Clinical reasoning, or the thinking and decision-making processes associated with clinical practice, is a critical skill in the health professions and is central to the practice of professional autonomy. It is a thinking process directed towards enabling the clinician to take 'wise' action, meaning taking the best judged action in a specific context (Cervero, 1988; Harris, 1993).

In the first edition of this book we presented clinical reasoning as a process incorporating the elements of cognition, knowledge and metacognition. In this edition we expand our clinical reasoning model to place a greater emphasis on patient-centred care as the context for clinical reasoning. We frame this developing interpretation of clinical reasoning within two emerging models of health professional practice. The first of these is a new model for health professionals called 'the interactional professional', which argues the need for today's health professionals to be effective in interaction with their immediate and larger work environment, with the key players in that context, and with the situational elements pertinent to the patient and case under consideration (Higgs and Hunt, 1999).

The second related model is a social ecology model for health care participation and provision. In this framework, health professionals 'are no longer discrete or inert participants in a stable comprehensive health care system. Instead they are faced with both an unprecedented dynamic of change and a growing emphasis on the wider social responsibility, social relevance and the interactional role of service providers. They need to be aware of health care in the greater context of life, and of their obligations and responsibility to help create and be informed by a more social ecological model of health care' (Higgs et al., 1999, p. 37), which requires them to be proactive as well as reactive to changes in health care. Clinical reasoning for individuals and community groups is challenged by the need to work within this environment.

In both these models the role for the health care consumer is radically different in many respects to the dependent patient role of traditional medicine, where 'autonomy' of health professionals was defined as complete control over clinical decision making and clinical intervention. Consumers of health care are becoming increasingly well informed about their health and about health care services. Terms such as 'self-help' and 'holistic health care' are becoming more central to health care, and the goal of achieving effective participation by consumers in their health care is widespread, requiring health professionals actively to involve their clients in clinical decision making wherever possible. Increasingly, clients' choices, rights and responsibilities in relation to their health are changing. Payton et al. (1990) advocate client involvement in decision making about the management of their health and well-being. They argue that this process of client participation is based on the 'recognition of the values of self-determination and the worth of the individual' (Payton et al., 1990). Using understanding of their clients' rights and responsibilities, clinicians need to develop their own guidelines for involving the client in reasoning and decision making. Mutual decision making requires not only a sharing of ownership of
decisions but also the development of skills in negotiation and explaining, to facilitate effective two-way communication. Professional autonomy becomes redefined as independence in function (within a team work context) combined with responsibility and accountability for one's actions (including the sharing of decision making).

The context of clinical reasoning

Clinical reasoning is a complex process occurring within a multidimensional context. In clinical settings, clinicians frequently face ill-defined problems, goals that are complex and outcomes that are difficult to predict clearly. Health care systems could be described as ‘soft systems’, a term introduced by Checkland (1981) to refer to systems in which goals may be unrecognizable and outcomes ambiguous. Professional judgement and decision making within the ambiguous or uncertain situations of health care is an inexact science (Kennedy, 1987) which requires reflective practice and excellent skills in clinical reasoning (Cervero, 1988; Schön, 1983). These skills reflect the importance of critical thinking rather than a priori criteria (Jangemann, 1986). Skills of professional judgement and critical self-evaluation are needed to cope with information processing constraints or bounded rationality (Newell and Simon, 1972) which result from limitations of the individual's ability to access knowledge and solve problems (Bransford et al., 1986; Feltovich, 1983; Hassebrook and Johnson, 1986). One way to interpret the way in which professionals cope with the uncertainties and challenges of clinical reasoning is to look beyond science. Harris (1993), for instance, presents the concept of professional practice as comprising a blend of art, craft and technology.

The context in which clinical reasoning occurs plays an important role in the process of clinical reasoning, both in terms of the parties who are involved in the reasoning process and also in terms of the many environmental factors which need to be taken into consideration. The context of clinical reasoning comprises a number of elements, including:

- The personal context of individual clients, which incorporates such factors as their unique cultural, family, work and socio-economic frames of reference and their state of health. Each of these factors contributes to the client’s beliefs, values and expectations, and to their perceptions and needs in relation to their clinical problems.

