



Original Article

Reflective practice enhances osteopathic clinical reasoning

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A B S T R A C T

Background: There has been extensive research of clinical reasoning in health professions, and reflective practice is widely used. However, in the field of osteopathy, clinical reasoning is largely under-researched and the use of structured reflective practice at its early stages.

Objective: To understand the broad role of reflective practice on osteopathic clinical reasoning during active delivery of patient care.

Method: Using an ethnographic method, the diagnostic and reasoning processes of one osteopath were recorded as they arose. These notes were then expanded to give a description of the interaction with the patient during the clinical encounter. Using autoethnography and reflective practice, the descriptions of the clinical encounters were developed into reflective narratives which were then analysed using elements originating from grounded theory.

Results: Reflective practice helps the practitioner become aware of their moment-by-moment osteopathic practice, it triggers the questioning of a practitioner's clinical reasoning, and creates change of practice.

Conclusion: This novel study highlights the relevance of reflective practice as a means of monitoring the thinking and reasoning processes in osteopathy. An increase in awareness of clinical reasoning processes could help prevent cognitive and affective biases and possible clinical error. We would argue that reflective practice is a critical tool in maintaining professional competence in osteopathy across a practice lifetime.

Introduction

Reflection and reflective practice have been adopted in many areas of healthcare in the last two decades, perhaps due to the recognition that healthcare practitioners need to embed their experiential learning; for example: nursing [1] physiotherapy [2], occupational therapy [3] and medicine [4]. Indeed, the ability to reflect is often regarded as essential for clinical proficiency despite little evidence to support this supposition [5]. Nevertheless, health professions are including tasks that develop reflective capabilities within pre- and post-qualifying education [6]. Nurses have been journaling their practice, reviewing their performance and writing reflections for appraisal for many years [7]. It has also been the main technique used in Action Research, which is directed at understanding, improving conditions and transforming practice in a range of healthcare environments [8]. Osteopathy is beginning its formal journey into reflective practice, probably driven by the fact that reflection underpins the recently altered continuing professional development (CPD) scheme in the UK [9].

Reflection and reflective practice

Reflection can be directed at many areas inside and outside practice and is considered to be a significant tool for learning [10]. It provides a

vehicle for delving into beliefs and values and helps challenge previously held assumptions that are important to understand for change to occur [11]. The major difference between reflection and reflective practice could be considered to be the adoption of a structured process for the latter [12]. The requirement to actively write and question one's actions and thoughts and receive supervisory and peer feedback, deepens the reflective process [13].

Self-awareness and critical evaluation of the practitioner's own responses and decision-making in practice situations is an important part of the reflective process. This allows new understandings and improves future practice [14]. The ability to develop a greater level of self-awareness about the style and impact of their performance, creates opportunities for maturing and developing professionally [15]. Observing and noticing your own actions and reasoning is a powerful motivation for change [16].

Tacit 'knowing how' is gained by experience [17] during clinical encounters, and clinical reasoning is a familiar practice for experienced clinicians. However, under usual working conditions, it is difficult for a practitioner to recount the actual cognitive processes they use due to their tacit nature making them difficult to analyse [18,19]. Reflective practice can provide a process by which osteopaths and other healthcare practitioners can describe and understand the nuance of their daily procedures [20]. It has been used within the health professions to

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research a route to improving practice [21] and allowed the practitioner/researcher to describe what they were doing not what they thought they did [11]. It has been explored as a way of improving clinical perception and medical knowledge and competence [4] and a method for decreasing medication prescribing errors [22]. If performed with intention, reflective practice may significantly increase a clinician's ability to provide exceptional healthcare [23].

Errors and bias in decision-making

There are many different factors associated with error in clinical decision-making, including lack of knowledge and unusual symptom presentations [24,25]. It has also been suggested that error in decision-making may occur because of cognitive biases and failed heuristics [26]. Cognitive biases are faulty beliefs that a practitioner uses during diagnosis and can occur as a result of reliance on heuristics. Heuristics are short cuts the brain uses when problem solving [27] that are used to speed up cognition, particularly in uncertain conditions where no obvious answer is available [28–30]. There are over 100 cognitive biases listed, but some arise more frequently in clinical reasoning and decision-making, for example, availability, anchoring, representativeness heuristics, premature closure and confirmation bias amongst others [31]. There seems to be agreement amongst some authors that although it may be impossible to eliminate cognitive errors and bias, the most effective method for improvement could come from metacognitive education and reflective practice [32,33].

Given the emphasis upon reflection for continued professional development in osteopathy, this study was directed at exploring the use of reflective practice during osteopathic clinical reasoning in real-life clinical encounters.

