



Original Article

Clinical reasoning in osteopathy: Experiences of novice and experienced practitioners



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ABSTRACT

Background: A number of clinical reasoning models, including hypothetico-deductive, pattern recognition and narrative reasoning have been identified in both novice and experienced medical, nursing and allied health professionals. The aim of this project was to explore clinical reasoning in osteopathy from the perspectives of both experienced practitioners and novice practitioners.

Methods: Data were collected via semi-structured interviews that encouraged practitioners to reflect on the clinical reasoning processes they used in response to two case studies. Interviews were transcribed and analysed to identify key themes.

Results: Two themes emerged: (1) that experienced and novice osteopaths demonstrated different approaches to clinical reasoning, and (2) that experiential findings (e.g. from observation and palpatory findings derived from having direct contact with the patient) were integral to clinical reasoning in osteopathy.

Conclusion: The results of this study suggest that clinical reasoning in osteopathy is similar to that of other health professions in that deep understanding of clinical applications and clinical experience were key factors in developing sophisticated clinical reasoning processes. However, clinical reasoning in osteopathy, unlike many other health professions, relies on experiential findings resulting from direct observation and palpatory contact with the patient. Clinical reasoning that relies on subjective experiential findings requires further investigation.

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Implications for Practice

- Novice osteopaths are more likely to rely on the formulaic approach of hypothetico-deductive reasoning, but as they become more experienced, they move freely between hypothetico-deductive, pattern recognition and narrative reasoning.
- Osteopathic practitioners, whether novice or experienced, clinically reason in a similar way to other health professionals.
- Clinical experience is integral to pattern recognition.
- Palpatory findings are an essential part of osteopathic clinical reasoning.

Introduction

Clinical reasoning (CR) has been defined as a process in which 'the therapist, interacting with the patient and others (such as family members or others providing care), helps patients structure meaning, goals, and health management strategies based on clinical data, patient choices, and professional judgment and knowledge' [17]; p. 3). This definition reflects the move from problem-centered descriptions of CR to those where the patient's contribution to the reasoning process is acknowledged [1,8,9,13,15,20]. However, CR is also influenced by practitioners' experience, education levels, specialization and communication style [10,15,16,19,25], with problem-solving rather than patient-centeredness being the foundation of novice practitioners approaches to CR [8,9,16].

A number of models of CR have been identified including hypothetico-deductive (HTD), pattern recognition (PR) and narrative reasoning (NR). The HTD model is analytical, with critical

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thinking and deductive reasoning involved in hypothesis testing based on prior knowledge [16]. The PR model refers to an intuitive approach, using reasoning based in inductive logic [4] and drawing on prior experience in similar situations [41]. NR is defined as a collaborative discourse between clinician and patient, whereby the clinician understands the patient's perspective and a management plan is agreed upon together [26]. NR models go some way to understanding variation in predicting diagnostic success, as they recognise the influence of social and environmental interactions [12] and physical responses and emotions [22] on clinical reasoning.

It was previously thought that novice practitioners relied on the HTD model exclusively until they had developed sufficient clinical experience and expertise, by which time they replaced HTD with the more intuitive reasoning model [21,26]. However, HTD reasoning has been recognised as the keystone of clinical reasoning in both novice [8,15,25,26] and expert healthcare practitioners [26,41]. Croskerry [4] highlighted this interplay of CR models in both experienced and novice practitioners, arguing that depth of subject knowledge rather than clinical experience was the likely key factor that influenced the sophistication of CR used [1,15,32,33,41]. It appears that clinical reasoning is highly dependent on the knowledge and knowledge organisational skills of the health professional [35]. PR and NR may feature more prominently in experienced practitioners as they tend to move easily between models, which may facilitate a more patient-centered approach [16,26,27]. However, more recent evidence suggests PR can be learned without experience [1,32,33,41].

