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Title: The effect of experience on clinical decision making by cardiorespiratory physiotherapists in acute care settings.

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ABSTRACT

This paper investigates clinical decision making in acute care hospitals by cardiorespiratory physiotherapists with differing degrees of clinical experience. Participants were observed as they engaged in their everyday practice and were interviewed about their decision making. Texts of the data were interpreted using a hermeneutic approach which involved repeated reading and analysis of field-notes and interview transcripts to develop an understanding of the effect of experience on clinical decision making. Participants were classified into categories of cardiorespiratory physiotherapy experience: less experienced (<2years), intermediate experience (2.5-4 years) and more experienced (>7 years). Four dimensions characteristic of increasing experience in cardiorespiratory physiotherapy clinical decision making were identified: 1) an individual practice model 2) refined approaches to clinical decision making 3) working in context, and 4) social and emotional capability. Underpinning these dimensions was evidence of reflection on practice, motivation to achieve best practice, critique of new knowledge, increasing confidence and relationships with knowledgeable colleagues. These findings reflect characteristics of physiotherapy expertise that have been described in the literature. This study adds knowledge about the field of cardiorespiratory physiotherapy to the existing body of research on clinical decision making and broadens the existing understanding of characteristics of physiotherapy expertise.

THE EFFECT OF EXPERIENCE ON CLINICAL DECISION MAKING BY CARDIORESPIRATORY PHYSIOTHERAPISTS IN ACUTE CARE SETTINGS.

INTRODUCTION

This research aimed to identify differences in clinical decision making by acute care cardiorespiratory physiotherapy practitioners with more and less experience, and to identify characteristics indicative of expertise in cardiorespiratory physiotherapy clinical decision making. Understanding the characteristics of expertise has the potential to meaningfully inform educational approaches that will optimally facilitate the professional development of health practitioners. Expertise refers to the possession of highly developed skills or specialist knowledge and is typically associated with extensive experience and professional development within a particular field (Higgs and Bithell, 2001). Rather than a finite point to be reached in professional practice, expertise may be viewed as a journey or process undertaken by practitioners (Jensen et al, 2007). For this reason we did not label our participants as ‘experts’ (people who have reached this point) but rather focussed on expertise, a characteristic that may indeed vary from task to task within an individual. How a profession defines expertise will depend upon the attributes of specialist practice that are seen to be desirable and valued by its members at a particular time (Higgs and Bithell, 2001).

Over the last twenty years much research has been undertaken to identify characteristics of physiotherapy expertise. A review and analysis of the literature was undertaken for the current project to identify potential commonalities in the described characteristics of physiotherapy expertise. Studies of physiotherapy expertise were included in this review if they investigated novice-expert differences, differences between less experienced and more experienced practitioners, or characteristics of expert practice. Although studies of physiotherapy clinical reasoning have typically used experts as participants these studies were not included unless they aimed to distinguish characteristics of experts and non-experts. The studies reviewed were conducted in the fields of paediatrics (Embrey et al, 1996; Jensen et al, 2000; King et al, 2007), geriatrics (Jensen et al, 2000), orthopaedics or outpatient musculoskeletal physiotherapy (Jensen et al, 2000; Jensen et al, 1992; Resnik and Jensen, 2003) and neurology (Beeston and Simons, 1996). There was not any evidence identified that cardiorespiratory physiotherapy in acute care settings had been included in this physiotherapy research. Case et al (2000) reported findings of a study of novice-expert differences in cardiorespiratory physiotherapy using paper-based case studies. By using an approach that

did not involve studying practitioners in actual work settings only limited comparison can be made from this study to the wider body of contextualised decision making research. Research approaches to the study of expertise in physiotherapy have typically used qualitative research methods that allow for the study of practitioners as they engage in their everyday practice and preserve the contextual nature of expertise (Jensen et al, 2007). Removing practitioners from their work environments makes the contextual aspect of expertise less visible and accessible to the researcher.