Methods

The reporting guidelines for publishing in the rehabilitation literature were followed by using the consolidated criteria for reporting qualitative research (COREQ) [34]. The University College of Osteopathy, (formerly The British School of Osteopathy) Research and Ethics Committee approved the study. Informed consent from participants was gained and any data used has remained anonymous and unidentifiable in the preparation of manuscripts for peer review publication.

Study design

The study used an autoethnographic and reflective practice approach in order to gather rich insights into behaviours and perceptions occurring within real-life clinical encounters. The emphasis was on exploring contextual situations rather than testing hypotheses [35]. The intention of the study was to gather information arising from the experiences of the researcher, in clinical patient facing situations, and have that form the central material of the study [36,37]. This would allow an understanding of the momentary and potentially intuitive insights that may not be available via other methods. Autoethnography arises from an ethnographic tradition but uses self as a source of data. Reflective practice and autoethnography provide reports that are scholarly and justifiable interpretations of inner dialogues, allowing the development of emergent central themes [21,38]. They are situated in the interpretive paradigm, and as such assume the presence of multiple realities [39].

Participants and sampling

The study used a novel modified participant-observation case study method to collect the data, to allow the investigation of complex concepts in context [40]. This creates an 'insider', or 'emic' perspective [41,42], considered valuable to develop inquiry [43]. Initially a random sample of forty-five participants was used in order to

accommodate an operating clinic diary. Times were selected specifically for research to occur. Any patient, new or existing patient could book those times and they were then asked if they could be included in the study. This was done in person or by telephone. On arrival at the clinic participants received a study information sheet and opt out form, and space provided to read them alone to avoid the feeling of coercion. Only one person did not want to participate. Children and vulnerable adults were not included. At this stage there was no specific profile targeted. Next, having collected information from the forty-five participants, nine were deliberately selected. This was based on their complexity from a clinical reasoning perspective, to allow rich information to be collected and researched, specifically about the momentary nuances of the researcher's praxis. Complexity was determined by uncommon symptoms, multiple pain sites, the need to use more than one treatment model, the existence of pathology or psychosocial factors for example. The presence of complexity created a response in the researcher, or an uncertainty, that underlined a theme needing reflective examination. The data collected were triangulated with insights from the field diary, and feedback on the descriptive text from supervisors and peers.

Researcher (CM) profile

Female.

Previous research experience with Medical Research Council/University of Kent.

Seventeen years as qualified osteopath.

Undergraduate education at the British School of Osteopathy.

Osteopathic qualification BSc Hons (Ost).

Additional postgraduate degree MPhil (Radiobiology).

Tutor for 7 years at an Osteopathic Education Institution.

Data collection

The data collector for this study was the first author (CM) who took notes of her thoughts and decisions whilst in the presence of patients. New patients were allocated a 45-min treatment session and 30 min for existing patients. The intention was to record naturally occurring phenomena, with as little as possible interference from the researcher. Immediately after the treatment, the notes were written into a description of the interaction whilst ensuring accuracy of the account. The occasional patient appeared twice in the data collecting, which enriched the unfolding clinical picture. If this occurred, each session was treated as a separate case and thoughts for that session noted. Only one such patient was then selected for narrative development.

Reflective narrative development

The forty-five case descriptions were read and re-read, and nine selected to develop into reflective narratives. Selection was determined by a complexity within the case, from a clinical reasoning perspective, that had caused the researcher to want to reflect further. Autoethnographic [44,45] and reflective practice methods [46,47] were adopted when developing the reflective narratives (Fig 1). There were regular discussions with supervisors and peers which provided feedback on the reflective narratives, assumptions that the researcher had drawn, general style of praxis and other perspectives that may need to be considered, for example. This provided an external view of the researcher's way of working and food for thought for reflection. A reflexive field diary was kept, ensuring assumptions were questioned and interpretations of thoughts and findings valid. This approach was adopted to provide trustworthy and robust findings and developing conceptual framework [48]. Data collection continued until no new insights developed, suggesting theoretical sufficiency had been achieved [49].

Data analysis

Elements of Grounded Theory were employed for data analysis as a way of providing a relatively deductive method of analysing the reflective narrative as though it were an interview transcript. This is because the reflective narratives were more an internal conversation rather than the traditional story telling narrative, which would lend itself to narrative analysis. The elements of grounded theory included the strategies of Rogan et al. [50], Strauss and Corbin [51], Charmaz [49] and Corbin and Strauss [52]. The main methods used were open coding, memo writing, axial coding and constant comparative analysis. The narratives were read and re-read, with the researcher searching for patterns and common features within the text. The grounded theory memos provided an extra reflexive tool to address researcher bias, pre-conceived ideas, and a priori knowledge. The maintenance of the reflexive field diary also assisted code generation and ensured researcher reflexivity [53]. Analysis continued until no new categories arose.