There has been little research into CR in osteopathy [28,40,41]. From the available literature it appears that CR in osteopathy is similar to that in other health professions (e.g. nursing, physiotherapy) in that osteopaths appear to use HTD, PR and NR [28,39,41]. [40] described three conceptions of osteopathic practice based on the CR approaches used by practitioners: practitioner-centered osteopathy, collaborative osteopathy, and osteopathy as empowerment, representing a spectrum of clinical reasoning approaches from analytical, to pattern recognition, to narrative reasoning. There has been no research that compares CR in experienced and novice osteopathic practitioners.

The aim of this project was to explore CR in osteopathy from the perspectives of practitioners with a minimum of 10 years' clinical experience and recent graduates with less than 3 months' clinical experience. Comparisons of these perspectives can facilitate our understanding of the CR process in this specific group of health professionals.

Materials and methods

This qualitative research design was informed by a similar study investigating the CR of 12 physiotherapists (average 12.89 years of clinical practice) [38]. An interpretive approach was appropriate for understanding meanings that are constructed in ways that are unique to their context [6] and that are manifest in the language and conduct of practitioners [18]. This study used a multiple case study design to explore CR in novice osteopaths with less than 3 months clinical experience and experienced osteopaths with at least 10 years clinical experience. Case study research can provide 'an in-depth appreciation of an issue, event or phenomenon of interest, in its natural real-life context' [7]. According to Yin (2009, p.18) case study research is particularly useful when the 'boundaries between phenomenon and context are not clearly evident'. In this multiple case research, the 'cases' were the osteopaths who participated in the study, the units of analysis were their responses to a series of questions designed to elicit their CR processes, and the contexts including their years of clinical experience.

Two case studies were given to each participant in order to differentiate the CR processes of novice and experienced practitioners in our study. The cases were initially designed by a group of experienced clinical educators based on real cases seen in practice, and have been used in problem based education over a number of years and adjusted in response to student feedback with regards to clarity and depth. This procedure created opportunities for elaboration of reasoning processes, and to elicit qualitative data about CR. Data were obtained through structured interviews via Skype, telephone or in person, lasting approximately 1 h (30 min per case). Information was given to the interviewee in three stages: (1) the presenting complaint, (2) further information about the patient history, and (3) physical examination and investigation findings. Standardised questions were asked at each stage to allow interviewees to verbalise their thought processes (see [Appendix 1](#)), following an established process used in problem based tutorials. A specific focus of the research was the ways in which practitioners made CR decisions and built a clinical picture based on the information provided. Ethical approval was provided by the Human Research Ethics Committee at Southern Cross University, number ECN – 14249. The Consolidated Criteria for Reporting Qualitative Research (COREQ) [42] was used to ensure the quality of this research.

Participants

The aim was to recruit an equal number of novice and experienced practitioners. In Australia, three universities offer osteopathic programs: Victoria University, Royal Melbourne Institute of Technology, and Southern Cross University (SCU). Participants were recruited primarily via an advertisement that was emailed to the Heads of Program at these universities to invite recent graduates to participate. This advertisement was also distributed via an online osteopathy discussion forum. In order to recruit adequate numbers to reach theoretical saturation, that is, the point in data analysis when new concepts or themes have ceased emerging from the data [29], a secondary strategy, namely making direct contact with new graduates and experienced practitioners in the geographic region of the researchers, was required. This involved the researchers contacting local practitioners, including those who had been previously employed as casual teachers and clinicians at SCU, through publicly available clinic phone numbers. Potential participants received a Participant Information Sheet outlining the purpose of the interview by email and given sufficient opportunity to ask questions about the research before signing the Consent Form.

Procedure

Interviews were conducted by five members of the research team at a time and location convenient for the participants via Skype or in person. These five researchers were male students enrolled in the Master of Osteopathic Medicine program at SCU. The remaining two members of the research team were senior osteopaths (one male and one female) with extensive qualitative research experience. Interviews were recorded with participants' consent. An initial presenting complaint was given to the participant, and following adequate reading time, standardised questions were asked to prompt the practitioner to think out loud. This procedure was repeated at subsequent stages of the case. This process was repeated for the second case.

