

Physiotherapy decision making in acute cardiorespiratory care is influenced by factors related to the physiotherapist and the nature and context of the decision: a qualitative study

Megan Smith¹, Joy Higgs¹ and Elizabeth Ellis²

¹Charles Sturt University ²The University of Sydney
Australia

Questions: What factors influence the decision making of cardiorespiratory physiotherapists in acute care? How do cardiorespiratory physiotherapists manage multiple factors in their decision making? **Design:** Qualitative study using observation and semi-structured interviews. **Participants:** Fourteen physiotherapists working in acute cardiorespiratory care. **Results:** Cardiorespiratory physiotherapy decision making was affected by factors related to the nature of the decision itself (such as the complexity and difficulty of the decision), factors related to the context in which the decision occurred (such as physical, organisational and socio-professional factors), and factors related to the physiotherapists themselves (such as decision making capabilities, physiotherapy frames of reference, and level of clinical experience). **Conclusion:** Optimising the quality of decision making in the context of health care today requires an awareness and consideration of a range of factors influencing decision making. [Smith M, Higgs J, Ellis E (2007) *Physiotherapy decision making in acute cardiorespiratory care is influenced by factors related to the physiotherapist and the nature and context of the decision: a qualitative study. Australian Journal of Physiotherapy* 53: 261–267]

Key words: Clinical Decision Making, Physiotherapy (speciality)

Introduction

Clinical reasoning and decision making are fundamental aspects of physiotherapy clinical practice. Clinical reasoning is now understood to be a complex and multidimensional phenomenon by which physiotherapists develop a deep understanding of patients and their problems as the basis for decision making and action (Edwards et al 2006, Higgs et al 2006). An increasing body of research has revealed a number of characteristics of physiotherapy clinical reasoning. These include therapists possessing dynamic, practice-based knowledge (Jensen et al 2000, Smart and Doody 2007), and the use of cognitive strategies such as hypothetico-deductive reasoning and pattern recognition (Rivett and Higgs 1997). Edwards et al (2004) identified that physiotherapists use multiple approaches to reasoning or 'clinical reasoning strategies'. These authors found that physiotherapists use clinical reasoning processes to make decisions about diagnosis and intervention and also use the strategies of narrative and collaborative reasoning to understand patients' interpretations of their own experiences of illness and to negotiate interventions. They found that physiotherapists combined multiple reasoning strategies in varying ways according to particular characteristics of patients and their problems.

Research into clinical reasoning in physiotherapy has tended to focus on areas of clinical practice such as musculoskeletal physiotherapy or rehabilitation (Beeston and Simons 1996, Edwards et al 2004, Resnik and Jensen 2003). In comparison, there has been comparatively limited

investigation in the area of cardiorespiratory physiotherapy. Studies of cardiorespiratory physiotherapy practice have identified expert-novice differences in the organisation of knowledge when using paper-based cases (Case et al 2000) and have explored consensus regarding characteristics of cardiorespiratory physiotherapy expertise (Roskell and Cross 2001). These studies suggest similarities to other areas of physiotherapy practice. However, to date, there has been no focus on cardiorespiratory decision making as it occurs in the realistic context of clinical practice.

There is increasing recognition that clinical reasoning and decision making are influenced by factors in the environment (Higgs et al 2004; Jette et al 2003, Thornquist 2001). Acute cardiorespiratory physiotherapy care is rich in factors that have the potential to influence decision making. Acute care is a complex, busy organisational context that involves physiotherapists engaging in multiple interactive roles with patients and members of health care teams, while they provide care that is often urgent, multi-focused, and associated with possible adverse effects. Research in acute care has the potential to reveal factors that influence physiotherapy decision making and provide an understanding of how these factors impact on decision making processes and outcomes. Therefore, the research questions were:

1. What factors influence cardiorespiratory physiotherapy decision making in acute care?
2. How do cardiorespiratory physiotherapists manage multiple factors in order to make decisions?