- The unique multi-faceted context of the client's clinical problem. Clinical problems can be confusing and contradictory, characterized by imperfect, inconsistent, or even inaccurate information (Kasirier and Koppelman, 1991, p. viii).

- The specific context of health care for the client under consideration. Health care settings are many and varied, ranging from programs of mass media health promotion to high technology intensive care hospital units. Despite this diversity, a number of commonalities do exist. Firstly, in each case the focus is on the health of people. Secondly, since the services provided occur in human contexts, the health care environment is typically characterized by complexity, uncertainty and subjectivity. These factors have a strong influence on the nature of reasoning and on the impact of decisions made.

- The wider health care environment. Health professionals need to develop a broad understanding of the environment in which they work, including knowledge of the factors influencing health (e.g. the environment, socio-economic conditions, cultural beliefs and human behaviour).

- The knowledge explosion, which requires health professionals to be able to deal effectively with an increasing body of scientific, technical and professional knowledge. Developing a sound individual understanding of clinical reasoning and a capacity to reason effectively will facilitate the clinician's ability to manage complex and changing information.

- The personal and professional framework of the clinician. As well as their personal frames of reference clinicians operate within their professional frameworks (e.g. the ethical standards/requirements of the profession) and the context of professionalism. The term health professional implies a qualified health care provider who demonstrates professional autonomy, competence and accountability (Higgs, 1993). Professional status incorporates the responsibility to make unsupervised and accountable clinical decisions.

Investigation and interpretation of clinical reasoning

Clinical reasoning can be investigated via process and content orientations. The former emphasizes behaviours and cognition, and the latter, clinical knowledge.
Process-oriented perspective

Process-oriented research into clinical reasoning can be closely linked to the field of psychology. Much of the early clinical reasoning research of the 1950s and 1960s focused on attempting to analyse the behaviours (and steps) involved in problem solving, within the psychometric paradigm (e.g. Rimoldi, 1961). The focus of these studies was the assessment of physician/student performance. The research of this era supported the notion of the generic nature and transferability of effective problem-solving skills (Grant, 1992).

Along with the rise of cognitive psychology, research into clinical reasoning also adopted a cognitive (rather than behavioural) focus with an emphasis on understanding the nature of clinical reasoning and on the development of clinical reasoning expertise. This cognitive psychology approach to clinical reasoning research led to information processing, simulation, decision theory and categorization studies. In each of these approaches, use of knowledge derived from the clinical knowledge base of the individual was an important factor, as well as the active processing of received data, in enabling interpretation and solution of the clinical problem. Examples of research in this area include work by Elstein et al. (1978), Bordage and Zacks (1984), Feltovich and Barrows (1984), Payton (1985), Putzier et al. (1985) and Corcoran (1986). Recent developments in the cognitive tradition have included the use of propositional analysis (e.g. Patel and Groen, 1989; Schmidt et al., 1988).

For some time in nursing and occupational therapy, and more recently in physiotherapy, clinical reasoning research has challenged the domination of this field by the empirico-analytical research paradigm (to which much of the above research belongs). Newer research models are being adopted which operate within the interpretive and critical research paradigms. (See below.)

The interpretive and critical paradigms add an important dimension to the search for (and use of) knowledge in the human sciences. The empirico-analytical research paradigm relies on rules and causal laws more appropriate to the natural sciences, and the knowledge produced is insufficient for operation within human contexts (Barnett, 1990; Manley, 1991; Schön, 1983). The human sciences need a view of knowledge that accords validity to both propositional (theoretical/scientific) knowledge and non-propositional knowledge (e.g. professional craft knowledge and personal knowledge/knowledge of self), that seeks both personal and public validation, and that recognizes that knowledge is a dynamic phenomenon.2

Content (knowledge)-oriented perspective

It is now well accepted that clinical reasoning and clinical knowledge are interdependent, rather than being factors that can be learned separately. Norman (1990), for instance, writes that in an endeavour to deal effectively with the knowledge explosion, many educational programs over the last few decades adopted the goal of developing problem-solving skills, simultaneously diminishing their curricular emphasis on knowledge acquisition. In doing so they neglected to recognize that effective problem solving requires a large store of relevant knowledge. This argument is supported in the model of clinical reasoning expertise developed by Boshuizen and Schmidt (1992),3 in which expertise is linked to depth and organization of clinical knowledge.