There are common characteristics of practice by ‘expert’ and more experienced practitioners, even across different fields of physiotherapy practice. The findings of the literature review are presented in Table 1. Expert practitioners demonstrate increased use of strategies that empower patients to be active participants in their own therapy. They also employ strategies to understand patients and their problems and to customise intervention to the needs of individuals. A number of the study authors have referred to these two characteristics as a way of expressing and implementing patient-centred care (Beeston and Simons, 1996; Resnik and Jensen, 2003). Other common characteristics of expert practice identified in this literature review include the possession of an individual practice model, philosophy or approach to their practice and a broader, deeper, well organised knowledge base tailored to their practice. Expert practitioners have also been found to demonstrate a greater level of self-awareness and involvement of self in practice and they engage in higher levels of reflective, metacognitive behaviour that shapes their evolving practice (Jensen et al, 2000, Resnik and Jensen, 2003). Although these broad commonalities exist, inconsistencies have also been identified within the specific attributes of expertise. For example, Embrey et al (1996) identified that paediatric practitioners made multiple rapid changes to the intervention procedures they were using during their physiotherapy sessions. This finding has not been noted by others. Inconsistencies in research findings is not surprising given the diverse nature of physiotherapy practice (for example when comparing physiotherapy for patients requiring admission to intensive care units to physiotherapy for ambulatory individuals attending a community based physiotherapy practice). Expertise is a complex phenomenon and a broad base of research is required to reveal a deep understanding about its nature in physiotherapy.

Insert Table 1 approximately here

OUR STUDY

Our research was undertaken to compare clinical decision making by cardiorespiratory physiotherapy practitioners of varying levels of experience. We also aimed to determine if characteristics described in the literature as typical of physiotherapy expertise were evident in the practitioners we studied. Acute care settings were chosen for this study. They are particularly complex working contexts and physiotherapists need to learn to negotiate these contexts in order to achieve successful outcomes for their patients. Given the potential importance of context on decision making (i.e. determining diagnoses requires understanding of multiple situation-specific variables and treatment planning/implementation/evaluation is dependent on the specific patient/task/setting context) we chose to study physiotherapists as they engaged in their normal daily work.

METHODS

Research approach

This research used qualitative methods to collect and analyse data from participants as they engaged in their daily practice of cardiorespiratory physiotherapy. Within the array of qualitative methods philosophical hermeneutics based on the work of Gadamer (1975) was used as the guiding method for this research. Hermeneutics is a method that involves researchers interpreting or finding meaning in texts. Originally used in the interpretation of biblical texts hermeneutics has been extended to research investigating human action (Crotty, 1998). The goal of our research was to develop an understanding of decision making by interpreting the actions and explanations of physiotherapists as captured through observation and interviews. The hermeneutic research process involves developing texts (e.g. interview transcripts and field-notes) that represent the phenomenon or action of interest and then analysing these texts. Hermeneutics was therefore considered well-suited for our research (see Ajjawi et al 2007; Barnitt and Partridge, 1997; Thornquist 2001 for examples of research using hermeneutics from physiotherapy). Other qualitative research strategies such as ethnography, which might focus on understanding and portraying a broader concept like culture of a workplace, or hermeneutic phenomenology, which might focus on deeply understanding and portraying the lived experience of being a cardiorespiratory physiotherapist, were considered less suited for this purpose.

Philosophical hermeneutics acknowledges that individuals will bring their pre-understandings to the phenomenon they are seeking to interpret (Palmer, 1969). In the case of our research

we had between twelve and twenty-five years experience of physiotherapy practice and had all been involved in the practice of cardiorespiratory physiotherapy. We all have experience in teaching physiotherapy with Megan Smith and Elizabeth Ellis having experience in teaching cardiorespiratory physiotherapy. Joy Higgs has published widely in relation to clinical reasoning and professional practice. These prior experiences resulted in us having beliefs about the nature of cardiorespiratory physiotherapy decision making and expertise. Throughout the research we reflexively considered how we were collecting and interpreting the texts given our pre-understandings. We practised reflexivity as described by Finlay (2003) which is a “process of continually reflecting upon our interpretations of both our experience and the phenomena being studied so as to move beyond the partiality of our previous understandings and our investment in particular research outcomes” Finlay (2003, p. 108). We were also guided by Leonard who notes that “the imperative in an hermeneutic study is to make sure that the integrity of the text is maintained and that the researcher does not become enmeshed in the study and thus unable to distinguish his or her own responses from what the text is saying” (Leonard, 1989 p. 53).

Participants

The participants in this study were fourteen physiotherapists engaged in the practice of cardiorespiratory physiotherapy in acute care settings. Purposive sampling was used to recruit participants from three metropolitan Australian hospitals who met the criteria for inclusion (as shown in Table 2). Participants were included if they were engaged in the practice of cardiorespiratory physiotherapy for more than 24 hours a week and had more than 4 weeks clinical experience in cardiorespiratory physiotherapy practice. Stratified purposive sampling was used to ensure that representatives from the range of clinical experience and areas of cardiorespiratory practice were included. The final participants had between 4 months and 12 years experience of physiotherapy practice and are described in Table 3.