Analysis

Interviews were transcribed verbatim, and compiled for thematic analysis of CR processes. Thematic analysis was informed by

the process described by Miles and Huberman [44]: reducing the raw data, displaying the data and drawing initial conclusions. To reduce the raw data each member of the team ($n = 7$) read and re-read the transcripts to identify recurring concepts or codes. Next, the codes were clustered and/or discarded to form higher order themes. The five student researchers and their two experienced research supervisors then met to discuss their independent analyses. The number of participants in the study enabled comparison across cases and facilitated pattern matching [43]. The research team continued to refine the data until consensus was reached. The process is outlined in Fig. 1.

Results

Twenty osteopaths (10 experienced and 10 novice) participated in the study. Practitioners ranged from 22 to 63 years of age, with 11 males and 9 females. All were registered fulltime practitioners and

therefore had up to date continuing professional development, and had a range of initial osteopathic training in Australia, UK and New Zealand. The range of years of clinical practice of the experienced group ranged from 10 to 30 years. No response was received from students at Victoria University and RMIT, and all novice participants were graduates of SCU, Lismore who were recruited via face to face invitation.

Two key themes emerged from the data analysis:

- 1 Experienced and novice osteopaths demonstrated different approaches to CR
- 2 Experiential findings (e.g. from observation and palpatory findings derived from having direct contact with the patient) were integral to CR in osteopathy