Box 1. Levels of cardiorespiratory physiotherapy experience of participants.

| | |
|-----------------------------|--|
| Low or novice level (n = 5) | <ul style="list-style-type: none"> • < 2 years experience in the practice of physiotherapy • employment in rotating positions that involved some cardiorespiratory physiotherapy • minimum of four weeks recently working in cardiorespiratory physiotherapy |
| Intermediate level (n = 3) | <ul style="list-style-type: none"> • 3.5 to 5 years physiotherapy experience • non-rotating senior designated cardiorespiratory physiotherapy positions • 2.5 to 4 years recent cardiorespiratory physiotherapy experience |
| High level (n = 6) | <ul style="list-style-type: none"> • 8 to 12 years physiotherapy experience • non-rotating senior designated cardiorespiratory physiotherapy positions • 7 to 10.5 years recent cardiorespiratory physiotherapy experience |

Method**Design**

A qualitative research design was chosen. Qualitative methods are well suited to research questions where the aim is to understand the influence of context on a phenomenon of interest, while ensuring the context is at the same time preserved (Denzin and Lincoln 2000). From this collection of methods hermeneutics was chosen as the guiding research strategy. Hermeneutics involves the construction of texts representing the phenomenon (eg, field notes from observation, and interview transcripts) that are subsequently interpreted through the rigorous and deeply interpretive use of hermeneutic analysis strategies (Crotty 1998, Moss 2005, Packer 1985).

The data were collected using a combination of observation and semi-structured interviews. Observational data were obtained by observing cardiorespiratory physiotherapists as they conducted their usual daily practice within acute cardiorespiratory care, focusing on their communications and actions linked to clinical decision making. Data were collected for each participant on two separate days, with between five and eight hours spent observing each participant on each day. When observing the participants, detailed field-notes were recorded documenting the words and actions of the participants as they engaged in patient care and interactions with other health professionals. These field-notes formed part of the texts that were then used as the basis for interpretation and analysis.

Additionally, each participant was interviewed on multiple occasions throughout the two days of data collection using semi-structured interviewing techniques. Participants were interviewed briefly, following each observation of an episode of patient care, about their decision making and factors

that were influencing their reasoning processes. A separate longer (approximately 45 minute) interview was used to pursue clinical decision making and the factors affecting it. These longer interviews were conducted on each of the two days, after a number of observations of patient care had occurred. An interview guide was used and the longer interviews began by asking participants to share a story from their experience of cardiorespiratory physiotherapy clinical decision making. The stories, incidents, and descriptions that participants provided were discussed, and probing questions were used to develop a deep understanding of participants' decision making. During the interviews, issues of interest that had arisen during the observations were also explored in greater detail to reveal participant's explanations of the observed behaviours. From the interviews, texts for data analysis were generated by transcribing verbatim the taped interviews. Following the first interview diagrammatic summaries of the data, in the form of concept maps, were prepared and forwarded to the participants for their review (see Figure 1 for an example). This was done to ensure that the data collection and preliminary interpretation processes reflected the participant's decision making and to stimulate more in-depth discussion in the subsequent interviews.

This study was conducted with approval from the Human Research Ethics Committee of The University of Sydney and the research ethics committees of all hospitals where the research participants worked. Informed consent was obtained from all participants and throughout the study the anonymity and confidentiality of the participants was ensured.

Participants

Physiotherapists actively involved in the practice of cardiorespiratory physiotherapy were recruited from three metropolitan hospitals. Potential participants for this study were identified using purposive sampling (see Morse 1991). Physiotherapists were eligible for inclusion in the study if they were actively engaged in the practice of cardiorespiratory physiotherapy > 24 hours per week, had at least 6 weeks' recent experience working in cardiorespiratory physiotherapy, were working in adult acute cardiorespiratory care, and were willing and able to discuss their clinical decision making. During staff meetings held in each of the hospitals, physiotherapists meeting the criteria were invited to take part.

Fourteen physiotherapists participated in the study. The participants were classified into three categories on the basis of their level of experience to allow interpretation of the influence of level of experience on decision making (Box 1). This number of participants allowed saturation to be achieved in data collection and analysis, ie, until redundancy occurred in the data and findings obtained in relation to the research questions.

Data analysis

Interpretation and analysis of the texts (all interview transcripts and detailed field-notes) was guided by the critically reflexive and systematic principles of hermeneutics. A cyclic interpretive process was used where the texts for each participant were read and interpreted repeatedly. This was followed by a process of interpreting and comparing the data from all participants. The interpretive process resulted in the progressive development of an understanding of cardiorespiratory physiotherapy decision making and the identification of factors influencing decision making.