Insert Table 2 approximately here

Research participants have been recruited to studies of expertise on the basis of their level of experience (Embrey et al, 1996), patient outcomes achieved (Resnik and Jensen, 2003), identification by peers (Jensen et al, 2000), self identification, or some combination of these methods (King et al, 2007). Each of these methods of participant recruitment can be problematic. Identifying experts upon recommendation can depend on views about what

constitutes expertise of those making the nomination. Roskell et al (2001) in a UK based study aimed to achieve consensus regarding the characteristics of cardiorespiratory physiotherapy expertise. Using a Delphi approach these authors revealed differing levels of agreement between national experts, senior 1 and senior 2 physiotherapists regarding attributes of expertise. For example, critical thinker/evaluator was ranked 1 by national experts, fourth by senior 1 physiotherapists and sixth by senior 2 physiotherapists. The use of patient outcomes as a recruitment strategy may be more applicable to some fields of physiotherapy than others. For example in cardiorespiratory physiotherapy where multiple professionals are involved in patient care, patient outcomes may be less easily attributable to the actions of individual practitioners than in for example musculoskeletal physiotherapy. Increased duration of clinical experience is closely associated with expertise; however, this is not an implicit relationship with more experienced practitioners not always demonstrating performance that can be judged as expert (Ericsson, 2005). In this study the decision was made to recruit participants on the basis of experience rather than impose pre-determined assumptions about the nature of cardiorespiratory physiotherapy expertise. The aim was to describe how cardiorespiratory physiotherapy decision making changes with increasing experience and to then compare the literature describing characteristics typical of expertise with the characteristics seen in the cardiorespiratory physiotherapists who took part in this study.

Participants recruited to the study were classified into three categories that allowed them to be differentiated according to their experience of cardiorespiratory physiotherapy practice.

These were:

- less experienced or novice cardiorespiratory physiotherapy practitioners (five practitioners),
- intermediate level of cardiorespiratory physiotherapy experience (three practitioners)
- more experienced cardiorespiratory physiotherapy practitioners (six participants).

The less experienced practitioners were all working in rotating positions at the time of the study. For example they spent up between 8 weeks and 3 months in one setting before rotating to a new area of practice. The intermediate and more experienced practitioners were all working in fixed positions.

Insert Table 3 approximately here

Data collection

The data for this study were collected using a combination of observation and semi-structured interviews. The goal of the data collection was to construct texts that represented the decision making of the participants; consistent with the hermeneutic approach. Field-notes were taken during the observation that recorded the conversations and actions of the physiotherapists and represented the outward expression of their decision making. The interview transcripts represented participants' answers to questions that required them to access, interpret and explain their decision making. Participants were observed on two separate days as they conducted their usual daily work. The researcher (first author) recorded the observations using field-notes, recording the actions, conversations and comments by the participants. A critically reflexive stance was maintained by the researcher throughout the data collection to ensure that the data recorded was reflective of the participant's practice. Participants were interviewed on both days when the observation occurred; for a short-period (10-15 minutes) after each patient care episode in which their clinical decision making with the previous patient was discussed and a separate longer interview to more deeply explore their experience of decision making in cardiorespiratory physiotherapy (45 minutes). During the longer interview memorable decision making incidents drawn from their experience and questions about observed clinical decision making and actions were explored. Participant checking was undertaken to confirm that the researcher was observing and capturing clinical decision making as experienced by the participant. This checking process also allowed a deeper exploration of the phenomenon in subsequent interviews.

Data analysis

The texts in the form of interview transcripts and field-notes were analysed and interpreted using hermeneutic principles. All texts were read and re-read in a process of immersion. The hermeneutic metaphor of the hermeneutic circle was used to guide the analysis of each piece of text in relation to the developing understanding of clinical decision making as a whole. A process of question and answer was used to approach each text, seeking answers to the research questions. Texts were initially read in a random order irrespective of level of experience of the participant to develop an overall interpretation of the text. The texts were then interpreted for the influence of experience with texts for all novices considered together, as were those of the intermediate group and the more experienced group, to identify commonalities and differences that existed within and across each level of experience.

Finally the texts were interpreted to clarify the differences between the least experienced and the most experienced participants.