Interpretations of clinical reasoning in the literature

Various models have been used to interpret and explain the process of clinical reasoning. These include hypothetico-deductive reasoning (Elstein et al., 1978), pattern recognition (Barrows and Feltovich, 1987), knowledge reasoning integration (Schmidt et al., 1990), and reasoning as a process of integrating knowledge, cognition and metacognition (Higgs and Jones, 1995).

Hypothetico-deductive reasoning

Hypothetico-deductive reasoning as a model of clinical reasoning originated in medical research (Barrows et al., 1978; Elstein et al., 1978; Feltovich et al., 1984; Gale, 1982). This reasoning approach involves the generation of hypotheses based on clinical data and knowledge, and testing of these hypotheses through further inquiry. The approach has also been identified in physiotherapy (Jones, 1992), and has been identified as one of the

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1 Refer to Chapter 3 for further discussion of these paradigms.
2 Refer to Chapter 3 for exploration of these forms of knowledge.
3 Refer to Chapter 2.
modes of reasoning in occupational therapy (where it is linked to the concept of 'procedural reasoning') (Fienning, 1991a), and as an approach used by nurses as part of diagnostic reasoning (Pattrick et al., 1987).

Hypothesis generation and testing involves both inductive reasoning (moving from a set of specific observations to a generalization) and deductive reasoning (moving from a generalization to a conclusion in relation to a specific case) (Ridderikhoff, 1989). Induction is used to generate hypotheses and deduction to test hypotheses. Albert et al. (1988) describe inductive reasoning as probabilistic reasoning, since a conclusion is reached (e.g. concerning a diagnostic hypothesis) on the basis of the probability of that conclusion in relation to the evidence available. This evidence is evaluated in relation to existing knowledge. Deductive reasoning is widely used in the health sciences in the presentation of arguments to defend decisions and actions. Such reasoning follows the 'if . . . then' mode, with the 'if' referring to an implicit or explicit premise (or supporting statement) and the 'then' to the conclusion that is derived from that premise in relation to the situation and evidence in question.

Pattern recognition

Pattern recognition or inductive reasoning, as an interpretation of the clinical reasoning process (in particular, diagnostic reasoning), has been supported by a number of researchers (e.g. Gorry, 1973; Hamilton, 1966; Scadding, 1967). Groen and Patel (1985) identified that expert reasoning in non-problematic situations resembles pattern recognition or direct automatic retrieval of information from a well-structured knowledge base. Elstein et al. (1990, p. 10) argue, however, that experts 'clearly do consider and evaluate alternatives when confronted with problematic situations'.

Inductive reasoning has both strengths and weaknesses. While it lacks certainty, inductive reasoning enables conclusions to be reached in the face of imprecise data and limited premises. Albert et al. (1988, p. 100) comment, 'Of course we would all prefer to deal with certainties rather than probabilities. Unfortunately, in most instances in medicine and science, sufficient information for correct deductive arguments from acceptable premises is lacking. We must then rely on inductive inferences from premises accepted as true.'

Pael and Groen (1986) and Arocha et al. (1993) have used the terms backward reasoning where the re-interpretation of data of the acquisition of new clarifying data is invoked in order to test a hypothesis and forward reasoning to describe inductive reasoning in which data analysis results in hypothesis generation or diagnosis, utilizing a sound knowledge base. Forward reasoning is more likely to occur in familiar cases with experienced clinicians, and backward reasoning with inexperienced clinicians or in atypical or difficult cases (Pael and Groen, 1986).

Pattern recognition could be thought of as pattern interpretation. Through the use of inductive reasoning, pattern recognition/interpretation is a process characterized by speed and efficiency (Arocha et al., 1993; Ridderikhoff, 1989). By comparison, hypothetico-deductive reasoning, particularly the phase of backward/deductive reasoning, is generally regarded as being a slower, more demanding and more detailed process (Arocha et al., 1993; Patel and Groen, 1986, 1991).

