed to the content, method, and amount of teaching in clinical practice, which is then assessed as to whether it has been effectively understood.
- *Predictive reasoning* is the active envisioning of future scenarios with patients, including the exploration of their choices and the implications of those choices.

- *Ethical reasoning* includes the apprehension of ethical and practical dilemmas that impinge on both the conduct of intervention and its desired goals, and the resultant action toward their resolution.

Second Conceptual Framework—Cue-Based Combining of Reasoning Strategies

In the second conceptual framework, we acknowledged the fluidity of clinical practice. Clinical practice was observed to consist of several dynamics or actions that either were happening at once or were closely juxtaposed to one another. In this conceptual framework, the clinical reasoning strategies were combinations of cue-based reasoning where there was interdependence among various strategies at any given time. That is, in agreement with Jensen et al,¹⁸ although these therapists had frameworks for information gathering and carrying out procedures, they did not follow a strict order of protocols in clinical practice. Instead, they attended to the cues provided by patients:

And I don’t always know when I start with them how I’m going to . . . you know . . . what path I’m going to take, if you see what I mean. I don’t have a recipe, but I tend to be triggered by what they say and then move them from there. (Neve, neurological therapist)

I tend to let the person guide the interview. And then, at the end, I think we haven’t covered shopping or we haven’t covered toileting or pressure care or whatever the gaps are. So I guess I have got that sort of internal list, and I work out what hasn’t been covered at the end. But I let the person take it for the first while. I’m not very good at sitting with someone with a form and saying “tick,” “tick,” “tick” down the form. It doesn’t work for me. (Denise, domiciliary care therapist)

I actually think their information is more important than your own sometimes because that’s the most powerful part of the relationship with them . . . and with subjectives [subjective examinations], I’ll never write them up afterwards because it’s just . . . it’s so much information you’re getting, and it’s such valuable stuff. (Michael, orthopedic [manual] therapist)

The following vignette illustrates how clinical reasoning strategies may be used in combination and is drawn from the field notes (and later discussion) of an observed treatment between manual therapist Michael and his patient *T*:

T has continued pain following discectomy 5 weeks previously. He reports that his leg symptoms have reduced by 50%. However, he is distressed by continued backache.

T’s distress, the way he walks in, the expression on his face, and his subdued manner provide initial cues that are recognizable features or patterns lodged in Michael’s clinical knowledge. Michael realizes that there are likely to be other contributing factors in *T*’s present pain experience

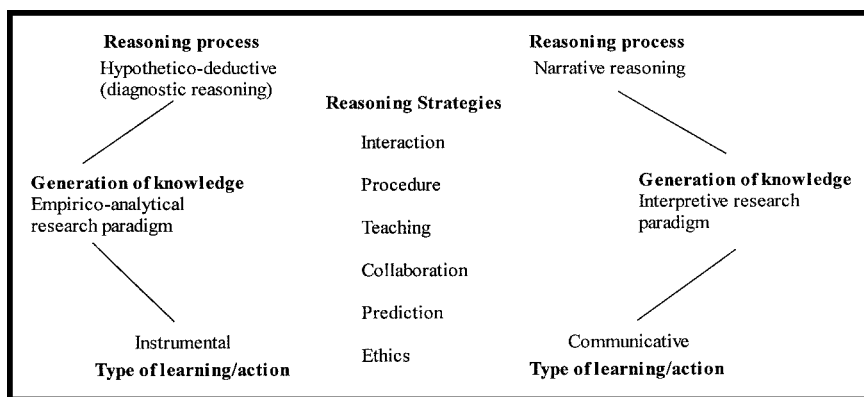


Figure 4. Summary of the relationship between knowledge and reasoning paradigms with clinical reasoning strategies.

apart from that emanating from the operated disk. What those factors are will need to be explored. Outside of diagnosis, hypothesis formulation and testing will be required in a number of areas. In the area of interaction alone, what will be the best way to gain *T*'s confidence?

Following assessment of symptom behavior, *T* undresses, and “ropes” of paraspinal muscle spasm are noted by Michael. A few minutes into the physical examination, *T*, himself, provides a cue that Michael immediately follows up: “When I take a deep breath, my pain is eased for a minute.” Michael asks *T* to demonstrate this, observes the action, and, in response, teaches him how to enhance the effect by contracting the transversus abdominis muscle.

What occurs now is the combined use of teaching and diagnostic reasoning; one informing the other. Having enhanced *T*'s own method of pain relief by transversus abdominis muscle contraction, Michael decides to teach him further about the relationship of the muscle behavior to his pain. He proceeds to carefully re-educate *T*'s lumbar spine movement in various positions by controlling and releasing the lumbar extensor muscles.

On reassessment of lumbar flexion movement, both patient and therapist agree that it is substantially better, although *T* is still tense and in pain. Thus, reasoning simultaneously in these 2 areas of diagnosis and teaching has strengthened the hypothesis that at least one contributing factor to *T*'s pain is an adverse and sustained tension in the lumbar extensor muscles.

Although 2 or more clinical reasoning strategies may be in operation concurrently and there may be overlap between the reasoning strategies (eg, interaction and collaboration), each clinical reasoning strategy requires an orientation of thinking and action, which is not wholly subsumed by the others.