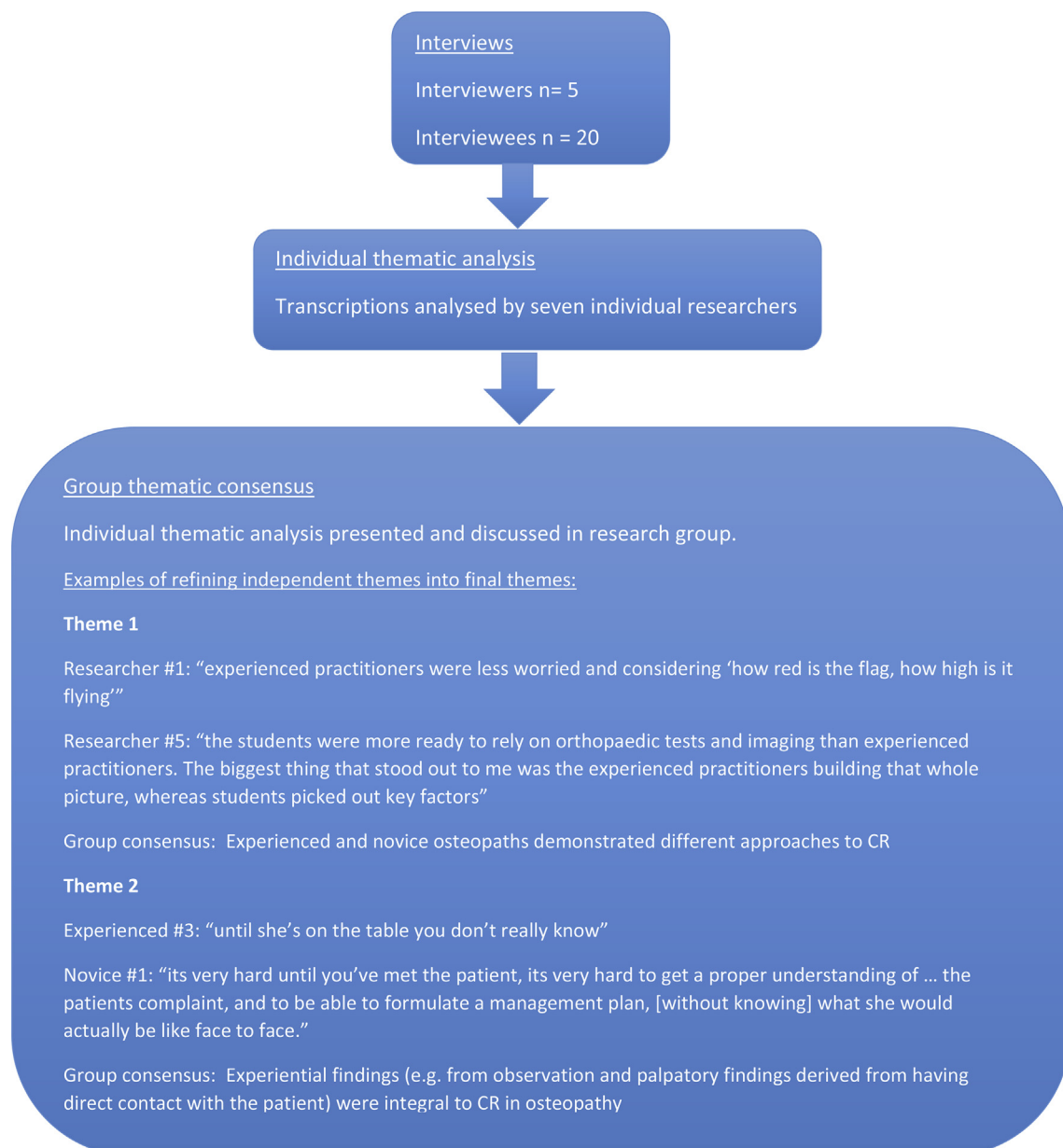


Fig. 1. Summary of the process of data analysis.

Experienced and novice osteopaths demonstrated different approaches to CR

Novice practitioners relied predominantly, but not exclusively, on the HTD model

The CR processes of novice practitioners were formulaic compared to those of experienced practitioners. Novices' CR closely reflected the procedures and methods that they had relied on in their pre-professional clinical training, including interpretations of physical examination findings.

I would like to know our MARCOSDRAFT¹ - where the pain is, what kind of pain it is, if there is any radiating pain, any other symptoms with that, what aggravates the pain, what she was doing that caused the pain, if there's anything that relieves it, if the pain is worsening.(NOVICE, 5)

Looks like sciatica, running down the buttock and posterior calf, which is the pathway of the sciatic nerve - that's what I'm thinking.(NOVICE, 3)

Novices tended towards predictable questioning from the outset of the case, with a greater focus on screening for red flags (that is, indications of potentially serious underlying conditions that require further investigation), and focus on physical examination findings to guide their diagnostic process compared with experienced practitioners.

I'm leaning more and more toward disc because positive slump, positive SLR,² the most commonly used tests for nerve impingement, pain over L4/L5/S1, reflexes fine, Trendelenberg sign³ on the left so maybe some glute weakness from nerve supply.(NOVICE, 4)

What I would like to know is whether he has any problems going to the toilet, any problems with urination, pins and needles around the groin area, saddle anaesthesia - maybe compression of the cauda equina, which is a red flag.(NOVICE, 5)

There were some instances of PR and NR among novice practitioners, however the HTD model clearly dominated. The following quotations illustrate novice practitioners' limited capacity for PR and NR. In the first example, the novice attempts to generalize from limited experience with other patients who practise yoga. (Note: The abbreviations HTD, PR and NR have been inserted into the quotations by the research team to indicate when different reasoning models were identified):

With the yogis, the ones that tend to become teachers are usually already very hypermobile as they're already naturally good at getting themselves into those positions(PR)(NOVICE, 9)

In this next example, the novice is trying to build a full understanding of the patient as a person/worker/family member/community member (NR).

I guess we could assume biomechanically he's not optimal. I mean he's made it this far, 57, being a mechanic but if he didn't have a single injury I'd start to assume it's an overuse or degenerative cause due to using his body incorrectly[NR]. (NOVICE, 8)

Experienced practitioners used a combination of models, moving freely between HTD, PR and NR without restrictions

Experienced practitioners simultaneously integrated a combination of different models, allowing them to form a mental picture of the patient. They would incorporate physical examination findings with aspects of PR and HTD to develop the patient's narrative that they used to guide the diagnostic process.