Explanations of pattern recognition include categorization and the use of prototypes. Categorization involves grouping of objects or events. It can be related to the process of recognizing the similarity between a set of signs and symptoms or treatment options and outcomes from a previously experienced clinical case. The new case is placed in the same category as the past case(s) and is given the same label (diagnosis) (Brooks et al., 1991; Schmidt et al., 1990). An important aspect of the use of categorization in clinical reasoning is the link made by the clinician between the context of the condition, events or situation and previous cases. In the prototype model, experience results in the construction of abstract associations which convey the meanings assigned to symptoms and signs (Bordage and Zacks, 1984) or semantic relationships consisting of links between clinical features (e.g. local versus general location of pain) (Elstein et al., 1990). The use of prototypes enhances the ability of clinicians to interpret clinical data, since the recognition of the clinical pattern is matched against learned abstractions rather than specific instances which may be difficult to match clearly.

Knowledge–reasoning integration

Recent research in the health sciences has demonstrated that clinical reasoning is not a separate skill that can be developed independently of relevant professional knowledge and other clinical skills, such as investigative skills (e.g. Schmidt et al., 1990). There is increasing evidence to support the
importance of domain-specific knowledge and an organized knowledge base in clinical problem-solving expertise (Elstein et al., 1990; Hassebrock et al., 1993; Patel and Groen, 1986; Patel et al., 1990; Schmidt et al., 1990). However, it is the interaction between such knowledge and skills in reasoning which lies at the heart of clinical reasoning expertise. Domain-specific knowledge and skills in cognition (critical, creative, reflective and logical/analytical thinking) and metacognition are essential for effective thinking and problem solving (Alexander and Judy, 1988).

Boshuizen and Schmidt (1992, 1995) propose a stage theory of the development of expertise, which emphasizes the parallel development of knowledge acquisition and clinical reasoning expertise. This model is based upon the notion and observation that developing knowledge and the resultant reasoning expertise are largely the result of changes in knowledge structure. The progress from medical student to expert clinician is accompanied by a transition from biomedical knowledge, through encapsulation of knowledge into concept clusters with clinically relevant foci, to structuring of knowledge around illness scripts and finally to instantiated scripts (actual detailed cases/specific instances). This development in knowledge is accompanied by increasing expertise in reasoning.

Patel and Kaufman (1995) regard the above interpretation as idealized, and cite biomedical misconceptions held by physicians and the different structure of the biomedical and clinical sciences as evidence that the biomedical sciences and clinical medicine constitute two distinct and not fully compatible worlds, with distinct modes of reasoning and knowledge. They suggest that the key role played by basic sciences may be in facilitating explanation and coherent communication rather than in facilitating clinical reasoning itself. In our model of clinical reasoning, the roles of knowledge in clinical reasoning are numerous and the use of various forms of knowledge is closely linked to the context (of the client, profession, situation) in which the knowledge is being utilized.

Recent interpretive models

In a number of health professions, other models of clinical reasoning, many based upon interpretive paradigm research studies, are gaining prominence. Work in the interpretive paradigm has been conducted by Benner (1984) in nursing (with an emphasis on seeking understanding of behaviours and context), by Crepeau (1991) and Fleming (1991b) in occupational therapy (with an emphasis on structuring meaning and interpreting the problem from the patient's perspective), and by Jensen et al. (1992) in physiotherapy (with a focus on elucidating the complex and unknown processes that occur during therapeutic interventions). The clinical reasoning processes which such approaches describe focus on strategies which seek a deep understanding of the client's perspective and the influence of contextual factors; in addition to the more traditional and 'clinical' understanding of the patient's condition. The relevance of this broader perspective is evident in the growing body of research demonstrating that the meaning patients give to their problem (including their understanding of and feelings about their problem) can significantly influence their levels of pain tolerance, disability and eventual outcome (Borkan et al., 1991; Feuerstein and Beattie, 1995; Malt and Olafson, 1995). As the volume and depth of research into clinical reasoning grows, it is becoming more and more apparent that traditional clinical reasoning models do not encompass the varying dimensions or reflect the diverse discipline-specific practice paradigms which exist across the health professions.