Third Conceptual Framework—Interplay of Reasoning Strategies in Different Paradigms of Knowledge Generation

The third and final conceptual framework involves the dialectical nature of reasoning within the clinical reasoning strategies. A dialectic is a debate intended to reconcile a contradiction (in this case between fundamentally different processes of reasoning) without attempting to establish either view as intrinsically truer than the other.⁵⁷ The term “dialectical reasoning” was used in our study to describe an interplay between the different paradigms of knowledge and reasoning processes that are expressed in each of the vari-

ous clinical reasoning strategies (as exemplified in the data). This interplay is summarized in Figure 4.

The 2 research paradigms (as discussed in the introduction) generate knowledge from different assumptions about the nature of reality. Therefore, the clinical reasoning processes “diagnostic reasoning” and “narrative reasoning,” as described in clinical reasoning literature,^{10,16,26,29} are representative of these different paradigms of knowledge and reasoning. The clinical reasoning strategies of interaction, procedure, teaching, collaboration, prediction, and ethics represent foci of clinical decision making or action in areas of patient management that may be oriented in either paradigm at particular times within a clinical encounter.

The terms “narrative” and “communicative” and the terms “hypothetico-deductive” and “instrumental,” as applied to the reasoning strategies, may be considered synonymous. However, the terms “hypothetico-deductive” and “narrative,” in emanating from the clinical reasoning literature, have traditionally been applied to the process of “inquiry” or diagnosis in clinical practice.^{10,29} The terms “instrumental” and “communicative,” in emanating from the literature of adult learning, are here applied to a range of learning and action tasks and are therefore, we believe, more appropriately applied to the diversity of clinical management strategies. For example, assessment leading to identification of specific exercise needs would fall into the hypothetico-deductive inquiry framework whereby the specific instruction, correct execution, feedback, and ultimate learning of the exercise would be described as a form of instrumental management. Similarly, exploration of a patient’s perspectives regarding his or her problem, including the patient’s understanding (or beliefs and attributions), expectations, and coping, are examples of narrative inquiry where management directed toward facilitating reflection and consideration of alternative

perspectives (by patient and therapist) would constitute communicative management.

The data in our study took the form of dialogues regarding treatments and interviews, and the length of these dialogues (thick description) created constraints on presenting examples of instrumental and communicative approaches to each reasoning strategy by each therapist or even within each field. Due to the constraints of space, the reasoning strategies are not presented in equal detail. However, all of the reasoning strategies illustrate the dialectical nature of the physical therapists' reasoning and can be found in more detail online in the non-peer-reviewed doctoral dissertation on the research project.⁵⁸ Diagnostic and narrative reasoning, being well documented in the clinical reasoning literature and having been explained in the background section, will not be further dealt with here, although patient stories (or fragments of them) are included as examples in the reasoning strategies of interaction, teaching, and ethics.

The Clinical Reasoning Strategy—Interaction

There is no question that the physical therapists in our study often appeared to socialize or interact with their patients out of pure enjoyment. On the many occasions in which the therapists were observed to divulge about themselves, for example, sharing stories concerning their families, this was almost always a purposeful activity. Sometimes this was done to gain the confidence of the patient or facilitate the engagement of the patient in the treatment session. The use of humor for this purpose also was observed. Consider these first exchanges in an initial treatment session with Neve (neurological therapist) and her patient, who had entered the room nervously:

Neve: Are you working, M . . . ?

M: I work 2 days a week as an occasional registered nurse at St A . . . 's.

Neve: I've got a daughter who's just finishing nursing, and she's at Repat—the last day of her course. She told me they were going to give her a Betadine[†] bath to mark the occasion [joint laughter].

M: As long as she doesn't come home with a cast on her arm.

Neve: Now you saw Dr B . . . Did he give you a letter at all?

This kind of interaction was *instrumental* inasmuch as it was carried out to produce a particular effect. In this

case, it was to put a nervous patient at ease and expedite rapport. At other times, the instrumental nature of interaction was even more pronounced, with the interaction obviously controlled by the physical therapist and characterized by closed questions. For example, during some manual therapy techniques, patients were asked to respond only by stating numbers between 0 and 10. This quantitative expression of symptoms, which might last several minutes over the duration of the technique, was far removed from any narrative component. Here pain was metaphorically manipulated as a variable in the intervention that was carried out. In these cases, interaction was simply a measure gauging the success of techniques that were being carried out.

Interaction, however, could be quite *communicatively* (or narratively) focused. At such times, interaction was characterized by open-ended questions with the purpose of simply understanding or finding out more about a person's values, beliefs, or assumptions regarding his or her (or his or her partner's) illness or treatment. An example of this is found in domiciliary care therapist Danielle's visit to an elderly couple of Croatian origin. Mr G had terminal cancer. The visit had been very problem oriented, without any particular expression of how Mr G or his wife was feeling about the situation. Mr G's daughter had been present and acting as interpreter. Danielle, aware of the time and the day's other commitments, nevertheless, precipitated what was to follow with a simple question:

Danielle: Is there anything we haven't covered that you think we really need to?

Daughter: He [indicating her father] reckons the one thing he wants to know nobody wants to tell him: how long he's got to live!

Wife: I wouldn't want to know [pointing to her husband]. Never sick [in the past] . . . just cold . . . cough.

Daughter: She's actually terrified. She panics.