It's quite severe. It's on the region of distribution of the sciatic nerve (HTD) and it can often be an insidious onset with the sciatic nerve because it's often disc degeneration (PR) ... he could've just had a big weekend and there might be instability so it could be not disc it could be a somato-somato referral and so if he drank too much on the weekend and you've got a lot of muscle weakness there and that could've just created instability(NR). (EXPERIENCED, 2)

People are in a lot of pain if they leave the apprentice to shut up shop that's for sure (NR) ... *I just have a sense he wants me to tell him it's not a disc injury, it's been 6 weeks and he's still in pain which to me indicates something more than a ligamentous sprain*(HTD). (EXPERIENCED, 1)

Both novice and experienced practitioners appeared to use NR to make sense of, or broaden, their understanding of the clinical scenario. However the experienced practitioners were more effective in the construction and use of NR simultaneously with other models of CR when compared to the novice practitioners. Novice practitioners rarely integrated NR with other forms of CR, using NR in a more simplistic way to try to understand the clinical scenario. These examples illustrate the isolated use of NR by novices:

It depends on the patient that sits next to me. If a frail 16 year old girl sits next to me then it would be different as well, depends on age and how the patient presents(NR). (NOVICE 3)

Stressful job or because he's a self-employed mechanic, there's a lot of stress that goes with that, so stress with the fact that he's hurt himself can definitely lead to high blood pressure(NR). (NOVICE 2)

The influence of experience was reflected in the language used by both novice and experienced practitioners. Novice practitioners used labels such as 'yellow flag' or 'biopsychosocial', however often failed to fully explain their concerns or how they would manage them. On the other hand, experienced practitioners were less concerned with labels and were more able to elaborate on issues of concern and how they might manage the case. The experienced practitioners were also less concerned with establishing a diagnosis, and appeared more comfortable managing the uncertainty of the case. This is illustrated by comparing responses to the question: "Is there anything in this further information that leads you to enquire further into other aspects of the patient's health?" from Case 2.

... the spotting between periods is a little bit of a red flag for any kind of uterine pathology, such as Asherman's syndrome, uterine fibroids, tumours - things like that ... there are also yellow flags there, her feeling burnt out, exhausted, post-partum depression, that kind of thing as well.(NOVICE, 1)

... with a history like that you want to know what her fatty acid levels are like, because in pregnancy you use a lot of omega 3 and if she's breast feeding ... so she's vegetarian, how much DHA and omega 3 is she getting? Is she supplementing with fish oils? That's related to prostaglandins and spotting. So she may be low in more than just omega 3, and being vegetarian, a lot of vegetarians have

¹ A mnemonic of guide questions for the presenting complaint.

² Straight Leg Raise — a nerve tension test.

³ A test for muscle weakness.

high omega 6 which is pro-inflammatory, affects prostaglandins, pro-inflammatory prostaglandins, which can lead to painful periods.(EXPERIENCED, 8)

My ongoing care would be to have discussed with him my differential diagnoses and I still haven't decided between disc and ligament injury ... so he'd be aware of that and often my working diagnosis is either proven or disproven by response to treatment.(EXPERIENCED, 1)

Experiential findings (e.g. from observation and palpatory findings derived from having direct contact with the patient) were integral to CR in osteopathy in both groups

In each case, participants were asked: 'Are there any osteopathic considerations in this case so far to add to the medical concerns?' The most common response alluded to the biopsychosocial model, particularly among novice practitioners.