In nursing, a number of studies (Agan, 1987; Pyles and Stern, 1983; Rew and Barrow, 1987; Rew, 1990) have emphasized the role of intuitive skills in clinical reasoning, linking intuitive knowledge to past experience with specific patient cases. In this sense 'intuitive knowledge' could be another way of describing 'instance scripts' which can be used unconsciously in inductive reasoning. Fonteyn and Fisher (1992) have linked nurses' experience and associated intuition to the use of advanced reasoning strategies or heuristics. Such heuristics include pattern matching and listing (or listing items relevant to the working plan) (Fonteyn and Grobe, 1993).

In occupational therapy, Fleming (1991a) proposes a reasoning theory of an occupational therapist with a 'three track mind'. In this model clinical reasoning involves an integration of three reasoning strategies, procedural, conditional (projected) and interactive reasoning.

In physiotherapy, recent investigators (Edwards et al., 1998) have identified the value and use of a number of the reasoning strategies arising from interpretive paradigm research within physio-
therapy practice. They found that expert physiotherapists in three different fields of physiotherapy (manipulative/orthopaedic, neurological and domiciliary care) consistently used these recently identified clinical reasoning strategies. Educationally, these clinical reasoning strategies can be regarded as an application of clinical reasoning principles to the tasks of clinical practice.

Interpretive models of clinical reasoning include:

- **Diagnostic reasoning** is that reasoning which aims to reveal the client’s impairments(s), disability(ies) and handicap(s), and the underlying pathobiological mechanisms. While diagnostic reasoning is the most familiar reasoning strategy in clinical practice it is combined with other strategies to establish patient rapport and to educate and promote patient self-efficacy and responsibility.

- **Interactive reasoning** occurs when dialogue in the form of social exchange is used deliberately to enhance or facilitate the assessment/management process. This reasoning provides an effective means of better understanding the context in which the patient’s problem(s) exist while creating a relationship of interest and trust.

- **Narrative reasoning** involves the use of stories regarding past or present patients to further understand and manage a clinical situation. Such real-life scenarios bring credibility to the advice or explanation which they are used to support and can be strategically employed by practitioners to strengthen their message.

- **Collaborative reasoning** refers to the shared decision making that ideally occurs between practitioner and patient. Here the patient’s opinions as well as information about the problem are actively sought and utilized.

- **Predictive or conditional reasoning** is part of the practitioner’s thinking directed to estimating patient responses to treatment and likely outcomes of management, based on information obtained through the patient interview, physical examination and response to management.

- **Ethical/pragmatic reasoning** alludes to those less recognized, but frequently made decisions regarding moral, political and economic dilemmas which clinicians regularly confront, such as deciding how long to continue treatment.

- **Teaching as reasoning** occurs when practitioners consciously use advice, instruction and guidance for the purpose of promoting change in the patient’s understanding, feelings and behaviour.

**Clinical reasoning expertise**

The attainment of clinical reasoning and clinical practice expertise is a target of clinicians and an expectation of health care consumers. What then is this expertise and how is it developed?

Glaser and Chi (1988, pp. xvii–xx) have identified seven characteristics of experts:

- Experts excel mainly in their own domains.
- Experts perceive large meaningful patterns in their domain.
- Experts are fast: they are faster than novices at performing the skills of their domain and they quickly solve problems with little error.
- Experts have superior short-term and long-term memory.
- Experts see and represent a problem in their domain at a deeper (more principled) level than novices; novices tend to represent a problem at a superficial level.
- Experts spend a great deal of time analysing a problem qualitatively.
- Experts have strong self-monitoring skills.

In addition to these generic skills of experts which are applicable to clinical reasoning expertise, there are particular characteristics of experts which are pertinent to the health professions.