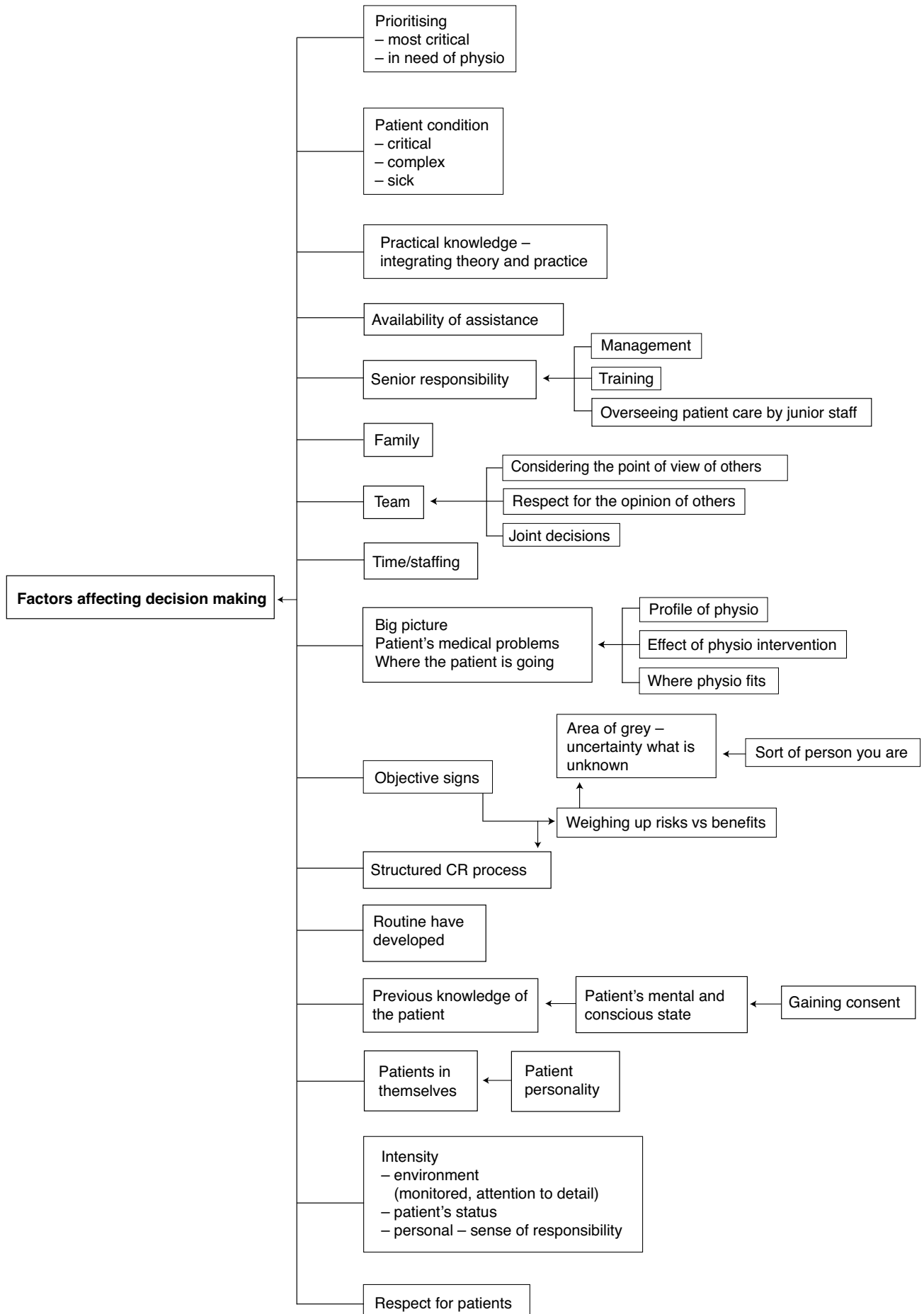


Figure 1. An example of diagrammatic summary of data drawn from observation and brief interview.

This process of interpretation continued until a point of theoretical saturation was reached, ie, no new findings were being identified from the texts.

To enhance the rigour of the research process, an analytical log was used to document the research process critically and to diarise the reflexive strategies used to identify and limit any partiality by the researcher. Further strategies used to ensure rigour and credibility included data checking by participants (ie, providing participants with diagrammatic summaries of the collected data for their review), prolonged engagement with the texts, and the use of multiple sources and sites. Participants confirmed that the actual nature of their context and work practices had been identified by the researcher.