An additional analysis of the notes, descriptive texts and narratives was carried out to provide a further level of understanding and ensure trustworthiness of the findings.

Elements of grounded theory analytical methods used in this study

(Rogan et al., 1997; Strauss & Corbin, 1990; Charmaz 2014; Corbin & Strauss 2015).

Initially, the narratives were read and re-read to understand concepts arising.

Coding – data driven codes developed by analysing line, paragraph, and phrase.

Memo Writing – identification of broad concepts arising from data. Conceptual not descriptive. Codes and concepts compared.

Categories – development of individual categories from concepts and codes.

Constant comparative analysis – used at each level of data analysis to challenge assumptions or identify repressed data. Data compared with data, data with category, category with category, and sub-category with sub-category.

Axial Coding – identification of causal conditions, actions/interactions, and consequences. Categories and sub-categories take on a more constructed essence.

Reflexivity

Reflexivity within a study attempts to make explicit the researcher's viewpoints, hidden assumptions, and values that affect the interpretation of data (Charmaz, 2014). The researcher in this study has had experience of working within an objective research environment and, as such, found it challenging to complete a qualitative study. There was a tendency to want to be objective, and the subjective world was relatively alien, where beliefs, values and understandings feed into the interpretation of each new patient encounter, and what is experienced with that encounter feeds into and impacts the existing beliefs. This became easier such that now three years after the doctorate was finished, CM has postmodernist leanings, replacing the 'truth game' with a search for culturally useful theories and findings with significant cultural meaning" (Gergen 2001, p.808). The motivation for the study was an interest in how osteopaths use their senses during clinical reasoning, and the results of that part of the study have been published previously. Reflective practice was used as part of a novel method that allowed the researcher to get close to the moment by moment decision making process and motivations. However, as the study progressed it became clear that reflective practice had the ability to transform and needed to be evaluated in its own right.



Fig. 1. Example of a reflective cycle (Gibbs 1988) [46].

Results

Reflective practice within this study was investigated with a view to understanding the effects that reflection can have on practice life, clinical reasoning, and patient care. Also, how subjective experiences can impart knowledge for osteopathic practice. Data analysis produced three main categories and three sub categories (see Fig. 2). (1) Reflective practice created a greater awareness of a practitioner's thoughts and habitual procedures during osteopathic practice. (2) Reflection retrospectively enabled a close examination and development of practice, whilst being strengthened and enhanced by peer review and literature-based evidence (see Table 1). (3) Retrospective reflection provided a powerful method for transforming practice. The third category divided into three main areas: a) identification of the potential for cognitive bias; b) development of a biopsychosocial (BPS) approach to practice; c) a vision to move toward collaborative reasoning.

(1). Reflective practice stimulates awareness

The results from this study propose that employing structured reflection gives the practitioner access to a greater sense of awareness of their actions during practice. It is as though structured reflecting after the event has allowed access to thoughts as a reflection-in-action, i.e. cognitive awareness at the time it is happening:

Since writing this reflection I have also started to notice when I want to take a short cut, my mind does remind me that perhaps I want to examine the abdomen, cranial nerves or perform another clinical exam. I also notice when my mind then overrides that suggestion ... (P2)

Why did I think about doing a neuro exam and then not do it? Did I have a valid reason not to ... yes, but maybe one should always do the test for safety and negative information? ... (Field Diary Entry 2/10)

(2). Retrospective reflection enables questioning

Perceptual information that is gathered from the patient during osteopathic clinical reasoning is verbal, observational, and palpatory. The practitioner then develops a hypothesis, diagnosis and plan for treatment. During reflection, CM noticed that she did not stay broad enough in her thought processes. She is aware she did not examine the patient's lungs but began to review other options for diagnosis. It made her question her diagnostic method and assess it in detail:

Looking back at my notes, I am not sure why I did not carry on considering the presence of red flags, but I accepted his testimony when he said he had no shortness of breath and did not have a cough ... What was