**Expertise and shared decision making**

Experts are expected to achieve better clinical results, based on reasoning which is ‘accurate’ and relevant (to the client and the situation), and on effective technical competence. However, other outcome dimensions, particularly as viewed from the patient’s perspective, may be lacking in some peer-judged experts. The clinical reasoning behind clinical performance encompasses not only diagnostic and management-oriented problem solving but also deals with clients’ unique personal experience of their problems (the specific meaning and influences of their clinical problems). Recipients of health care may regain their health or function yet still feel that the clinician’s performance was inadequate. A premise of this chapter, and indeed of many chapters throughout this book, is that clinical reasoning cannot be fully understood when only the clinician’s perspective is considered. Shared decision making between client and clinician is important if ‘success’ is to be realized from the client’s perspective.
Expertise and metacognition

Alexander and Judy (1988) argue that cognitive research over the last 20 years has indisputably found that, in addition to a greater domain-specific knowledge base, expertise is demonstrated by those people who monitor and regulate their cognitive processing (i.e. use metacognition) during task performance. Metacognition refers to being aware of one’s cognitive processes and exerting control over these processes, and the cognitive skills that are necessary for the management of knowledge and other cognitive skills (Biggs, 1988). Biggs (1986, p. 143) argues that ‘high quality human performance inevitably requires metacognitive as well as cognitive components. To perform well, one needs to be aware not only of the knowledge and algorithms required for the task, but of one’s own motives and resources, the contextual constraints, and to plan strategically on that knowledge’.

Expertise and the critical use of knowledge in several forms

Nickerson et al. (1985, p. 68) identify two key features of expertise, ‘the ability to manage one’s intellectual resources and to use whatever domain-specific knowledge one has most efficiently’ and the presence of a wealth of domain-specific knowledge. Three forms of knowledge are necessary for clinical expertise: propositional knowledge, professional craft knowledge and personal knowledge (Higgs and Titchen, 1995). The critical use of knowledge, based on the ability to be self-aware and self-critical, and to reflect on one’s decision making, is essential for effective professional decision making, critical self-evaluation and responsible practice (Higgs and Titchen, 1995). Critical thinking relies on continual updating of knowledge in the professional domain and within the individual clinician’s knowledge base, and on the use of professional judgement to appraise the relevance, worth and currency of knowledge in application to clinical reasoning.

Expertise and skilled companionship: the expert and patient-centred practice

The forces of accountability, cost-efficiency and consumerism have led a number of health professionals to call for a return to patient-centred care and to a recognition of the importance of patient-centred practice as the hallmark of an expert clinician. In occupational therapy, for instance, considerable emphasis is placed on the utilization of a client-centred approach in which the focus is on people’s rights to develop the skills and habits required for a balanced, wholesome life (Shannon, 1977).

One way of conceptualizing the skilled or expert clinician is as a skilled companion. Titchen (1998) uses the metaphor skilled companionship to mean accompanying patients during their journey toward health. This approach, she argues, is the essence of the helping relationship between a health professional and a patient. Similarly, Ersser (1996) contends that our capacity to understand and respond appropriately to the patient’s experience of care is essential to patient-centred practice.

Expertise and critical companionship: the expert as mentor and guide

Titchen (1998, p. 1) also describes the expert as a critical companion. Critical companions accompany ‘less experienced practitioners on their own very personal, experiential learning journeys’. At the core of this process is the relationship between the critical companion and the practitioner. This relationship involves four processes: mutuality (working together), reciprocity (valued exchange), particularity (knowing the particulars of the situation) and graceful care. Practical rational-intuitive tools of intentionality, saliency and temporality help to create the learning relationship. Facilitation of learning is based on four concepts, consciousness raising, problematization, self-reflection and critique, and these concepts are translated into learning facilitation strategies such as articulation of craft knowledge and critical dialogue. The overarching dimension of the critical companion’s expertise is the facilitative use of self: This dimension involves bringing together the human and situational aspects of the learning context, blending craft and theoretical knowledge, intuitive and rational thinking, self-awareness and professional artistry.