Results

Cardiorespiratory physiotherapy decision making in acute care was identified as a dynamic, complex, and multidimensional process influenced by multiple factors. Three types of factors were found to influence decision making by the participants. These were: factors related to the nature of the decision itself, factors related to the context in which the decision occurred, and factors related to the physiotherapists themselves. A model was developed which represents the factors influencing cardiorespiratory physiotherapy decision making (Figure 2).

Participants were required to manage these factors in multiple combinations in order to reach an optimal decision given the circumstances. This interwoven process is illustrated in an interview with a highly-experienced participant:

There are so many different factors that can influence your clinical decision making. We would all like to think that it is based on a thorough assessment, and evidence and a good research base behind it, etc. and we all like to think that we carry out the most optimal treatment for every patient, but there are so many factors that affect the ultimate thing that you do.

Factors related to the nature of the decision itself

Decision making was affected by factors such as the focus of the decision, the relationship of the decision to other decisions being made (both a temporal relationship and relationship to the level of decision, eg, decisions as components of larger decisions), and composite attributes of the decision such as complexity and difficulty. There were four foci of cardiorespiratory physiotherapy decisions: making decisions about patients' problems, deciding about interventions, deciding how best to interact with patients, and making decisions that evaluate the outcome of previous decisions. Different sub-processes (ie, the methods of making decisions within each of the foci) were used according to whether the decision involved determining patient problems or determining an intervention.

The more complex and difficult the decision, the more in-depth was the reasoning process. Complex or difficult cardiorespiratory physiotherapy decisions were associated with situational factors such as uncertainty, multiple and changing clinical variables, a lack of congruence among factors such as patient history and clinical test data, an important or critical outcome, a high risk of adverse outcomes, and complex emotion or ethical issues. Such decisions required processes of greater deliberation, critical appraisal in repeating previously successful interventions,

Box 2. Contextual factors influencing cardiorespiratory physiotherapy decision making.

| | |
|----------------------------|--|
| Physical factors | <ul style="list-style-type: none"> • Equipment used as adjuncts to cardiorespiratory physiotherapy intervention (eg, PEP masks) • Furniture and equipment that constitute the physical environment around the patient • Furniture available for all staff and not physiotherapy-designated • Structure and layout of the context |
| Organisational factors | <ul style="list-style-type: none"> • Resource allocation and distribution (eg, physiotherapist workload) • Formal and informal decision guidance systems (eg, clinical pathways and protocols) • Communication and information systems • Funding and organisational priorities • Prevailing health care models |
| Socio-professional factors | <ul style="list-style-type: none"> • Actions and decisions of other health professionals • Designated professional roles, responsibilities and unique skills that different health care disciplines contribute to overall patient care • Availability and provision of physical assistance by other staff • Gatekeeper functions controlling physiotherapy access to patients • Provision of information, knowledge and guidance • The generation of expectations, provision of directions for physiotherapy intervention, and control of the nature of physiotherapy interventions permissible in particular settings |

progressive risk taking through cycles of experimentation, and inclusion of other health-care professionals in the decision making process. Where physiotherapists were less experienced with a particular scenario, they responded to these complex situations by choosing to follow more recipe-type approaches and to replicate previous decision making by others, feeling less certain about taking risks. For example:

I find them hard to do, you can treat them but I feel when I'm treating burns patients I tend to be reverting to more recipe book rather than developing something that I think would work for that patient, just because you're doing more recipe book ICU. I go in and I'll bag as appropriate and I'll suction, I'll tip them on the side; just because you don't know them enough to be able to treat effectively.

Factors related to the context in which the decision occurred

The context of cardiorespiratory physiotherapy practice is rich and complex, consisting of multiple interacting factors.



Figure 2. Model of factors influencing cardiorespiratory physiotherapy decision making. Innermost ring represents decision foci and task attributes. Second ring from centre represents types of contextual factors influencing decision making. Third ring from centre represents practitioner frames of reference influencing decision making. Outer ring represents characteristics of decision making that change with experience.

Acute care can be dynamic, uncertain, and unpredictable. Three types of contextual factors were identified: physical, organisational, and socio-professional (Figure 2 and Box 2).