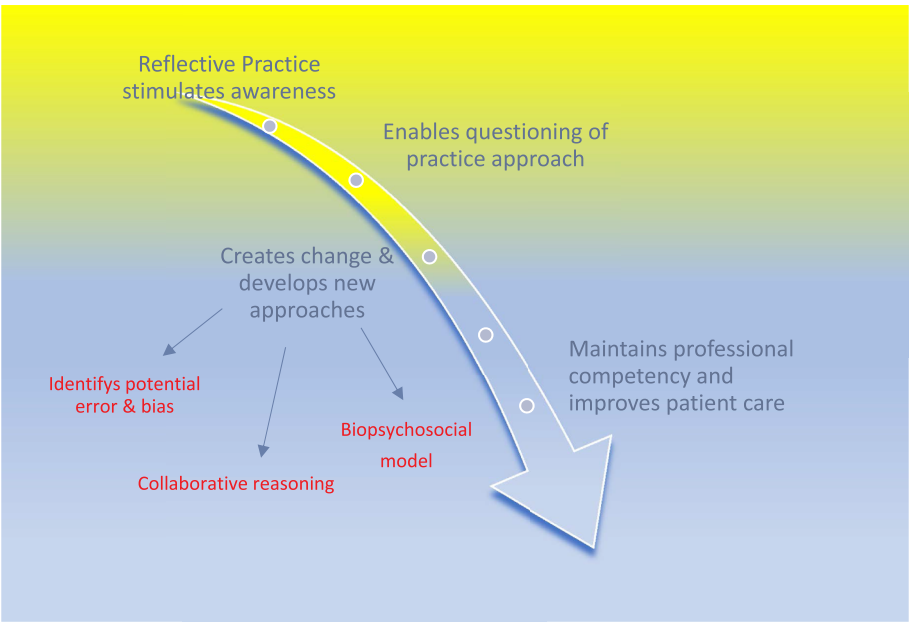


Fig. 2. The effect of reflective practice on an osteopath's clinical reasoning.

it about this case that made me certain I was dealing with a musculoskeletal condition perhaps it was because he was so animated and did not stop talking and laughing making it difficult for me to maintain my focus, or is this something in my daily practice that I need to change?. (P6)

That was a mad treatment session today, not enough time to think, he was all over the place. Looking back, I didn't stay broad for long. He seemed fine but perhaps for completion sake I should have done the tests? Have things changed, at Uni we were encouraged to rationalise and test what was needed e.g., if leg pain, do a neuro exam but not if only back pain? Something to explore (Field Diary 31/10)

(3). Reflection as a conduit for change

(a). Highlighting cognitive error and bias in clinical reasoning

Osteopathic consultations are relatively short with large amounts of information to digest, and it is easy to run out of time. As a result, it is likely that osteopaths have evolved clinic procedures that allow rapid decision-making. Aspects of these routines necessarily become unconscious giving potential for cognitive error. In the following case, CM engaged some analytic strategies such as recognising there was no presence of pathology, but in general she employed intuitive reasoning. The reflection combined with supervisory feedback identified an area which might have the potential to cause error or bias:

'As far as I was concerned this was a fairly straight forward consultation that seemed to go according to plan ... When I got to the part about symptoms, she told me it was left side anterior hip pain and some pubic pain. She was very easy to follow because her story did not jump about from one area to another which can happen. She also seemed in good health and not in acute pain. The patient gave an uncomplicated account

of her symptom picture, there were no apparent red flags that would suggest the presence of serious organic pathology, or glaring yellow flags (psychosocial predictors of chronicity) and it appeared very musculoskeletal ... My supervisor JE suggested that it maybe I was over relying on pattern recognition and intuition' ... (P2)

This is an interesting time, in more ways than one! I had no idea that my thinking could be so apparently 'something' ... what is it? Biased, rapid to move on, uncritical, time pressured? (Field Diary 5/11)

(b). Developing a biopsychosocial approach

The use of the reflective practice process, incorporating peer review, highlighted that at times CM's displayed a tendency to use the biomechanical model for clinical reasoning, although she was acquainted with the biopsychosocial model and the impact of psychosocial factors on pain. She noticed it herself, but it was also suggested by peer reviewers:

It's obvious to me when reflecting on this case that I had really only taken notice of the biomechanical reasons for her visiting my clinic ... I admit to feeling more than a little untrained when considering the possibility of helping a patient investigate their inner demons ... Perhaps I need to dwell longer in the empathic space with another ... (P1)

The following extract from a patient who attended much later in the study shows that the reflective practice process has stimulated change in CM's behaviour. She is starting to develop ideas of how to work with psychosocial factors:

As she started to cry her grief consumed her and she sat there in front of me crying, sitting upright, perfect posture, with tears pouring down her face and I felt genuine sympathy for her, she seemed to have become enormously stuck within her grief. I also wasn't sure how to show the

Table 1
Examples of peer review and supervisor feedback of reflective narratives.