Danielle said nothing. It was not, however, a silence borne of awkwardness. There was a receptiveness in Danielle's attention that was not only comfortable with the momentary pause in conversation but then created the space and opportunity for the husband and wife to reflect with poignancy on their lives since coming to Australia. They spoke of the richness of their married life, describing their early years after immigration to South Australia, working long hours on their fruit block in the Riverland. This was the wonderful setting in which their children grew up. Husband and wife related what each was doing now. By the end (perhaps 10 minutes), Mrs G was able to give gentle expression to the tears that had been rising but held so far during the visit.

[†] The Purdue Frederick Company, One Stamford Forum, Stamford, CT 06901-3431.

The Clinical Reasoning Strategy—Procedure

By far the most commonly observed procedure across the 3 fields was the therapeutic use of movement. Movement, as a procedure, includes several subcategories: touch, handling, palpation, massage, mobilization, manipulation, stretching, and guided exercise. Various scenarios focusing on movement as a procedure were described in the case studies. Almost always the use of movement in intervention was a highly instrumental procedure (ie, techniques were selected and applied and their effects were measured and predicted through reassessment of range of motion and so forth). However, movement could also, at times, be a highly communicative action where handling, touch, and massage were used to convey therapist attitude or empathy (ie, meaning and intent) and were not assessed in any measurable way. Interviewed domiciliary care therapist Dianne expresses this idea:

My hands can actually do more than just about anything, and sometimes . . . most times they're more powerful than what you can say anyway . . . putting hands on someone can speak enormous amounts.

The following example was taken from field notes written while observing neurological therapist Narelle at work. Her patient, *N*, had a particularly aggressive form of multiple sclerosis. She was attending the treatment session with her caregiver and friend *H*. It was not long since *N* ceased being able to look after herself and was forced to go into a nursing home. She was not an old woman, yet she gave an impression of feeling it to be so. *N* was depressed and, understandably, experienced mood swings. Narelle, in the session, had been working on tightness in *N*'s foot. The treatment atmosphere had been loud (particularly on Narelle's part) and also action filled. At one point, Narelle was called to the telephone. While she was away (no more than 2 minutes), *N* began to cry. When Narelle returned, she got in very close, softened her voice, and cradled *N*'s left arm without speaking further for a short time. This was despite the fact that prior to the telephone call, she had been working on *N*'s foot. After a silent moment, *N* uttered, in response to Narelle's proximity rather than to any question: "God, it's heavy!" The session then slowly resumed its course.

The Clinical Reasoning Strategy—Teaching

Teaching was a ubiquitous activity in the practice of all of the physical therapists in our study. The scope of teaching included information provision, instruction, advice (including informal counseling), and explanation.

Examples of instrumental teaching were numerous. Domiciliary care therapist Denise taught Mr *H*, who had a stroke, how to get up and down off a chair independently. The maneuver—rising from a sitting position to

a standing position—required consideration of the possible contribution of several factors affecting its successful completion: Mr *H*'s position on the chair (buttocks forward), the position of his feet, the flexibility of his knees, the height of the chair, and the use of arms to push off. Denise addressed each factor, hypothetically confirming or negating the influence of each factor in Mr *H*'s inability to rise from the chair. The outcome of her intervention was measurable—what Mr *H* could not do initially, he could do now. Many other examples of exercise instruction were similar to this.

A very different form of teaching—communicative teaching—was observed when Neve (a neurological therapist) sought to provide a means by which *M*, a young mother with tension headaches, could become aware how teeth clenching could result from a number of different behaviors.

Neve: I had a guy who was a plasterer, and he had terrible headaches, and I said to him, "What do you notice happening?" . . . and he really didn't notice very much. But he asked the people whom he worked with, and he said, "Well, how do I look when I've got a headache?" and they said, "You smile all the time," and he realized he was clenching his teeth, trying to look like he wasn't in pain . . . but teeth clenching was really perpetuating the headaches. So it's not the whole story of headaches, but sometimes the teeth clenching can be a problem, especially if there is a lot to do and not a lot of time to do it in. Sometimes we get into the habit of just gritting our teeth and . . . keeping going when we're in pain. It's sort of a chicken and egg thing. I don't know what comes first, whether the teeth clenching comes first or the headache.

A strong theme in the earlier part of this initial session had been *M*'s poor coping mechanisms and unresolved conflict with other family members. Some of this conflict had derived from *M*'s inability to keep her house maintained to the standards that she would like. Having a 2-year-old son was not helping her in this endeavor and neither were the high expectations of her mother-in-law. The story that Neve told *M* regarding the plasterer with headaches appeared to have the aim of providing her with the insight that people sometimes may be unaware that their own responses, or coping behaviors can contribute to the production or perpetuation of symptoms. Thus, the plasterer, who in response to Neve's question, "What do you notice happening?" (when he had these headaches), asked his workmates what he looked like and was told that he "smiled all the time." The plasterer then realized that he was clenching his teeth, trying to look like he was not in pain, but in doing so was contributing to further headache symptoms.

Neve's purpose in telling this story had been to encourage *M* to reflect less on the "outcome" of her stressors and more toward her own responses to these stressors as

possible factors contributing to her headaches. This is a communicative form of teaching: What perspectives does *M* hold concerning her situation that are either unreliable or unhelpful?

The kind of communicative teaching used was accompanied in the same session by Neve's teaching *M*, in a more instrumental way, how to recognize increased tension in her temporalis and masseter muscles and to then be able to use relaxation techniques to decrease these factors. Thus, we considered both forms of teaching, the instrumental and the communicative, essential components of sound management of *M*'s headaches. We believe there is an intrinsic relationship between the instrumental and communicative forms of management for each of the reasoning strategies.