Expertise and communication

Higgs and Titchen (1995) argue that the capacity to justify clinical decisions articulately is essential for effective professional practice. The expert is expected to communicate effectively with clients, colleagues and families, to listen as well as to explain, educate and negotiate, and to use language
appropriate to the people and situation involved.
Professionals are expected to communicate effectively across language, cultural and situational barriers (Josebury et al., 1990).

Expertise and cultural competence
To perform clinical reasoning expertly clinicians need cultural competence. They need to reason in a manner which is culturally sensitive and appropriate for their clients. (Chapter 29 explores this topic further)

Clinical expertise
From the above considerations, we would add to Glaser and Chi’s (1988) seven characteristics of experts the following points, pertinent to health professional experts:

- Experts value the participation of relevant others (clients, caregivers, team members) in the decision-making process.
- Experts utilize high levels of metacognition in their reasoning.
- Experts recognize the value of different forms of knowledge in their reasoning and use this knowledge critically.
- Experts are patient-centred.
- Experts share their expertise to help develop expertise in others.
- Experts are able to communicate their reasoning well and in a manner appropriate to their audience.
- Experts demonstrate cultural competence in their reasoning and communication.

We propose that clinical expertise, of which clinical reasoning is a critical component, be viewed as a continuum along multiple dimensions. These dimensions include clinical outcomes, personal attributes such as professional judgment, technical clinical skills, communication and interpersonal skills (to involve the client and others in decision making and to consider the client’s perspective), a sound knowledge base, as well as cognitive and metacognitive proficiency.

An integrated, patient-centred model of clinical reasoning
The interpretation of clinical reasoning we presented in the first edition of this book (Higgs and Jones, 1995) involved three core elements of clinical reasoning (knowledge, cognition or thinking and metacognition). These elements interact throughout the process of receiving, interpreting, processing and utilizing clinical information during decision making, clinical intervention, and reflection on actions and outcomes. Clinical reasoning was described as a process of reflective inquiry, involving the client if possible, which seeks to promote a deep and contextually relevant understanding of the clinical problem, in order to provide a sound basis for clinical intervention. In our revised model we retain the three dimensions as above:

- Cognition or reflective inquiry.
- A strong discipline-specific knowledge base.
- Metacognition, which provides the integrative element between cognition and knowledge.

To these dimensions we add:

- Mutual decision making, or the role of the client or patient in the decision-making process.
- Contextual interaction, or the interactivity between the decision makers and the situation or environment of the reasoning process.
- Task impact, or the influence of the nature of the clinical problem or task on the reasoning process.

The basis for the inclusion of these new dimensions is the growing expectation by and of consumers that they play an active role in their own health care. The image of compliant, dependent patients is replaced by one of informed health care consumers who expect their needs and preferences to be listened to, who increasingly want to participate in decision making about their health, and who expect to take action to enhance their health. Alongside this health rather than illness focus on the part of the consumer there are also economic factors such as an increasing reliance on 'user-pays' funding strategies, which mean that consumers are indeed purchasing health care, and their expectations of service, quality and ownership of health programs are therefore increasing. Similarly, caregivers need and wish to play a greater role in health management and decision making.

The increasing participation by, and dependence upon, clients and caregivers in health care management also highlights the need to pay greater attention to the client's environment. This includes the physical home and work environment, clients' personal circumstances (e.g. culture, family, finances), and their access to health care. Access involves considerations such as location of health
care facilities, transportation options, language and cultural factors, and economic provisions for health care.

Many of these situational factors also interact with the nature of the clinical problem or task facing the health care team and the client (and caregivers). Clinical problems facing clients and health professionals can be difficult, changeable, uncertain and multi-dimensional. They involve human and non-human elements. They are affected by local and global contexts, and occur in the context of uncertainty, changeability and the indeterminate knowledge base of the health sciences.

The model of the interactional health professional (Higgs and Hunt, 1999) is particularly pertinent to these three added dimensions. Such individuals have the capacity to interact effectively (both proactively and responsively) with the many elements (people, task, situation) of the work environment. They seek and value the input of others, particularly clients, caregivers and other health care team members, in the reasoning and decision-making processes, to achieve the goal of providing quality, appropriate and acceptable (to the client) health care.