The cardiorespiratory physiotherapists in this study were limited by and could limit the influence of contextual factors. At times, they were constrained by contextual factors in their decision making in that these factors limited, changed, modified, compromised, and guided their decision making. On other occasions, they were able to limit and manipulate contextual factors (such as the actual timing of pain medication delivery) in order to achieve optimal decision and treatment outcomes. Cardiorespiratory physiotherapists were variably aware or conscious of the influence of contextual factors on their decision making. Although the participants were able to list factors that influenced their decision making, these factors could not be ranked consistently according to their prevalence or importance in influencing decision making. Rather, the relevance of contextual factors varied according to the circumstances at a given time. This finding was associated both with the level of experience and deep understanding of cardiorespiratory practice by the participants, and the extent

Box 3: Effect of high workload on cardiorespiratory physiotherapy decision making.

- Prioritising patients and individual patients' problems
- Providing fewer physiotherapy sessions
- Discharging patients more readily
- Not performing more time consuming and less critical interventions (eg, rehabilitation-focused interventions)
- Having less thinking time
- Missing important aspects of the patient's condition
- Using less creative intervention options
- Performing less effective interventions (eg, shorter, incomplete)
- Offering less choice to patients
- 'Doing just enough'

to which they engaged in reflective practice. Teaching more junior staff and students aided such reflection and these physiotherapists were more able to articulate and explain factors they considered in making clinical decisions.

A typical example of how contextual factors influenced decision making was the daily workload. Participants reported a range of ways in which their decision making was altered when they had high workloads (Box 3). One participant summarised the influence of workload on her decision making in the following way:

You sort of change your priorities for what you want to do with each patient. You turn more from best management to management that will be enough for

the patient. What can I do so this patient doesn't get any worse? What is the minimum amount I can do so I can call this a physio session and address some of the issues that I would like to address if I had more time?

At the core of decision making in all aspects of cardiorespiratory physiotherapy was the patient and the problem. The characteristics of a patient's problems and their influence have already been described. Participants also made decisions and adjusted their interaction to each patient's situation, forming personalised therapeutic relationships. They made decisions about the capacity of patients to interact and actively engage in interventions (eg, based on a patient's cognitive state). Factors unique to each patient and their context were considered when involving patients in decision making, choosing interventions, using interaction during interventions, and as the basis to forming effective relationships.

Factors related to the physiotherapists themselves

Cardiorespiratory physiotherapy decision making was influenced by factors related to physiotherapists including their decision making capability, their unique frames of reference, and the level of their experience. Decisions made by cardiorespiratory physiotherapists in acute care reflected the unique combination of attributes of individuals.

The participants displayed four types of decision making capabilities that enabled them to draw together the multiple factors involved in decision making (shown as radiating 'spokes' or factors transcending the other factors in Figure 2). These were manifest in their ability to interact effectively with others, make decisions under difficult emotional circumstances, and recognise and respond to their own levels of decision making confidence.

The concentric ring third from the centre of the model (Figure 2) represents frames of reference identified by participants in this study. Individuals use frames of reference when they make decisions. In this study, the frames of reference identified were the physiotherapists' multidimensional knowledge and preferred approach to practice, their sense of professional identity as a cardiorespiratory physiotherapist, and their personal frames of reference (ie, values and attitudes).

Participants derived their unique knowledge bases and preferred practice approach from multiple sources and this evolved through their reflexive critique of this knowledge. Cardiorespiratory physiotherapy practice was deeply contextual in nature and included: norms and criteria for decision making, knowledge used to predict the likely outcomes of decisions, knowledge of the context and how best to work in that context, available resources (eg, equipment, personnel), and knowledge of how to work with particular patients. The approach to practice was also influenced by the specific organisational model as recorded in local protocols, the typical approach of that setting, the culture of practice exemplified by more senior members of staff, the dominant model of practice in the workplace (eg, the biomedical model), the application of cardiorespiratory physiotherapy theoretical concepts, and personal theorisation about practice.