The adrenal fatigue from being burnt out in the past, and her tendency as well to maybe go back to being burnt out or over-committing to things, that can affect the menstrual cycle ... so that could lead to the spotting, even if it doesn't mean anything medically, it could be the reason why there is spotting and changes in the menstrual period.(NOVICE, 2)

Biomechanics ... what are her feet doing, what are her knees doing, what are her calves doing? What's the tibial rotation like? What's the femoral rotation like? Because that has a huge impact on what her pelvic rotation and imbalance are like. Whatever her pelvis is doing is going to determine what her lumbar spine is doing. There could be a disc element here, that's always something to think about. But for me I find that's usually not that relevant. Nowhere near as relevant as the obvious biomechanics that we can assess – because you can't assess someone's disc.(EXPERIENCED, 7)

All practitioners, particularly experienced ones, relied on having the patient in front of them to observe, palpate and assess as part of their CR. The following are typical quotations from experienced practitioners about additional information they wanted and how they would collect it:

... [conduct] abdominal examination to feel if there's any lumps or things like that. I'd do a physical examination of the low back and spine for any musculoskeletal things that stand out as well.(-EXPERIENCED, 2)

I'd definitely be interested in the patterns of muscle tension around his lower back, buttock and all around his legs. I'd really be looking for tension everywhere.(EXPERIENCED, 4)

I'd want to be checking out her pelvis and her lumbar spine as well as the sacro-tuberous ligaments and muscles like the piriformis as well. I would also want to assess her pelvic viscera.(EXPERIENCED, 4)

Both novice and experienced osteopaths consistently indicated that they required additional information before they were able to answer specific questions about differential diagnoses and patient management. This appeared particularly true of the information the practitioner felt they would gain from palpatory findings and having the patient physically present.

I find it so hard to read these and then ... because I have no palpatory sense and if I'm going to be really honest I don't even trust the tests without feeling the tissues myself.(EXPERIENCED, 1)

I suppose examining someone without touching them, without getting a feel, because that's a big thing with osteopaths, our actual physical examination and our palpation tells us so much. Without having that information, you're kind of just doing a differential diagnosis.(EXPERIENCED, 8)

Well I need to see him. It's all on paper now. You need to see him sitting next to you to see how he acts and how he is and if the pain is really getting better or not and I really need to see the patient and feel with my hands - is there inflammation or any systemic sign?(NOVICE, 3)

Discussion

The results of this study provide insights into the CR processes of novice and experienced osteopaths. Both novice and experienced practitioners used HTD, PR and NR models to guide their CR, however, PR and NR were often poorly developed in novice practitioners. This finding aligns with the literature about CR in other health professions, including medicine [4], physiotherapy [8,26] and physical therapists [15].

Novice practitioners displayed an inclination to practitioner-centered care [8,9,16,26], having a tendency to draw on specific symptoms, physical examination findings and special orthopaedic test results to guide their differential diagnoses, rather than viewing the client in the context of their whole lives or their own practice experience [8]. In contrast, experienced practitioners used NR more prominently, with greater importance and more time and recognition given to context-dependent patient information, resulting in patient-centered reasoning [8,19,25,26]. This may be due to the knowledge of the experienced practitioner being qualitatively different from that of less experienced practitioners [3]. Contextual factors like the practice setting and interactions between patients and other health practitioners that evolve over time are likely to develop with experience [11]. Clinical confidence is influenced by depth of clinical education [31,34] and through clinical experience [30].

The two groups of practitioners in the study tended to use language that indicated their CR processes: Novice practitioners used labels like 'biopsychosocial' and referred to mnemonic-based formulas, perhaps indicating their strategy for coping with the high cognitive load they encounter when they first enter clinical practice. The language used by novice practitioners in this study reflected their lack of confidence in making clinical decisions. They focused on red flags as a priority without further depth of reasoning, whereas the experienced practitioners were confident to progress their reasoning beyond the possibility of a red flag. With a lack of confidence there may be an excessive focus on potential harm [14]. The HTD model was used to varying degrees by practitioners in this study as a safety precaution to screen for red flags. It is uncertain whether experienced practitioners who failed to utilize the red flag safety net would have scanned thoroughly with the patient in front of them. The confidence gained through years of experience allowed experienced practitioners to relate their own knowledge and experience to their knowledge of the patient [16]. As the practitioner's confidence increases there is a shift away from specific clinical findings and red flags to a broader focus which

incorporates a wider view of the situation [14]. This accommodates the use of the PR model of clinical reasoning [4] as reflected in the language used by the more experienced practitioners in our study. However being over-confident leads to an increased risk of errors during clinical decision making [2,5].