The Clinical Reasoning Strategy—Collaboration

Collaboration was observed to be about the meeting of perspectives: the therapist's with the patient's (or caregiver's). The nature of certain procedures precluded—apart from a more generalized consent or imprimatur—the therapist consulting the patient or asking his or her permission at every decision point. Collaboration at such times was necessarily instrumental. In instrumental forms of collaboration, the patient, through either an implicit or explicit negotiation with the therapist, was observed to place himself or herself (even if only for specific durations within a treatment session) in the hands of the expert practitioner. For example, the therapist would say, “Lift your arm” or “Push harder” and the patient either did or did not do it. Its effect was observable and, to this extent, empirical. Consider Narelle's (neurological therapist) work with her patient *J*, who had hemiplegia as a result of surgery to remove an aneurism:

Just try and drop that wrist down . . . slowly! Don't push down at your shoulder! Don't push down at your shoulder! Just relax it. Just think about rotating at the elbow.

and,

Lift those toes right up for me and let them down . . . and lift them up, right up . . . c'mon, c'mon . . . c'mon toes get moving . . . and drop down. And lift them up and drop. And lift them up. Alright?

Communicative approaches to collaboration were observed in all settings, but were particularly found in the domiciliary care (home health) setting. Danielle spoke positively of a power shift from therapist to patient:

The power difference is not the same as in the hospital. There's none of this, “Do this because I say so.” People say “no” to you more often in this setting than they ever would,

even in your rooms or as an outpatient in the hospital; definitely as an inpatient in the hospital. So it's good because there's no point in them saying, “Yes,” they'll do something if they're not going to.

A communicative approach to collaboration emphasizes the plurality of choices and the necessity of “means to ends” approaches to problem solving that relate to a person's values and beliefs. It is not only this transfer of meaning (ie, where the intentions of the therapist and the perspectives of the patient are communicated and mutually understood) but also the transfer of power (ie, the therapist's letting go of a professional “right” to be right in favor of the patient's assumption of a greater voice) that constitutes the move to a communicative approach to collaboration. The instrumental and communicative forms of collaboration are not being set against one another, and both could occur within a single treatment session.

The Clinical Reasoning Strategy—Prediction

Prediction as a task in clinical practice was found to vary among settings. Prediction included such decisions as when athletes could return to their sport or when injured workers could return to their jobs. Predictive reasoning also could be used to assess the potential benefit a person who had a stroke was likely to obtain from physical rehabilitation. However, predictive reasoning was at times required in quite a different way to answer more existential questions pondered by those with terminal disease, or recalcitrant neurological conditions, or chronic pain states who asked either implicitly or explicitly: “What does the future hold for me?” Such variations required quite different paradigms of reasoning. Again, both forms would frequently be identified within the one treatment scenario.

The Clinical Reasoning Strategy—Ethics

Ethical problems were seen to take various forms within the 3 fields. A major source of ethical dilemmas in clinical practice revolved around problems associated with resource allocation. These problems took different expressions according to setting. For example, in domiciliary care, these problems often involved access issues such as waiting lists and availability of equipment, whereas, in manual therapy, these problems took the form of determining adequate and fair treatment times and billing issues. Ethical dilemmas arose from complex situations within therapy encounters as the following example illustrates.

Neurological therapist Narelle works with *J*, who had hemiplegia and was introduced in the collaborative reasoning section. *J*'s husband, Bob, is in attendance. As Narelle works with *J* to alleviate stiffness and abnormal reflex activity in the lower limb, the conversation takes a turn, one that reaches a point of unexpected intensity. It

concerns a 17-year-old boy, known to both *J* and Narelle, and his experience after a subarachnoid hemorrhage 3 years previously. He now has severe cerebellar ataxia. The story provokes reflection by *J* on her own situation. It also leads to Narelle being confronted with an ethical dilemma. All this occurs as intervention continues (still monitored) on the foot.

J: Got a long way to go, and it's been 3 years . . . and him and his brother had tests to see if it's hereditary, and they said, "You've got no worries."

Narelle: Well, you can't tell.

J: No, you can't tell. It's an awful thing to happen.

Narelle: Well, my mum's father died of one, and my sister's had one, so . . . [with an ironic laugh] they do run in families unfortunately. [Narelle is currently doing intertarsal glides.]

Wheee! [as she provokes some increased tone from *J*'s big toe muscles]

J: Well, I've suffered from headaches since I was 16, well over 30 years, and I'm sure it must have been my aneurism.

Narelle: But the statistics, *J*, are that 1 in 4 of us have some kind of malformation to our brains because it's such an incredibly intricate structure.

J: But when it happens to you . . .

Narelle: But a lot of people never have problems, but just occasionally people will. There's not a lot you can do.

J: I never heard of it until it happened to me, and then everyone you speak to. . . I spoke to someone yesterday.

Bob: What gets me is that they know what the side effects are, but they still go ahead and do the operation.

Narelle: The side effects of the operation?

Bob: h-uh. . . They still go ahead and do the operation, they just chalk up: "Huh, there's another life I've saved."

J: Bob's a bit bitter about it.

Bob: Oh bitter? I'd cut the bastard's hands off if I could.