Peer Review Comments	Supervisory Feedback
Hmm, I am wondering where that empathic practitioner is that I know so well, seems a little biomechanical (24/5) Are you still thinking that after the 1st OsteoMAP day? (23/6)	The presence of visual cues such as scoliosis, pinched tissues above the innominate possibly guided the interpretation? Also, what time of day was it, were you fatigued? (3/7) Important to take into account that affective biases can negatively affect decision making. Croskerry et al. (2013) talk about them (17/4)

sympathy and empathy I was feeling, so I just sat there hoping that she could feel my understanding ... Psychology at the BSO taught us to not move toward the patient at these times (Nankie1996), so I just looked at her fully and stayed with her whilst she was in tears and gradually they abated ... (P5)

That was an emotionally draining treatment session. What is the right way to manage a patient like that? Out of my depth if I'm honest, I'm glad I am doing this process as I'm learning when and where to look for help. I have never thought hard about managing emotional and psychological presentations, just gone with my gut. I'll check the literature, Tamar Pincus may have ideas (Field Diary 28/5)

(C). Moving toward collaborative reasoning

The intuitive practice routine, and biomechanical focus identified at times in this study also showed an unconscious method of interacting with patients that could be practitioner-led. In this extract, there is no discussion about whether the patient is comfortable undressing to her underwear:

I then asked her to change to her underwear and I left the room ... (P1)

Reading Edwards et al., I would like to become more patient-led in all circumstances, or maybe it is situation led which encompasses the patient also. I definitely think that the Uni learnt 'undressing to underwear' can be relaxed now. Amazing what we do by rote (Field Diary 15/4)

During the reflective practice process CM became aware of her practice routine. Whilst working with the literature, she was introduced to different ideas of working relationships with patients. As a result, she decided to move toward a more patient-centred collaborative approach. This next excerpt demonstrates she had moved away from practitioner-led to asking what the patient was comfortable with:

Having completed all the questioning, I asked her if she was okay to undress to her underwear, she said it was fine, so I left the room to allow her to change ... (P3).

Discussion

This novel study investigates the subjective, momentary, cognitive and reasoning processes of an osteopath during real-life encounters. The intent was to examine the effect of reflective practice on osteopathic clinical reasoning. Although results from a study of a single practitioner's approach to reflective practice cannot be generalised to the wider osteopathic community, a number of features strengthen the value of these findings for other interested osteopaths. These include the use of a field diary to record thoughts, rich, thick descriptions to enhance transferability (Charmaz 2014), and careful reflections on auto-ethnographic insights relating to insider knowledge. The study helps promote discussion and shared understanding of scope of practice and professional responsibilities in the UK and in other countries where the profession is statutorily regulated or working towards regulation.

CM found that reflective practice allowed her to examine her practice at an intense level. Reflective practice made her much more aware and mindful of her moment-by-moment practice. It allowed her to identify how she actually practiced, rather than her imagined practice [11], broadened her perspectives and presented a strong method of changing practice. This study corroborates hypotheses suggested by authors particularly in the fields of nursing, physiotherapy and occupational therapy. They have suggested that reflection and reflective practice inform practice, challenge beliefs, widen viewpoints, and produce change e.g. Refs. [47,54–56]. In this study, as reflective process created an awareness it allowed a realisation of the state of 'being with' and 'for' a patient rather than 'doing to' [57]. As Bolton [11] suggested, it is simpler to report what we think we do, whereas reality is often different. The awareness and mindfulness that developed helped

promote a situation where practitioner versatility was present. This should increase the quality of patient care and help practitioner wellness [58]. It has been proposed that mindfulness induces a state of higher, or meta-metacognition, i.e. a state of cognitive supervision of thinking and knowledge [59,60], that is reached when a person becomes aware of their consciousness [61]. Developing awareness enabled CM to notice when during clinical reasoning she entered cognitive reflection-in-action. This is the mode of metacognition arguably first identified by SchÖn [18]. Professionals use reflection-in action during problem solving in their daily practice. It allows them to be conscious of their actions whilst they are happening. The condition of reflection-in-action became apparent during situations of uncertainty and/or complexity in the unfolding symptom picture. It has been demonstrated in another part of this study that an analytic diagnostic strategy is enabled when complexity is encountered [20].

Intuitive cognition and tacit knowing are important aspects within strategies that practitioners use to interpret information and make practice-based decisions [62]. This study corroborates the suggestion that experience brings an element of semi-unconscious practice [63]. There is evidence in this study that practice routines can become very intuitive. A well-honed practice routine allows a practitioner to move relatively unhindered through cue acquisition, examination and treatment during the limited appointment time, particularly if the case is considered straightforward. Intuition is vitally important, but it appears possible for the practitioner to be unaware that their mind has disregarded an intuitive suggestion to perform further tests to evaluate data. It is thought that humans may be aware when they are relying on heuristics [64], CM found that retrospective reflection highlighted this trait. She then became more aware of her momentary thoughts whilst with patients.