Numerous strategies were used throughout the research to ensure the credibility and authenticity of the findings. As noted the researchers reflected upon and made explicit their pre-existing beliefs about the nature of cardiorespiratory decision making and implemented reflexive strategies throughout the research process to ensure that the decision making of those being studied was the clear focus of this study. Authenticity of the findings of this study was ensured by collecting data while practitioners were engaged in their everyday work. Multiple sources of data, observation and interview, were used to ensure a more complete understanding of the phenomenon. Authenticity was also ensured by returning preliminary analyses of the texts to the participants prior to the second day of observation and interview. This allowed participants to comment on the extent to which the data being collected and the preliminary interpretation made by the researcher was representative of their decision making. Throughout the data collection and analysis a procedural and analytical log were kept to document reflections and decision making in the research. The research was conducted with the ethical approval of the University of Sydney and all hospitals involved in the study. All participants gave informed consent to participate and throughout the study strategies were implemented to ensure the anonymity of the participants and their data. All participants were given a pseudonym that reflected their level of experience. Novice practitioners were given names beginning with N, I is used for names of participants with an intermediate level of experience and E for practitioners with higher levels of experience.

RESULTS

Clinical practice as experienced by the acute care physiotherapists participating in this study was determined by the researchers to evolve with increasing experience such that differences between less and more experienced participants were able to be distinguished.

Cardiorespiratory physiotherapy clinical decision making evolved on a continuum from novice to experienced practice along four inter-related dimensions: 1) an individual practice model that was informed by a multi-dimensional knowledge base and personal attributes of the practitioner; 2) refined approaches to clinical decision making, 3) working in context and 4) developing social and emotional capabilities. (Each of these dimensions is discussed below). The evolving nature of clinical decision making was underpinned by a motivation to learn from practice and improve practice, the use of monitoring and reflection on practice,

ongoing critical appraisal of knowledge and practice, enhanced confidence in practice and relationships with work colleagues.

Not all practitioners within each category were found to have identical characteristics. The unique expression of practice in the individual reflected their total amount of cardiorespiratory physiotherapy experience, the specific context of practice they were currently working in and had previously worked in, and their unique practice experiences. Although we identified a category of participants with an intermediate level of experience this group were found to have characteristics that represented the transitional nature of experience and shared characteristics of both less and more experienced practitioners. In the remainder of the results we have chosen to discuss the characteristics that were typical of the two ends of the experience continuum.

An individual practice model

A characteristic of more experienced practice was the existence of well-developed and well-articulated practice models or approaches to practice. Practice models guided the specific decisions participants made and the actions they took. Less experienced practitioners showed less evidence of a defined practice model. Rather their practice model reflected approaches consistent with copying and following the actions of others, fitting in with common practices in the setting, and being consistent with recent university teaching.

I did usually follow what was done the day before, but having said that, I still looked at the parameters if there were any changes in condition that would need a change in treatment. But if a previous treatment was working and there was no particular changes in the patient then I usually did continue [with what was being done] (Nadine).

I tend to have a quite a “get them up early, walk them, sit them up” kind of focus whereas different members of staff here might have a more “hands on, perc’s vibes, side lying, positioning approach”, not that it doesn’t work, but it just doesn’t tend to be the way I tend to do things (Ingrid).

Practice models in the experienced practitioners reflected personally and contextually derived theories of practice, a multi-dimensional knowledge base, practitioners’ sense of identity as cardiorespiratory physiotherapists and personal attributes. More experienced practitioners

became increasingly more confident and reliant upon their own clinical decision making and brought more life and clinical experiences to their practice. They also recognised how to use attributes of themselves in their practice to achieve outcomes, seeing themselves as part of the therapeutic instrument.

Understanding the different ways that people cope with the situation they are in, what styles they respond to, being able to modify your own style according to the patient, being more relaxed with some people and more directive with other people ...I think that knowledge and understanding of people, interpersonal stuff and how to motivate people, how to build rapport quickly, communication skills, that sort of stuff is often the difference between having success with a patient (Eleanor).

More experienced practitioners described a knowledge base that was multidimensional, personalised, broad, deep and more organised for practice than the knowledge base of less experienced practitioners. The organised nature of their knowledge was used to determine the degree of 'fit' of the current circumstances with expectations derived from their experience and enabled faster and more complex clinical decision making.

I think once you repetitively see things you start to recognise patterns and very much how people look and don't look and I think you are faster to think of differential diagnosis and change, or something that doesn't fit – now I am more quickly able to do that in a shorter period of time than I did before ... I think also with the complexity of being comfortable with the actual knowledge base as well the knowledge of the interplay of the physiological systems, time courses, disease courses, I think that is broader now than it was, and it is just exposure to things I guess – making sense of things (Eleanor).