J: That's because I was told that I would have—might have—a minor stroke, and I don't think this is . . .

Bob: Might have a slight little bit of paralysis that'll only last a few weeks.

J: But I mean if I had the ultimatum, what do I do? Do I have the operation to cut the aneurism off?

Narelle: I don't know. I don't know about the history. I couldn't really comment.

J: Mmmm. Well, my aneurism was leaking, so I mean it needed to be done straightaway.

Narelle: It probably had to be done.

Bob: Because when I asked, what's his name, Dr Squirrel [a sarcastic nickname given by Bob], "What's the percentage that [in] these operations there's nothing goes wrong?" he said, "Zero, there's always something goes wrong."

J: We'll get there.

Narelle: Well, that's actually not completely true. My sister had an operation, and she's fine. Sometimes probably it's a bit more difficult to control, I don't know.

[addressing *J*] I'm really going to cut this toe off!

J: Yeah, you can if you like.

Narelle: Would you mind?

J: Nah!

Narelle has just had to pilot her way through a situation where, she needed to acknowledge *J*'s disappointment and Bob's burning anger toward the surgeon and surgical management of *J*'s aneurism. She also needed to express another perspective about outcomes in such cases. Working with neurologists and neurosurgeons on a regular basis, Narelle is aware of some of their realities. In *J*'s situation, Narelle decides not to make any definitive comments about whether or not she would have been better not to have had the surgery. She mildly corroborates *J*'s own statement that "it needed to be done straightaway." Interestingly, she does not "toe" any professional line as such, feeling content to contradict "Dr Squirrel's" alleged remark that "there's always something goes wrong" with the contrasting example of her own sister. Narelle apparently decides that there is nothing further she can add to the present conversation and returns the focus, through her "cutting off the big toe" remark, to the foot that is being mobilized.

The ethical reasoning that has taken place exhibits recognition of the particular faces (patterns) of patient or caregiver anger. Although not necessarily evoking ready-made or protocol-based solutions to such dilemmas, nevertheless some elements of Narelle's learned experience are brought into action at these times: the imperative to listen carefully to and take seriously the patient's or caregiver's feelings or complaints; the importance of determining perspective and the "completeness" of the story; and the knowledge that her response is not only sought by the patient or caregiver

but will generally be considered to carry weight, and so it must be a wise and responsible response that does justice to all parties. Narelle appears to act from these principles, and yet there is that self-revelation both at the beginning and near the end of the interaction that personalizes her perspective. Her response to Bob and J is not wholly based on a detached set of principles. Narelle is able to introduce an experiential component to her response with the introduction of her own sister's experience. She chooses to contradict the medical "defense." Narelle has been a witness in this situation to a narrative protesting the havoc of iatrogenesis (or medically induced harm to the patient). Such narratives, with their experiential truth and passion, compel re-examination of medical (and other health care practitioners') practices and precepts.⁵⁹

The dialectic nature of clinical reasoning continues, therefore, in ethical decision making. On the one hand, there is ethical decision making as the application of normative or professional rules and principles to particular situations in a deductive or instrumental manner. Patient autonomy, justice, and not doing harm to patients are examples of such principles.⁶⁰ On the other hand, there is a narrative (or communicative) approach to ethical decision making where the experiential and contextual elements of a given situation (or narrative) guide decisions and actions, in turn, providing perspectives on these broader rules or principles of right and wrong.⁶¹

Discussion

Previous clinical reasoning literature has proposed different reasoning processes for particular tasks in clinical practice (eg, procedural [ie, doing something to the patient] reasoning versus interactive [ie, knowing the patient] reasoning).^{26,28} We found that there was an interplay of different reasoning processes in every task of clinical practice, suggesting both a complexity and scope of clinical reasoning activity not previously understood.

Our findings support existing research^{19,20,26,28} concerning the attention given, and importance attributed, to the interaction between practitioners and their patients in a range of areas such as therapist-patient interaction, collaboration, teaching, and ethical practice. Unlike the seminal works in clinical reasoning in the allied health fields,^{19,26,29} however, our study leads to conclusions that do not seek so much to draw the contrast (and distance) between cognitively based, rational models of reasoning (eg, hypothetico-deduction) and interactive or meaning-based forms of reasoning (eg, the use of narrative). Rather, we contend that our conclusions concentrate on illustrating their intrinsic relationship in clinical practice.

The dialectical model of clinical reasoning arising from our study is depicted as reasoning that moves between those cognitive and decision-making processes required to optimally diagnose and manage patient presentations of physical disability and pain (hypothetico-deductive or instrumental reasoning and action) and those required to understand and engage with patients' (or caregivers') experience of that disability and pain (narrative or communicative reasoning and action). Hypothetico-deductive or instrumental reasoning and action involves physical therapists engaging in critical reflection of the underlying assumptions (ie, hypothesis testing) behind the content and process of their own decision-making and knowledge structures. Critical reflection in narrative or communicative reasoning and action, however, involves physical therapists endeavoring to understand the assumptions underlying patients' beliefs and decision making and to communicate their own assumptions to the patient. Following consensual validation of these assumptions with their patients, we propose that communicative management then also involves physical therapists fostering a process of critical reflection on the part of patients regarding the reliability and adequacy of those assumptions as exemplified by neurological physical therapist Neve's work with her patient *M* in facilitating an understanding of her tension headaches.