In our revised model (Figure 1.1), clinical reasoning is defined as a process in which the clinician, interacting with significant others (client, caregivers, health care team members), structures meaning, goals and health management strategies based on clinical data, client choices, and professional judgement and knowledge. This process is centred on the client and the client’s clinical problem(s) and the related environment. The major function of clinical reasoning is to enhance understanding (by clinician and client) of the clinical problem, in order to provide the basis for sound health management.

The process of clinical reasoning is represented by an upward and outward spiral. This image is intended to demonstrate clinical reasoning as both a cyclical and a developing process. Each loop of the spiral incorporates data input, data interpretation (or re-interpretation) and problem formulation (or re-formulation) to achieve a progressively broader and deeper understanding of the clinical problem (Figure 1.2). Based on this deepening understanding, decisions are made concerning intervention, and actions are taken. For instance, the clinician can decide to refrain from intervention, to collect further data or to provide care, etc. The efficacy of the clinical reasoning process relies on the clinician’s reasoning proficiency and the client’s capacity and willingness to participate in clinical decision making. The combined process can be represented by parameters.
such as the speed of decision making (i.e. the speed of "ascending the spiral"), the depth of understanding of the clinical problem that is achieved, and the validity and relevance of the management approach adopted. These outcomes are influenced by internal factors relating to the health professional (e.g. knowledge base, familiarity and experience with this type of case, reasoning skills), factors relating to the client (e.g. needs, communication skills, circumstances, choices) and external factors (e.g. institutional expectations, profession-specific frameworks of operation, complexity of the case).

Throughout the reasoning process the core elements of task impact, knowledge, cognition and metacognition interact in a process of mutual decision making and context interaction. That is, cognitive or thinking skills (such as analysis, synthesis and evaluation of data collected) are utilized to process clinical data against the clinician’s existing discipline-specific and personal knowledge base in consideration of the client’s needs and the clinical problem. At the same time, metacognition is employed to monitor the clinician’s thinking processes and conclusions, in order to detect links or inconsistencies between clinical data and existing clinical patterns or expectations based upon prior learning, to reflect on the soundness (accuracy, reliability, validity) of observations and conclusions, and to critique the reasoning process itself (for logic, scope, client relevance, efficiency, creativity, etc.). The process of clinical reasoning occurs throughout the clinician’s interaction with the client, each decision or action producing a clearer picture of the clinical problem and context influences or targets, which in turn generates further information and/or questions in the continuing process of data interpretation and mutual decision making.

Our model supports the interpretive and critical paradigms, not only for the relevance of these approaches to the clinical context, but also because we emphasize that clinical reasoning, and the understanding or interpretation which results from this process in a given situation, is unique to the clinician (and client) involved. This argument rests on the following premises: that clinical reasoning occurs within the frame of reference of the participating individuals; that the knowledge base of the clinician is unmatched, being derived from personal and professional experiences as well as from the learning of propositional knowledge; and that the engagement of individual clinicians (within their particular frame of reference and knowledge base) with clients in their specific contexts must result in a unique understanding of and proposed solution to client’s clinical problem. We recognize that many human problems can have multiple interpretations and solutions. The key to effective and accountable clinical practice, we contend, is that the clinician’s understanding of the problem should be substantial in order to avoid potential harmful or ineffective intervention outcomes, and that management should be justifiable in terms of sound arguments based upon the propositional, professional and personal knowledge of the clinician and (as appropriate) the personal knowledge of the client.

**Conclusion**

In this chapter we have argued that clinical reasoning is central to clinical practice, and have explored the nature of clinical reasoning and criteria for demonstrating expertise in clinical practice and reasoning. An integrated, patient-centred model of clinical reasoning is presented, incorporating the key elements of knowledge, cognition, metacognition and task impact interacting in a process of mutual decision making and context interaction. This process occurs within the frame of reference of the clinician, the context of the client and the complex, variable world of health care, and seeks to achieve a growing understanding of the clinical problem with which to provide the basis for sound clinical management.

**References**


Hasebrock, F., Johnson, P. E., Bullenner, F., Fox, P. W. and Moller, J. H. (1993) When less is more: Representation and