There is a suggestion that more experienced practitioners make decisions and use strategies more automatically and effectively [65]. However, there are those who believe it is possible to induce error by not paying enough attention, or by being uninformed [22]. It was demonstrated that unconscious practice allows practitioners to be unaware of the way in which they treat their patients. In this study even though CM was aware of the biopsychosocial approach she displayed a tendency at times to have a biomechanically-focused clinical reasoning. This is likely to be because when she was trained the biopsychosocial model was not taught except as progressive theory. Many manual therapists and medical doctors still use biomedical models of patient management because these models used to be taught in educational establishments [66]. This was the situation CM found herself in. Although she noted their stress or distress, she did not always know how to help them professionally, and so carried on as she had been originally taught. It has been posited that there is an interrelationship between the biopsychosocial model and patient-centred care [67,68]. However, undergraduate education still tends to encourage a more analytic approach, which conceivably inspires the biomedical model [69]. Certainly, at times, technical rationality in decision-making has endured in CM's practice. However, there was evidence of her approach changing as she became aware of this biomedical tendency. She recognised that although being aware of the possible psychosocial factors present is important, it is also essential to actively manage psychosocial issues when they present. During reflective practice, dialogue with the literature introduced CM to the concept of collaborative reasoning which is at the critical social science end of the patient-centred care continuum [70,71]. As a result, she decided to see if she could move her practice toward it, demonstrating the conduit for change.

The supervisory and peer review aspect of reflective practice is highlighted by CM's use of the expressions 'instantly liked her', and 'she is an easy person to like'. Her supervisor questioned whether this was the 'halo' effect in operation, which is a type of cognitive bias. It is a bias whereby we bestow positive characteristics to another because we like them [72]. The study was not assessing bias but noticing what happened during the daily practice of this specific practitioner. It is not

therefore possible to know whether the ‘halo effect’ caused error in this instance. The bias of premature closure results in the practitioner not considering other hypotheses [73]. It was in evidence in the early stages of the study particularly where a case was straightforward, there was then a tendency to rely on intuitive practice routine and pattern recognition. This has been shown to be an efficient and effective method of diagnosing non-complex cases [4]. However, as a result of recognising the presence of premature closure CM started to insert cognitive de-biasing strategies [26,74,75] even when her intuition suggested the initial diagnosis was correct. She introduced more systematic reasoning by including extra clinical tests, forcing a differential diagnostic list, and then evaluating less likely hypotheses.

The presence of peer review, supervision and reference to the literature during reflective practice, brought criticality, widened perspectives and enhanced CM's practice. They are a valuable part of the reflective practice process (see Table 1). They clearly demonstrate in this case, that making a practitioner aware allows them to identify methods to overcome ingrained habits to prevent biased clinical reasoning [74]. Creating and improving awareness in osteopathic practice should not be understated. A high awareness of practice decisions and processes, whilst maintaining knowledge via peer review and the healthcare literature, is important for ongoing professional accomplishment. Transformed perspectives and understanding can develop by critically reflecting on practice and examining values and beliefs, leading to new insights [76–78]. It adds strength to the suggestion that structured reflection is more effective at transforming practice than simply reflecting [79]. Osteopaths are perfectly placed to undertake regular reflective practice. Osteopathic educational establishments teach osteopaths to actively use critical thought during the diagnostic process; there is generally a natural understanding of the motivations of others, and an enquiring mind. This is a perfect position to turn the lens of analysis on themselves. Time pressure is often a factor whilst in clinic and the authors would like to suggest keeping a diary or notebook alongside during practice would allow practitioners to note down situations that they would like to review. Developing such habits would encourage that start of intrapersonal criticality and potential for change. Retrospective reflection, or reflection-on-action, provides an overview of clinical reasoning that places it above the metacognitive state see Fig. 3 and McIntyre et al. [20]. If used in practice it will help generate a critical overview of practice that allows the maintenance of professional competency across a practice lifetime.

Study strengths and challenges

The findings presented and all nine reflective narratives formed the raw data of a doctoral thesis and are strongly linked to the extant literature. The study was critically developed with quality uppermost throughout [80]. The single practitioner/researcher nature of this study is both a strength and limitation. The method of understanding the momentary thoughts of the practitioner whilst with patients was preferred over retrospective recall. Some thoughts were not noted because it was not possible to break from engagement with the patient. However, this should not diminish the findings, or change the interpretation because empirical information was not needed. Subjectivity in this study enhances the findings because it was possible to inhabit a cognitive microcosm during clinical reasoning. The use of narrative allows the uncovering of what we do not realise we do not know [11]. Donald Schön [18,81] was interested in exposing professional tacit knowing-in-action which he espoused was often discarded in favour of objective knowledge. He believed we require a combination of the two to ensure the emergence of absolute knowledge. Qualitative research allows for variable and not completely external reality. A reality that is generated and altered by the perceptions and beliefs of the viewer [38]. Qualitative research therefore has the advantage of personal interpretation and demonstrates how the researcher made sense of the world [43].