The final, outside, ring of the model (Figure 2) represents the level of experience in cardiorespiratory physiotherapy decision making. A high level of experience resulted in a

high level of confidence and self-efficacy in decision making. This was in contrast to less-experienced physiotherapists who doubted the decisions they made and their ability to perform an intervention that would benefit the patient. High self-efficacy in highly-experienced physiotherapists was reflected in their being much less reliant on other physiotherapists and health professionals to support and influence their decision making. Less-experienced physiotherapists would depend on the support of others and be less likely to attempt or risk interventions where there was a chance of adverse events. Cardiorespiratory physiotherapy decision making was associated with the pursuit of actions in conditions of uncertainty that would progress understanding. With more experience, the physiotherapist's practical certainty, building on a deeper and more critical knowledge base, was associated with a greater degree of risk taking. Rather than taking risks and being considered reckless, highly-experienced physiotherapists had developed their own criteria for practice that embodied a reflexive and critical approach, making them more confident to 'push the boundaries'. Decision making was perceived less as being 'the right thing to do' and more as seeking to make optimal decisions given the circumstances. Highly-experienced physiotherapists were more flexible and adaptable, and exerted greater control over contextual factors, while less-experienced physiotherapists were more likely to be influenced by the environmental pressures around them and to have limited or fixed ways of practice.

Discussion

This study revealed that clinical decision making by the cardiorespiratory physiotherapists involved in this study was influenced by multiple factors related to the physiotherapist and to the nature and context of the decision. The findings support the growing understanding that clinical reasoning is a complex and multidimensional phenomenon that is contextually dependent and task dependent (Higgs et al 2004, Edwards et al 2004). The nature of factors influencing decision making in cardiorespiratory physiotherapy practice and how physiotherapists manage these multiple factors has not been described previously. There has also been limited research into these questions in other areas of physiotherapy. Although much of decision making as it occurs in daily practice seems automatic and subconscious, this study reveals that physiotherapists consider and integrate multiple factors into their decision making. Raising awareness of factors that influence decision making together with critical reflection upon the nature of this influence would seem an important aspect of enhancing the quality of clinical decision making. The model developed in this study provides a framework for physiotherapists to use when considering factors influencing their decision making.

This research identified a number of consistencies between clinical reasoning in cardiorespiratory physiotherapy and in other areas of physiotherapy practice. For example, as in other areas, cardiorespiratory physiotherapy decision making also involves a range of processes beyond diagnostic decision making that include decision making about intervention, interaction, and evaluation; it varies according to the circumstances and patient problems. These findings are similar to those described by Edwards et al (2004). Other similarities include the presence of a critical and reflexively constructed knowledge base underpinning clinical reasoning, and definable characteristics of highly-experienced therapists as found by Jensen et al (2000).

These similarities support the relevance of applying research from other areas of physiotherapy practice to cardiorespiratory physiotherapy practice. Likewise, the findings of this study have the potential to add to the present understanding of physiotherapy clinical reasoning more broadly by highlighting the impact of factors relating to the nature of the decision, the context, and the physiotherapists themselves on clinical reasoning.

Factors influencing decision making have the potential to change decisions that physiotherapists otherwise would have made. An important example of this is workload. Previous literature has emphasised the effect of high workloads on the time available for decision making and the potential for errors in decision making to occur when time is limited (Kennedy 2004). Eraut (2004) proposed that with limited time, decision makers do not have enough time to think analytically, solve problems, monitor their actions, or consult others. Instead they adopt modes of cognition that rely on the use of routines learned from past experience. This suggests that for novice physiotherapists, high workloads may have a critical effect while they are establishing a model of practice for the future.

The findings from this study also suggest that factors influencing decision making are not external impositions – rather they are woven into decision making in a reciprocal process of negotiating and managing multiple factors to achieve optimal outcomes for patients. This implies that learning to reason clinically involves beginning physiotherapists engaging with this reciprocal process at the same time as learning to determine diagnoses and choose interventions. Likewise, the context- and physiotherapist-dependent nature of clinical reasoning suggests that future research should not isolate decision making from the context in which it occurs.

The findings from this study represent the words and actions of fourteen physiotherapists working in three metropolitan hospitals in Australia. Due to the nature of qualitative research, these findings cannot be generalised to a wider population; readers need to determine the extent to which the findings are transferable to their own setting (Leininger 1994).

In conclusion, the findings and the model presented in this study offer a framework for physiotherapists to critically evaluate their decision making and reflect upon factors that might influence this decision making. Future research is warranted to explore how beginning physiotherapists can best be educated to prepare them for decision making as it occurs in clinical practice, and to explore factors that impact on the quality of decision making. Decision making cannot be assumed to be a subconscious or invisible process; it needs to be considered explicitly, with physiotherapists actively seeking to make decisions that are informed and optimal given the circumstances in which they occur.