Dialectical reasoning, with its notions of instrumental and communicative management, fits well with recent models of health and disability such as the biopsychosocial model⁶² and the World Health Organization's (WHO) *International Classification of Functioning, Disability and Health*.⁶³ For example, in the WHO classification the functioning of an individual in a given setting is "an interaction or complex relationship between the health condition and contextual factors."^{62(p19)} There is, therefore, an interaction between *activity limitations* (difficulties an individual may have in executing activities) and *participation restrictions* (problems an individual may experience as a consequence of his or her involvement in life situations). It is recommended that health care practitioners "collect data on these constructs independently and thereafter explore associations and causal links between them."^{63(p19)} The clinical reasoning model proposed here offers physical therapist clinicians a framework to be able to explore (and act in) the dynamic interaction of activity limitations and participation restrictions.

Summary

We found that all of the observed physical therapists in each of the 3 settings used a range of clinical reasoning skills or strategies representing a diversity of thinking and actions in a variety of tasks and relating to many issues that exist in clinical practice. These skills or strategies range from the act of making a diagnosis

through management issues through ethical decision making. These therapists used these reasoning strategies in an interplay that was governed by particular patients' needs and their contexts.

The grounded theory underpinning this dialectical model represents the development of a series of conceptual frameworks describing clinical reasoning. In arriving at this model, the data concerning clinical reasoning strategies and therapists' use of knowledge has, in the manner of grounded theory, been repeatedly compared and reapplied to existing theories or literature in relevant areas such as clinical reasoning, paradigms and typologies of knowledge, and the more formal theories such as Habermas' "Critical Social Theory"³³ and Mezirow's "Transformatory Learning Theory."³⁵ Our model draws on these theories but in a manner that recontextualizes them in relation to the data of this study in particular and the scope of clinical reasoning in physical therapy in general.

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● Invited Commentaries

Edwards et al have offered us a valuable extension of the previous work on clinical reasoning in physical therapy. One of their most valuable contributions is to help differentiate the clinical reasoning of physical therapists from that of other health care professionals.

The most frequent mode of thinking described in the clinical reasoning literature is the hypothetico-deductive reasoning model, as is described by Edwards et al in their review of the literature. While the work that explicated this model most commonly explored physician decision making, this is a mode of thinking that feels familiar to any practitioner trained in diagnostic reasoning and can readily be used in teaching decision making to students and in improving decision making among clinicians in many different health care professions.

Understanding the hypothetico-deductive process, however, I believe does not necessarily help distinguish decision-making processes among various professions. Do physical therapists, occupational therapists, and physicians all approach decision making in the same way? Our clinical experience tells us that they do not.

In earlier work in physical therapy, Jensen et al¹ identified 4 themes that they contend contribute to a unified philosophy of practice in expert practitioners: knowledge, clinical reasoning, virtue, and movement. I believe that the descriptions of knowledge and virtue based on this work could be applied to practitioners in many health care occupations. For example, experts stressed the need to see the patient as the most important source of knowledge, and they emphasized the need to serve as advocates for patients, sometimes placing their own livelihoods at risk. In the other 2 areas, however, it is possible to see some issues that distinguish physical therapy practitioners from other types of practitioners. Physical therapist experts showed a preference for a collaborative mode of clinical reasoning that involved patients and families and that relied less on a diagnosis of pathology and more on identifying patient goals. The physical therapists whom Jensen et al studied also showed an exquisite sense of movement, both their own movement as an instrument of patient care and the patient's movement as a source of information and communication.

These attributes resonate with physical therapists, who I believe often speak of the differences in their view of patients and patient care as compared with members of other health care occupations. This new work by Edwards et al appears to validate the perception that there is a difference by demonstrating that expert phys-

ical therapists move between the 2 worlds of logical and intuitive reasoning as they work with patients. Edwards et al have also made a very important observation in their discussion of these dual modes of thinking related to the concept of a disablement model of understanding health and illness. The premise of defining health and disability through application of a biopsychosocial model has given physical therapists a means to articulate and explicate what I believe we have done with our patients since the outset of our profession. Models of health and disability that show a continuum from pathology through impairments to functional limitations and possible disability have given us the language to describe our care more precisely.²

The work by Edwards et al has given us the basis to fully explore clinical reasoning in the context of this language. There are many different paths this future work can take. For example: When a physical therapist progresses from novice to experienced to expert, does this ability to move between both modes of thinking develop? Can physical therapists describe the purposes of their interventions, distinguishing between reducing activity limitations and improving the ability of the patient to participate fully in life, or are these purposes so entwined as to be indistinguishable? What are the best ways to help students and clinicians gain necessary skills in the use and application of these 2 modes of thinking? What other differences distinguish physical therapists from other practitioners, especially as compared with other practitioners who move comfortably in the realm of health and disability, such as occupational therapists and speech pathologists? Are there ways to structure practice, for example, through recommended patterns of practice or documentation templates, to help physical therapists develop both modes of thinking of their clinical decision-making skills? I look forward to future research, both phenomenological and positivistic, that further explores this type of role between health and disability in the context of physical therapists' reasoning.