More experienced practitioners referred to a body of propositional knowledge (information and facts) and a body of procedural, contextual, predictive, interpersonal and self knowledge that informed their practice. Practitioners developed a knowledge base for practice with an internal focus in which they had developed and refined their own set of rules and criteria for safe effective practice. They tended to critique protocols and generic rules that governed practice interpreting the boundaries of practice according to the circumstances. For less experienced practitioners their knowledge base had a more external focus and reflected

published contraindications and precautions, local rules and advice from work colleagues. The practical knowledge of more experienced practitioners was largely developed through the critical appreciation of both their experience with patients, particularly experiences of successes and failures and knowledge transmitted from others with whom they worked.

ICP [Intra-cranial pressure] must've been about 30, we tend to not touch anybody unless it's under 20 (Natasha).

I tend to treat people with a higher limit of ICP than other staff would treat - my cut off is about 35 (Elle).

More experienced practitioners demonstrated better awareness of the limits of their knowledge with respect to what could be known. In contrast less experienced practitioners faced uncertainty about the adequacy of their knowledge. They were aware of having less knowledge; however, found they were unable to differentiate between their own knowledge and what could be known.

One of the biggest differences is that [the senior physio] was quite confident about what all those options were. Instead I've always got this feeling like there's something I'm missing (Natalie).

Refined approaches to clinical decision making

More experienced practitioners adopted approaches to clinical decision making that were more specific, creative and refined towards the individual needs of patients and the context in which they worked. This resulted in a style of practice that was flexible, adaptive and used previous experience to predict the outcomes of their actions. In contrast less experienced practitioners focused on providing an intervention, rule following and meeting expectations. Clinical decision making for more experienced practitioners was revealed as a process of making an optimal decision in relation to the task and context at hand. In contrast less experienced practitioners expressed a sense of there being a “right” decision to be made.

I think as time has gone on I have become better at making those decisions as to whether intervention is warranted or whether it is detrimental ... I think as time goes on I have become better and better at weighing through the indications, the contraindications, the possible detrimental effects and weighing those up in line of treatment choices I have made ... 10 years ago I

probably wouldn't have been able to make some of the decisions that I am making now. Purely because of lack of experience (Erica).

Uncertainty was an ever present aspect of practice for all participants. The more experienced participants were noted to handle uncertainty in clinical decision making more effectively. They displayed a sense of practical certainty, being better able to engage in risk-taking that reflected wisdom gained through experience of the likely risk of adverse effects and the potential benefits to be gained from the intervention. The possession of a greater knowledge base decreased the relative uncertainty of clinical decision making. The less experienced participants were more cautious in trying interventions and sought the judgements of others in order to decrease their uncertainty.

Working in a context

Experienced decision making was reflective of greater awareness of, and the integration of context into practice. More experienced practitioners demonstrated a broader perspective on patients' contexts and their workplace context. They specifically considered and negotiated contextual factors that impacted on their clinical decision making. Their actions reflected the ability to be more flexible and adaptive in relation to the context surrounding the decision they wanted to make. They responded to contextual limitations by being inventive, critiquing and searching for the most optimal outcomes. In contrast less experienced practitioners were constrained and limited by context and were more likely to compromise on decisions they would have liked to make.

Yes, that is life in a normal hospital. There is the ideal, and there are modifications that you have to make all the time because of all those external factors. That comes with the territory. I guess it is being aware of all those constraints, and setting stuff up so they have less of a negative impact (Eleanor).

Every day I was struggling, I couldn't even get through my workload which didn't seem to be appreciated by anybody and there was just this constant stress of everyone's patient was the most important person and if I hadn't seen their patient then I wasn't doing my job basically and obviously there were

*people I wasn't seeing or wasn't seeing as much as they would've liked
(Natalie).*

Social and emotional capability

More experienced practitioners showed greater capability in managing the social relationships with patients and colleagues, the emotional aspects of their work and their own emotions. In comparison to less experienced practitioners they were better able to identify their emotions in relation to their work and to recognise and manage emotions in others.

Social relationships require effective means of interaction and communication. Less experienced practitioners tended to interact with patients in a fixed way or style. With increasing experience there was a greater awareness that the style of interaction used could be negotiated according to individual patients. Likewise in interactions with other team members less experienced practitioners tended to work within discipline boundaries and interacted for the purposes of gaining knowledge and as needed to complete tasks. More experienced practitioners on the other hand placed greater emphasis on collaboration in general, sharing of knowledge and collaborative clinical decision making.

A consistent characteristic of increasing experience was increasing levels of confidence in clinical decision making.