CM is a practising osteopath and familiar with the culture which

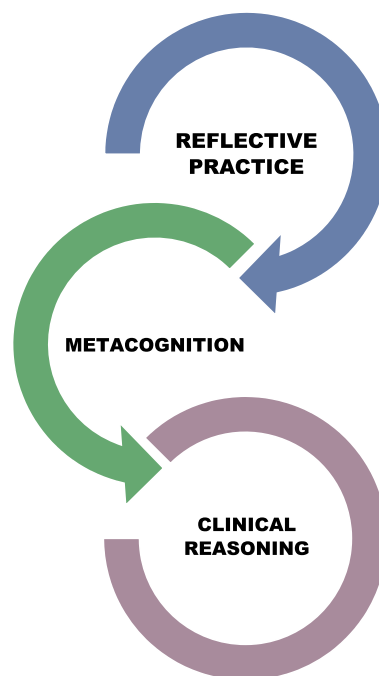


Fig. 3. Conceptual Overview of Relationship between CR, metacognition and Reflective Practice.

allows an understanding of the subject under study, which is an advantage. The study is also influenced by this, and it could be argued that a researcher from another philosophy may put a different interpretation on the findings, or this researcher at another time or in another context [82]. In addition, research noting the cognitions and strategies of a single osteopath should be interpreted with caution to the wider osteopathic community. It provides a restricted viewpoint [45] and further research is needed.

The researcher immersed herself in the narratives and adhered to elements of grounded theory analytic methods [49–52] in order to ensure high trustworthiness of the study [83]. Themes were allowed to emerge [49] and an audit trail could be seen [84]. Memos were used as a reflexive tool, reporting was via ‘thick descriptions’ in the findings, a reflexive field diary [53] was maintained throughout, narratives were peer reviewed and the extant literature was used to cross reference emerging data [13,21]. All were used to prevent researcher bias, pre-conceived ideas, deduced knowledge, but also to display a decision trail [85]. Methods using video or digital recording with accompanying transcripts were considered to add triangulation. However, digital recording may have caused a change in the thoughts and behaviour of the practitioner and patient. The use of ‘think aloud’ protocols [86] were considered, similar to that used with stimulated recall. However, speaking thoughts into a microphone for vocal recording during differential diagnosis may require discussion of pathology. This was considered likely to cause the patient anxiety and not adopted in this study. It was also not possible to verify data or themes that emerged with the participants because they were not acquainted with thoughts of the practitioner, preventing confirmation of details. The above suggestions could be used in further research using osteopathic students or other practitioners instead of patients. This might prevent distress being caused because of their awareness of diagnostic strategies.

Conclusion

The findings from this novel study demonstrate the positive effect that reflective practice had on the practitioner in this study. They support the idea that structured learning by experience is critical in the development and maintenance of competency throughout a practice

lifetime. Reflective practice is impactful by highlighting entrenched routines in relation to best practice. The process of reflective practice encourages deep consideration to occur within the reflecting individual. Consultation with supervisors, peers and the existing literature, intensifies the process by providing insights that may be invisible to the practitioner, and presents new ideas. An increase in awareness of clinical reasoning processes could help prevent cognitive and affective biases and possible clinical error. We would argue that reflective practice is a critical tool in maintaining professional competence in osteopathy. However, further research is required to establish transferability and the resonance of these findings within the wider osteopathic population. This could be achieved by observation of other practitioners, video analysis and the use of interview transcriptions with elements of grounded theory. Alternatively, a cross sectional questionnaire, and/or focus group research could be employed, developed from key themes in this study to establish other osteopaths' opinions of their praxis and the benefits and challenges of reflective practice. The results of other studies may not have the same themes and categories because other practitioners may have other challenges. The further study would establish whether reflective practice has benefits to the wider community.

Other discussions that arise from the study involve the use of reflective practice with supervision and the desire within healthcare to become more patient-led. This gives the opportunity to explore the psychosocial aspects of interactions with patients as part of a more holistic biopsychosocial model. This does, however, open up difficult questions for the whole profession about the need for, and role of, more formal supervision methods or mentoring for practitioners similar to psychotherapy.