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The practice of health care professionals such as physical therapists is frequently described as consisting of both “art” and “science.” Optimally, these concepts are viewed as consonant and complementary in clinical practice. Yet among researchers, art and science often become dichotomized to the point of becoming adversarial. There can be little doubt of the preeminence afforded to the “science” of practice in 20th-century Western medicine. Research standards have been grounded in a positivist epistemology, seeking to discover the truth of the “best” intervention for patients with a particular disorder.¹ The emphasis within this paradigm has been on quantitative methods and deductive reasoning, with the researcher testing prespecified hypotheses under highly controlled conditions.

Qualitative research, such as the study by Edwards et al reported in this issue of the *Journal*, operates within a different paradigm. The principal aim of qualitative research shifts from attempting to uncover a single truth about the best management to acknowledging and understanding the influence of multiple perspectives on clinical care.² Qualitative research does not propose discrete hypotheses for testing, but instead utilizes inductive reasoning to generate theories about observed phenomena.³ Given the challenges presented by qualitative methods to the sacrosanct principles of the dominant quantitative research paradigm, it is not surprising that qualitative research has generally met with tepid acceptance by the broader scientific community.⁴

Recent emphasis on evidence-based medicine (EBM) would appear to afford an opportunity for greater integration of qualitative research findings into the professional knowledge base of health care professions such as physical therapy. The initial model of EBM proposed 3 overlapping and interconnected concerns that should inform clinical decision making; research evidence, patient preferences and values, and the expertise of the clinician.⁵ This model recognizes that clinical decisions are not made strictly on basis of data gleaned from quantitative research. Evidence-based medicine supports the necessity of understanding the interplay among patients, clinicians, and the evidence. Qualitative research methods certainly offer a means for such investigations. As EBM has evolved, however, the balance among patients, clinicians, and the evidence often seems lost. Critics of EBM regularly cite an excessive allegiance to the authority of evidence for the efficacy of various interventions, with little concern for the unique needs of individual patients or the complex interaction between individual patients and clinicians delivering care.^{6,7} Although not consistent with its philosophical underpinnings, there can be little doubt that the practical reality

of EBM is too frequently simplified down to reading the results of a systematic review or practice guideline, without concern for the applicability of the results to the unique situation presented by an individual patient.

The ultimate goal of EBM is to assist clinicians in making more effective decisions about individual patients.⁸ Edwards et al utilized qualitative research methods to examine clinical reasoning and knowledge used by clinicians identified as experts in 3 different fields of physical therapy. The authors found that these clinicians made decisions based on an interaction between rational, cognitively based reasoning and interactive, narrative reasoning. They labeled this clinical reasoning strategy as a dialectical model, indicating that the task of clinical decision making is to reconcile information obtained from both rational and interactive reasoning paradigms. This finding cautions against any attempt to reduce clinical decision making to a strictly cognitive process of applying statistics to patients without regard to the patients’ situation and concerns.

Although the overall findings generated by Edwards and colleagues are certainly consistent with the underlying principles of EBM, if the specific findings of this and other qualitative studies are to have an impact on the evidence base of the profession, then qualitative studies cannot become an end unto themselves.⁹ The distinctive characteristics that permit qualitative research to develop unique perspectives on clinical phenomena also make it unable to test the hypothesis that the theories it generates are “true” or “better” than competing theories. This is the domain of quantitative designs and deductive research methods. The “problem of induction,” a concern for the interpretation of all observational research, must be borne in mind when examining qualitative research. That is, without a control group of some kind, it is not possible to determine that what is observed is actually superior to some alternative. For example, bed rest for individuals with acute back pain appeared to be effective based on observations that most people who received this intervention recovered within a matter of weeks. It was not until controlled studies showed that even more individuals would recover when alternative interventions were used that bed rest was no longer recommended.¹⁰ Edwards et al, by selecting clinicians identified as “experts,” seem to presume that the dialectical model they have identified is a superior clinical reasoning model. Recent research¹¹ has questioned the traditional ways used by Edwards and colleagues to identify “expert” therapists. Perhaps another group of therapists would use alternative reasoning strategies that would result in better clinical outcomes.

Only a comparative study using quantitative methods could ultimately address this hypothesis.

The *Guide to Physical Therapist Practice*¹² makes it clear that end result of the entire clinical reasoning process is the patient/client outcome. Ultimately, this end must be borne in mind. The present study generates some interesting theories regarding the nature of the clinical reasoning process used by therapists presumed to be experts. It is unlikely that traditional quantitative research methods could have identified these theories. Further qualitative work on the topic of clinical reasoning, without doubt, will raise new or modified theories. Quantitative studies are needed along with this process of theory generation if the results of qualitative research are to begin to have an impact on the evidence base of the physical therapy profession.

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● Author Response

We are grateful to Fritz and Hack for providing these commentaries and for the opportunity to discuss the issues that arise from them.

We would like to address the question of what impact qualitative studies can have on the evidence base of the profession when used as “stand-alone” methods. In particular, we consider the “problem of induction,” as Fritz describes it, where without a control group it is not possible to determine whether what is observed (and its subsequent explanation) is actually superior to some alternative. We do not see inductive learning or problem solving as a “problem” even within a climate that demands that knowledge derived from research should provide better evidence for practice.