I sometimes feel like that with more experience I have the confidence to look at his objective signs objectively and work through an objective treatment plan, having experienced patients like that before. So it takes out of the equation in your clinical decisions, the anxiety that I think you often feel when you're inexperienced, there's that factor that's often present, thinking is this right? Am I messing this up? (Isabella).

For less experienced practitioners low levels of confidence were associated with fear and anxiety and inhibited the nature of practice where risk was involved. More experienced practitioners were better able to identify negative emotions in themselves, minimise these and separate negative effects of emotion from the situation in order to achieve positive outcomes.

I'll go see [the senior physio], not wanting to treat and I'll say they have got this and this, and try to sell the idea of not treating, just to back yourself up and think that you have made the right decision and it's not just fear and

you'll get there and [the senior physio] will say, no you know go ahead just go ahead and watch that and that and it will be fine (Nicole).

Factors underpinning changes in clinical decision making with experience

Changes in practice with increasing experience were underpinned by motivation to provide best practice, the use of reflection on experience (for example thinking about successes and failures with patients), critique of new information before adding it to their knowledge base and increased self-confidence in their practice.

Because I enjoy it too much. In the midst of all that there will be a few patients where you think - yes that worked - or how will I progress that now - or that was interesting. And going to uni means I will not be there in the afternoon, [so that] can give quite a lot of stress [but having] the opportunity to really indulge in the literature again, keeps that inspiration going (Emma).

Also evident was the contribution to the evolution of clinical decision making made through relationships with more experienced physiotherapists and other health professionals such as medical staff and senior nursing staff. These colleagues were used as valuable sources of knowledge and guidance by practitioners to build their knowledge base and practice model.

DISCUSSION

The findings of this study demonstrated that practitioners with more experience of cardiorespiratory physiotherapy share a number of common characteristics. These characteristics allowed the clinical decision making practice of these practitioners to be distinguished from that of their less experienced colleagues. A number of the characteristics of the more experienced practitioners in our research are consistent with characteristics of physiotherapy expertise described in our review of the literature (see Table 1). However, the participants in our study revealed a number of features that may be distinctive to the practice of the cardiorespiratory physiotherapists.

In common with previous research in other fields of physiotherapy this study found that these physiotherapy practitioners focussed on adapting and customising their practice to the needs of individual patients. These cardiorespiratory physiotherapists developed an understanding of patients, and creatively adapted their therapy to patients' unique needs. In contrast to previous research, however, there was less evidence in this study of a consistent use by the

physiotherapists of strategies to empower patients to be actively involved in their therapy through the use of collaboration and teaching. In cardiorespiratory physiotherapy practice in acute care settings interventions are often short-term in nature with patients who may be critically unwell. This may result in practitioners placing less emphasis on patient collaboration as an important factor in patient outcome. An exception to the general finding in our study was a practitioner working in respiratory medicine with patients with chronic respiratory illness who placed greater emphasis on the importance of teaching and empowerment in her management approach. This may imply that the characteristic of using strategies to empower patients seen in expert practitioners may reflect their capability to adapt their therapy approaches to achieve optimal therapy outcomes given the context, rather than empowering patients being a particular characteristic of physiotherapy expertise itself.

The existence of an individual practice model or philosophy of practice with increasing experience is consistent with previous research findings. Jensen et al (2007) in a revision of their theory of expertise in physiotherapy published in 1999 (Jensen et al, 1999) have added philosophy of practice. The evolution of individual models to guide practice would seem to reflect the refining of practice that occurs as practitioners reflect upon the daily demands of their clinical practice and determine optimal strategies to meet these demands. The evolution of practice models would seem to be occurring in parallel with the construction of organised multi-dimensional frameworks of knowledge. The participants in this study had practice models that emphasised achieving outcomes related to cardiorespiratory health. ‘Movement’ has been identified as central to the conceptual frameworks used by physiotherapists across a number of fields of physiotherapy practice (Jensen et al, 2000). This research did not include cardiorespiratory physiotherapy practice and we did not find movement as a central framework in this study. This might imply that expert physiotherapy practice may involve the development of frameworks for practice that are relevant to the focus of practice rather than a more general physiotherapy relationship to movement that is applicable across all fields.

The clinical decision making processes and resultant actions of participants in this study varied according to levels of experience. Many studies of physiotherapy reasoning have involved the exclusive study of experts, and thus the contrastive nature of their clinical decision making when compared to less experienced practitioners is less clear. Research from medicine supports distinct differences between novices and expert clinical decision making (Patel, Kaufman, and Magder, 1996). Expert medical practitioners have been found to have

more organised knowledge bases that allow them to make decisions by recognising patterns in patient illness presentations. Experts use these patterns in rapid forward reasoning processes. The findings of our research indicate that more experienced cardiorespiratory physiotherapy practitioners also make clinical decisions that are based upon recognising patterns of patient presentation to determine patient problems and predict likely responses to intervention.