The variety of responses from the question designed to prompt reflections about osteopathy-specific CR may reflect the diversity of approaches to health care in osteopathic practice. Thomson et al.'s [41] spectrum of CR in osteopathy may explain this diversity [28,40,41]. Further research is required to answer the question of the nature and extent of any application of the osteopathic principles in CR.

Though considered an integral part of CR in osteopathy by these practitioners, palpation has been shown to have a low to moderate evidence for inter-practitioner reliability due to many influencing factors, including individual patients not being static models and consequently making reliability difficult to assess [37], differences in the ways in which diagnostic information is portrayed [36], variability in the number of practice hours spent learning palpatory skills [24], and the practitioners' ability to integrate multi-sensory information [23]. Nonetheless, physical and emotional responses to patients appear to influence the clinical reasoning of physical therapists [22] and this should not be overlooked in osteopathic practice. Findings of our study showed that experienced osteopaths relied on having the patient in front of them so that direct observation and palpation (and their emotional responses to these) could guide CR. This reflects the dependence on the function of somatic tissues to the health of the patient, one of the tenets of osteopathic philosophy.

Implications

This study's findings suggest that clinical education and experience are key factors in the capacity to use sophisticated models of CR like PR and NR. To further develop CR, early exposure to authentic clinical experiences and opportunities to reflect on that exposure should be embedded in the curriculum. This could be through case-based learning and scaffolded clinical practicum experiences to increase opportunities to develop clinical reasoning for novice practitioners. Over the duration of their course, osteopathic students would have increased time immersed in cases requiring CR, allowing for a greater development of the PR and NR models.

This study also suggests that further research is required to investigate the role of the osteopathic principles and palpation in CR by osteopaths as a number of participants stated that their decisions would be guided by palpatory findings. As CR is the cornerstone of clinical safety and effective health care, developing practitioners CR skills is critical.

Limitations

The limitations of this study include the lack of diversity among novice practitioners, as all were graduates of one university and would have been exposed to similar CR learning experiences. Conversely, the wide range of clinical experience in the experienced group (from 10 to 30 years) could have over-simplified potential differences in CR for practitioners of 10 and 30 years' experience.

For consistency in data collection, researchers limited their questioning to those in the proforma. Reflecting on the vignettes, it was noted that further explanation and alternative questions might have helped participants to think about their CR processes. Responses to Question 5, 'Are there any osteopathic considerations in this case so far to add to the medical concerns?', in particular, may have benefited from alternative prompt questions. Participants

from both groups were unsure of what they were being asked and required further prompting. Moreover, the vignettes may have been more effective in exploring CR if two cases with two different body regions were used, rather than using two low back pain scenarios.

Asking practitioners to clinically reason in an environment that is removed from the clinical environment they are used to may also limit the validity of this study. This is true of any study looking at CR that is removed from real clinical practice [4], although using vignettes to discuss CR is a common practice in CR research [38]. For the purpose of this research, we focused primarily on HTR, PR and NR though other models of CR exist. This may have also limited the results obtained in this study.

Conclusion

Clinical experience was a key influence on the CR processes of osteopathic practitioners. The insecurity associated with lack of experience in novice practitioners drove them to rely on the formulaic approach of HTD reasoning, whereas experienced practitioners who had more confidence in their ability to effectively manage patient care, demonstrated a greater capacity to move freely between HTD, PR and NR models of CR. Early introduction to scaffolded CR (e.g. through case-based learning and early exposure to appropriately integrated clinical practicum) should be embedded in osteopathic curriculum. Findings of this study also suggests that CR in osteopathy incorporated data derived from direct contact with patients, including observation and palpation. Further research is required to investigate the role of the osteopathic principles and experiential findings derived from direct observation and examination of patients in guiding CR in osteopathy.