We believe it is worth reiterating, albeit briefly, that qualitative research does not pretend to determine absolute truths such as which hypothesis, explanation, or theory is right and which is wrong or which is more true or superior than another, at least not in an absolute sense. Does this mean that qualitative studies remain at the purely descriptive level, with little or no potential to actually have an impact on clinical practice? We do not think so. Were controlled studies really the only way or possible catalyst by which the regimen of bed rest for patients with acute pain could be replaced with a better alternative? We think not. Interestingly, the prescription of bed rest for acute back pain harks back, in our opinion, to an era where the importance of understanding and valuing the patient’s experience was perhaps less understood. Adherence to medical or therapist directives rather than collaborative decision making was the order of the day. It is quite possible that these patients could have informed us themselves, either through formal qualitative studies or through the processes of decision making in clinical practice (if we had at that time a framework for understanding and integrating these experiences as a source of clinical knowledge) of the anxieties, sense of helplessness, and deconditioning that they may have experienced lying in bed for weeks on end.

The most basic premise underlying qualitative research is that reality or truth is not singular or unchanging for all people at all times. Consider for example, a bright sunny day. This same reality is experienced differently by the person who is intending to spend the day at the beach and by the farmer perhaps 50 miles inland who is experiencing a drought. So too, our patients may experience aspects of a condition (eg, a fractured neck of femur) that are generalizable and experienced by others, but much else of what they experience will be unique and will be shaped by many personal and social

factors. We therefore argue that in evidence-based practice we do not move from one set of patient “directives” to another set of “directives” as one proven theory displaces another. Rather, we argue our mandate is to present the levels of evidence for particular courses of management in therapy and assist our patients to make decisions based on the choices available.

The further skill in collaborative decision making is to facilitate our patients’ ability to work through the implications of the various management options. There may be a strong preferred direction or even a particular treatment imperative based on evidence, but the overall sets of management strategies, in our view, will necessarily vary (perhaps considerably) according to the needs and context of the patient. Research on expertise¹⁻³ reminds us that experts do not have recipes, and they also tend to acknowledge that, in broad terms, there is often no one “right” path for a course of therapy to proceed. Theory generated from qualitative research, we believe, does not have to be right or best in an absolute manner in order for it to have an impact on clinical practice. Instead, its role is to bring to light the multiple realities of a particular experience, situation, or phenomenon.

Fritz, however, raises an important question regarding qualitative research. Stated another way, it is whether theories generated by qualitative research have necessarily to remain as localized sets of observations and conclusions. Do such theories remain tied to a specific situation or context without any kind of broader implication or applicability than the specific or unique situation from which they were derived? After all, there can be no doubt that such research is not either statistically generalizable or predictive.

The recent research, cited by Fritz, on identifying experts¹ provides an opportunity to further discuss the nature of theory in qualitative research. Both our study and that of Resnik and Jensen¹ are grounded theory studies, which build on previous grounded theory (that is, particular theory generated inductively from the data). Resnik and Jensen used retrospective analysis of outcome measures for the management of low back pain as a basis for identifying experts. This allowed for the possibility of “ordinary” therapists to be involved in the study and not just those of long experience and seniority. Apart from mentioning that our study, based on the research experience of others,^{2,3} did not use the traditional method (ie, choosing therapists based on years of experience) as our method for identifying experts, we believe it is worth noting that Resnik and Jensen¹ found that the experts they identified exhibited the same

multidimensional knowledge base and patient-centered values as those Jensen et al² found in their grounded theory work on the nature of expertise in physical therapy.

Our study, as Hack suggests, also supports many of Jensen and colleagues² findings such as the multidimensionality of the therapists' knowledge base, the pre-eminence of collaborative decision making in their clinical reasoning, and the centrality of movement not only "as an instrument of patient care" but "as a source of information and communication." The findings of our study and those of Resnik and Jensen¹ and Jensen et al² represent a form of triangulation.⁴ That is, although each study sampled their "expert therapists" differently, the methodological tools of observation and interview were rigorous enough to point to similar findings with respect to the behaviors, values, and qualities of expert therapists that distinguish them from average practitioners. Each of the 2 subsequent studies extended the previous work, ours by proposing a model of clinical reasoning somewhat different from but not inconsistent with Resnik and Jensen¹ and Jensen et al² by carrying out a new and more inclusive sampling approach to the grounded theory work on expertise.

Based on the discussion of the relationship of theory among our study and the studies by Resnik and Jensen¹ and Jensen et al² and on our examination of the literature, we conclude that there can be theory resonance or dissonance between qualitative studies, each either lending support to previous findings or raising new explanations or theory. Substantive theory, which is grounded theory derived from particular instances or contexts, not only can be compared with and contrasted to other grounded theories regarding similar phenomena for its fit and completeness as an explanation or theory, it also can be related to other "middle" or "formal" theory for its applicability to other situations and phenomena.^{5,6} Mezirow's theory of transformative learning⁷ in the field of adult education is an example of this in our study. This theory both helped us interpret what we were finding, and, in a modest way, our findings add some credence to what Mezirow proposes concerning adult learning. We argue, therefore, that the findings (eg, theories) generated by qualitative studies, especially when they build upon each other, while not statistically

generalizable, can be theoretically generalizable⁸ (or transferable⁹) where their "groundedness" in the particular does not necessarily limit their potential application to broader situations and contexts.

In summary, we concluded that experts move easily between deductive and inductive forms of reasoning in clinical practice. We believe that the several interesting research possibilities suggested by Hack offer a challenge to the further building of theory regarding both the nature of expertise and clinical reasoning in physical therapy. In pursuing these research ideas, or any others for that matter, the challenge, we argue, remains for researchers in physical therapy to move as easily between deductive and inductive paradigms of research.

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