Jensen et al (1992) determined that expert physiotherapists were better able to control distractions in their context while providing patient care. We have found the cardiorespiratory physiotherapists in this study learnt to negotiate and incorporate their context into their clinical decision making to determine an optimal course of action given the circumstances. This suggests that a characteristic of more expert physiotherapy decision making is flexibility and adaptability and that they have the ability to make judgements about appropriate levels of compromise when faced with competing demands. Uncertainty is commonly associated with clinical practice in acute care settings. In our study more experienced physiotherapists made decisions with a practical certainty that was underpinned by higher levels of self-confidence about their practice and decision-making ability.

The motivation to provide optimal care, the use of reflection to evaluate experiences with patients, the critical assessment of new knowledge, progressive increases in self-confidence were key factors that underpinned the transition from novice to expert. These findings support the results of previous research which suggests that deliberate activities are required to develop advanced levels of practice (Ericsson, 2005). Interestingly we noted that these features were not exclusive to more experienced practitioners rather they were present across all levels of experience. Practising in relationships with others who are positive role models in the development of expertise (Ericsson, 2005) is also supported by our study.

These research findings report on a qualitative study of a select group of cardiorespiratory physiotherapy practitioners. The sampling process aimed to recruit participants engaged in practice that was typical of contemporary cardiorespiratory physiotherapy practice; however, qualitative research uses methods where readers should determine if the results are relevant and transferable to their own clinical practice rather than generalising these findings to all cardiorespiratory physiotherapists. This study is limited to the practice of adult

cardiorespiratory physiotherapy in acute care settings and may not be applicable to cardiorespiratory practice in rehabilitation settings, rural practice or in paediatrics.

Expertise is a complex phenomenon and further research to deeply understand its nature in physiotherapy is warranted. For example, of interest to educators would be the investigation of factors that facilitate and inhibit the growth of expertise. Additionally professional definitions of expertise could be explored to better define which attributes held by advanced practitioners are particularly important for optimal patient care and how these attributes might be enhanced.

In conclusion, we found that there were differences in the characteristics of clinical decision making by cardiorespiratory physiotherapists with more and less experience. Higher levels of experience were consistent with many of the characteristics of physiotherapy practice expertise as described in the literature. Our study has added to the previous understanding of expert physiotherapy practice by revealing that decision making processes are increasingly integrated with managing and negotiating the specific context in which decisions are made. Cardiorespiratory physiotherapy in acute care settings differs from other fields of physiotherapy due to the particular focus on cardiorespiratory health, the short-term acute nature of patients' problems and the higher likelihood of significant negative consequences (morbidity and mortality) of inadequate decision making and intervention. Becoming an expert in cardiorespiratory physiotherapy would appear to require the ability to flexibly adapt to the specific nature of this type of physiotherapy practice.

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Table 1: Categories of experienced and expert practice in physiotherapy

Categories of expert practice evident in the literature	Reported elements and actions associated with categories of expert practice	Authors
Collaboration and promotion of patient involvement	<ul style="list-style-type: none"> • Teaching is considered an important skill • Empower patients in therapy • Employ a supportive, educational role • Use relationship or partnership strategies • Motivate the client/family • Support the client/family as decision maker • Patients are included as active participants in therapy • Collaborate in problem solving • Emphasise patient education • Facilitate patients to be independent • Value handling, teaching and negotiation 	<p>Jensen et al 1992 Jensen et al 2000 Resnik & Jensen 2003 Embrey et al 1996 King et al 2007 Beeston & Simons 1996</p>
Customised care to patients and understanding of patients and their carers	<ul style="list-style-type: none"> • Establish intense focussed connection with patients using verbal and non-verbal communication • Focus on the psychosocial needs and input of the patient • Focus on patient function and strengths • Have a greater appreciation of the patient’s context • Match the intervention to the unique goals and needs of the patient • Tailor the intervention session to the client/family • Plan a relevant, customised approach • Ensure the appropriateness and feasibility of intervention • Possess an ethic of caring and respect for individuality • Work in harmony with the patient and carer • Start with the patient 	<p>Jensen et al 1992 Jensen et al 2000 Resnik & Jensen 2003 Embrey et al 1996 King et al 2007 Beeston & Simons 1996</p>
A practice approach, philosophy or model of practice	<ul style="list-style-type: none"> • Have knowledge of principles of change • Have therapeutic strategies linked to a philosophy of practice • Movement is a central focus for their practice • Recognise potential for the patient to change 	<p>Jensen et al 1992 Jensen et al 2000 Resnik & Jensen 2003 King et al 2007 Beeston & Simons 1996</p>