Acknowledgements: This study was conducted with financial support from the Australian Physiotherapy Association Physiotherapy Research Foundation and Charles Sturt University. We wish to acknowledge the contribution of the physiotherapists who so willingly opened their clinical practice to our understanding.

Correspondence: Dr Megan Smith, School of Community Health, Charles Sturt University, PO Box 789 Albury NSW 2640, Australia. Email: mesmith@csu.edu.au

References

- Beeston S, Simons H (1996) Physiotherapy practice: practitioners' perspectives. *Physiotherapy Theory and Practice* 12: 231–242.
- Case K, Harrison K, Roskell C (2000) Differences in the clinical reasoning process of expert and novice cardiorespiratory physiotherapists. *Physiotherapy* 86: 14–21.
- Crotty M (1998) *The Foundations of Social Research*. St Leonards: Allen & Unwin.
- Denzin NK, Lincoln YS (2000) Introduction: The discipline and practice of qualitative research. In Denzin NK, Lincoln YS (Eds) *Handbook of Qualitative Research* (2nd edn). London: Sage, pp 1–36.
- Edwards I, Jones M, Carr J, Braunack-Mayer A, Jensen GM (2004) Clinical reasoning strategies in physical therapy. *Physical Therapy* 84: 312–335.
- Edwards I, Jones M, Hillier S (2006) The interpretation of experience and its relationship to body movement: a clinical reasoning perspective. *Manual Therapy* 11: 2–10.
- Eraut M. (2004) Informal learning in the workplace. *Studies in Continuing Education* 26: 247–273.
- Higgs J, Jones M, Edwards I, Beeston S (2004) Clinical reasoning and practice knowledge. In Higgs J, Richardson B, Abrandt-Dahlgren M (Eds) *Developing Practice Knowledge for Health Professionals*. Edinburgh: Butterworth, pp181–199.
- Higgs J, Trede F, Loftus S, Ajjawi R, Smith M, Paterson M, Croker A (2006) Advancing clinical reasoning: Interpretive research perspectives grounded in professional practice. *Collaborations in Practice and Education Advancement Occasional Paper 4*. Sydney: The University of Sydney.
- Jensen GM, Gwyer J, Shepard KF, Hack LM (2000) Expert practice in physical therapy. *Physical Therapy* 80: 28–43.
- Jette DU, Grover L, Keck CP (2003) A qualitative study of clinical decision making in recommending discharge placement from the acute care setting. *Physical Therapy* 83: 224–236.
- Kennedy D (2004) Analysis of sharp-end, frontline human error: beyond throwing out 'bad apples'. *Journal of Nursing Care Quality* 19: 116–122.
- Leininger MM (1994) Evaluation criteria and critique of qualitative research studies. In Morse JM (Ed) *Critical Issues in Qualitative Research Methods*. Thousand Oaks: Sage, pp. 95–115.
- Morse JM (1991) Strategies for sampling. In Morse JM (Ed) *Qualitative Nursing Research: A Contemporary Dialogue* (rev. edn) Newbury Park: Sage, pp. 127–145.
- Moss PA (2005) Understanding the other/understanding ourselves: toward a constructive dialogue about 'principles' in educational research. *Educational Theory* 55: 263–283.
- Packer MJ (1985) Hermeneutic inquiry in the study of human conduct. *American Psychologist* 40: 1081–1093.
- Resnik L, Jensen GM (2003) Using clinical outcomes to explore the theory of expert practice in physical therapy. *Physical Therapy* 83: 1090–1106.
- Rivett DA, Higgs J (1997) Hypothesis generation in the clinical reasoning behaviour of manual therapists. *Journal of Physiotherapy Education* 11: 40–45.
- Roskell C., Cross V (2001) Defining expertise in cardiorespiratory physiotherapy. *British Journal of Therapy and Rehabilitation* 8: 294–299.
- Smart K, Doody C (2007) The clinical reasoning of pain by experienced musculoskeletal physiotherapists. *Manual Therapy* 12: 40–49.
- Thornquist E (2001) Diagnostics in physiotherapy – processes, patterns and perspectives. Part II. *Advances in Physiotherapy* 3:151–162.