Conflicts of interest

We declare that we have no conflict of interest. The study had ethical approval from the Southern Cross University Human Research and Ethics Committee.

Appendix 1

Case 1

Presenting complaint

The patient is a 57 year old male. He is a self employed mechanic who has presented with a 6 week history of low back pain. Bob initially injured his back during the day at work, but cannot specifically remember the incident. He thinks that he may have lifted something awkwardly and felt a slight twinge but continued working. The pain was on the left side of his lower back (he motions around the LS region) and the ache travelled into his buttocks and post thigh to his lateral calf. Throughout the day, the pain worsened until he had had to go home and leave the apprentice to shut up the shop. He put a heat bag on his back that night at his wife's insistence and after taking two Panadol had slept well. The next morning he found that getting out of bed was agony and putting any weight on his left foot sent a 'shock wave' up into his lumbar spine. Bob had taken some of his wife's Panamax which had helped the pain and allowed him to go to work but he really couldn't do much except annoy his apprentice.

Q1. What are your first thoughts about this case?

Q2. Do you see any connections and links between any of the information you have received so far?

Q3. What are your initial medical and diagnostic thoughts? What further information do you need?

Examiner gives extra information

The pain had gradually improved over the last few weeks, Currently the pain was at a 5/10 but he was feeling pretty good this morning. He was still taking up to 6 Panadol a day.

Recent constipation - taking some laxatives to help move things along. He suffered from high blood pressure as well as moderately high cholesterol. His doctor had put him on Lipitor and Coversyl in the last 6 months and that seemed to be working. His mother had suffered from diabetes type II before her death at 73. His father is still alive and well but suffers badly from arthritis.

Q3. Is there anything in this further information that leads you to enquire further into other aspects of the patient's health? Do you see any primary cues in the additional case information?

Q4. What are the most important elements of this case? Could you suggest some possible differential diagnoses? OR

If this case presented to you in clinic what would you consider the most important factors and what differential diagnoses would you think about?

Examiner reveals physical examination/Investigation findings

- +ve slump L (reproduction of patient's symptoms at 45o knee flexion worse on the L)
- +ve SLR L (at 50o hip flexion, ankle in neutral)
- +ve Trendelenburg's sign L
- -ve FABER bilaterally
- -ve SI provocation bilaterally (thigh thrust & compression/distract)
- +ve Lx quadrant test L (pain over L4/5 & L5/S1 region)
- Knee and Ankle reflexes +2 bilaterally

Q5. What are your comments regarding a management plan?

Case 2

1. Presenting complaint

35-yr old female presents with acute low back pain referring into left buttock following a yoga class

Q1. What are your first thoughts about this case?

Q2. Do you see any connections and links between any of the information you have received so far?

Q3. What are your initial medical and diagnostic thoughts? What further information do you need?

2. Examiner gives extra information

Doing yoga teacher training, had first child 9 months ago, vegetarian, was a lawyer in the city for 10 years "burnt out", reports spotting (blood) between periods lately.

Q3. Is there anything in this further information that leads you to enquire further into other aspects of the patient's health? Do you see any primary cues in the additional case information?

Q4. What are the most important elements of this case? Could you suggest some possible differential diagnoses? OR

If this case presented to you in clinic what would you consider the most important factors and what differential diagnoses would you think about?

Examiner reveals physical examination/Investigation findings

- Kumps positive for left familiar buttock pain
- Slump negative
- Plain lumbosacral x ray NAD
- Negative SLR

Q5. What are your comments regarding management plan?

Appendix 2. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.ijosm.2018.04.002>.

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