Categories of expert practice evident in the literature	Reported elements and actions associated with categories of expert practice	Authors
A body of knowledge for practice	<ul style="list-style-type: none"> • Evaluate and use patient illness and disease data as a framework for interviewing and are able to deviate from this framework during reasoning • More confident in predicting patient outcomes linked to an integrated cognitive framework • Use movement patterns/schemata to identify abnormal movement • Schemata are linked to intervention choice • Have a broad multi-dimensional knowledge base from a range of sources, • Knowledge is centred on the patient • Critically think about patients as a source of knowledge • Use formal and informal knowledge to answer complex clinical problems 	<p>Jensen et al 1992 Jensen et al 2000 Resnik & Jensen 2003 Embrey et al 1996 King et al 2007 Beeston & Simons 1996</p>
Comfort with uncertainty	<ul style="list-style-type: none"> • Are comfortable with uncertainty • Manage uncertainty during their daily work 	<p>Jensen et al 1992 Jensen et al 2000 King et al 2007</p>
Flexible, adaptive, and more rapid practice during therapy	<ul style="list-style-type: none"> • Demonstrate smooth integrated performance • Make more frequent procedural changes • Have a less judgemental and more flexible approach to therapy 	<p>Jensen et al 1992 Embrey et al 1996 King et al 2007</p>
Evidence of self in practice	<ul style="list-style-type: none"> • More affirming in self-monitoring • Self-knowledge includes heightened humility and increased self-confidence • Motivated to continue learning • Inquisitive • Possess virtues of caring and commitment aiming to do what is best for patient • Seek harmony in their practice • Have a high level of personal involvement and commitment with a sense of purpose and professionalism 	<p>Jensen et al 1992 Jensen et al 2000 Resnik & Jensen 2003 Embrey et al 1996 King et al 2007 Beeston & Simons 1996</p>
Self-monitoring and reflection during practice	<ul style="list-style-type: none"> • Use reflection and thinking about practice • Engage in self-monitoring 	<p>Jensen et al 2000 Resnik & Jensen 2003</p>
Other	<ul style="list-style-type: none"> • Better able to control the surrounding environment in their practice • Have a more holistic perspective of the patient and their practice (can see the big picture) 	<p>Jensen et al 1992 King et al 2007</p>

Table 2: Participant inclusion criteria

Inclusion criteria
<ul style="list-style-type: none"> Actively engaged in the practice of cardiorespiratory physiotherapy >24hours per week minimum of 4 weeks experience in cardiorespiratory physiotherapy Current or recent practice in an acute care cardiorespiratory physiotherapy setting Current or recent practice in an adult cardiorespiratory physiotherapy setting Willing and able to discuss clinical decision making

Table 3: Summary of participant categories and characteristics

Pseudonym	Duration of experience	Area of cardiorespiratory practice	Duration of cardio respiratory physiotherapy experience
Novice: < 2 years experience, Cardiorespiratory physiotherapy for >4 weeks, rotating position			
Natalie	18 months	Abdominal surgery	15 months
Natasha	20 months	Cardiothoracic surgery	6 months
Nicole	15 months	Intensive Care Unit	8 months
Naomi	19 months	Intensive Care Unit	10 months
Nadine	4 months	Intensive care, post-surgery	4 weeks
Intermediate: 3.5-5 years physiotherapy experience, 2.5-4 years Cardiorespiratory physiotherapy, non-rotating position			
Isabella	4 years	Intensive Care Unit	3 years
Ingrid	5 years	Coronary care, cardiovascular conditions	4 years
Irene	3.5 years	Intensive Care Unit	2.5 years
Experienced: 8-12 years physiotherapy experience, 7-10.5 years Cardiorespiratory physiotherapy experience, non-rotating position			
Emma	12 years	Respiratory medicine	10.5 years
Eve	9 years	Cardiothoracic surgery/intensive care	7 years
Erin	10 years	Respiratory, post-surgery	7 years
Erica	10 years	Intensive care/respiratory	8 years
Eleanor	10.5	Respiratory, post-surgery, organ transplant	8.5 years
Elle	8.5 years	Post-surgery, post-trauma, intensive-care	7 years