Funding sources

None.

Ethical approval

British School of Osteopathy Ethics committee (BSOREC) approved the research January 21, 2013.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijosm.2019.07.002>.

References

- [1] Barbour JF. The making of a butterfly: reflective practice in nursing education. *Int J Hum Caring* 2013;17(3):7–12.
- [2] Donaghy M, Morss K. Guided reflection: a framework to facilitate and assess reflective practice within the discipline of physiotherapy. *Physiotherapy Theory and Practice* 2000;6:3–14.
- [3] Roberts AEK. Advancing practice through continuing professional education: the case for reflection. *Br J Occup Ther* 2002;65(5): 237e241.
- [4] Mamede S, Schmidt HG, Penaforte JC. Effects of reflective practice on the accuracy of medical diagnoses. *Med Educ* 2008;42:468–75.
- [5] Schutz S. Reflection and reflective practice. *Community Pract* 2007;80(9):26–9.
- [6] Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: a systematic review. *Advances in Health Science Education Theory and Practice* 2009;14(4):595–621.
- [7] Nelson S. The lost path to emancipatory practice: towards a history of reflective practice in nursing. *Nurs Philos* 2012;13:202–13.
- [8] Lingard L, Albert M, Levinson W. Grounded theory, mixed methods, and action research. *BMJ* 2008;337.
- [9] GOsC (General Osteopathic Council). New CPD Scheme. London. General Osteopathic Council. <https://www.osteopathy.org.uk/standards/continuing-professional-development/> accessed October 2018.
- [10] Freshwater D. Reflective practice: the state of the art. In: Freshwater D, Taylor BJ, Sherwood G, editors. *The international textbook of reflective practice in nursing*. UK: Blackwell Publishing; 2008.
- [11] Bolton G. Write to learn: reflective practice writing. *InnovAIT* 2009;2(12):752–4.
- [12] Austin R, Farlinger C. What if...?: a simple, creative tool for reflective practice. *Clin Teach* 2015;12:1–3.
- [13] Johns C. *Becoming a reflective practitioner*. third ed. Oxford: Wiley- Blackwell; 2009.
- [14] Finlay L. *Reflecting on reflective practice*. vol. 52. PBPL The Open University Paper; 2008. p. 1–27.
- [15] Osterman KF, Kottkamp RB. *Reflective practice for educators: improving schooling through professional development*. Newbury Park, CA: Corwin Press, Inc; 1993.
- [16] Ellis C, Bochner A. Autoethnography, personal narrative, reflexivity: researcher as subject. In: Denzin N, Lincoln Y, editors. *The handbook of qualitative research*. second ed. CA: Sage; 2000.
- [17] Polanyi M. *Personal knowledge: towards a post-critical philosophy*. London: Routledge and Kegan Paul; 1958.
- [18] Schön DA. *The reflective practitioner: how professionals think in action*. Surrey. Ashgate Publishing 1983. ISBN 10 number is 0 85742 319 4.
- [19] Mattingly C, Hayes Fleming MH. *Clinical reasoning: forms of inquiry in a therapeutic practice*. Philadelphia, PA: F.A. Davis; 1994.
- [20] McIntyre C, Lathlean J, Esteves JE. Osteopathic clinical reasoning: an ethnographic study of perceptual diagnostic judgments, and metacognition. *Int J Osteopath Med* 2018;28:30–41.
- [21] Jarrett L. Being and becoming a reflective practitioner: through guided reflection, in the role of a spasticity management nurse specialist. 2009. PhD. City University.
- [22] Pezzolesi C, Ghaleb M, Kostrzewski A, Dhillon S. Is mindful reflective practice the way forward to reduce medication errors? *Int J Pharm Pract* 2013;21:413–6.
- [23] Koshy K, Limb C, Gundogan B, Whitehurst K, Jafree DJ. Reflective practice in health care and how to reflect effectively. *International Journal of Surgery Oncology* 2017;2:1–3. e20.
- [24] Schiff GD, Hasan O, Kim S, Abrams R, Cosby K, Lambert BL, et al. Diagnostic error in medicine: analysis of 583 physician-reported errors. *Arch Intern Med* 2009;169(20):1881–7.
- [25] Zwaan L, De Bruijne MC, Wagner C, Thijs A, Smits M, Van der Wal G, et al. A record review on the incidence, consequences and causes of diagnostic adverse events. *Arch Intern Med* 2010;170(12):1015–21.
- [26] Ely JW, Graber ML, Croskerry P. Checklists to reduce diagnostic errors. *Acad Med* 2011;86(3):307–13.
- [27] Zwaan L, Thijs A, Wagner C, Timmermans DRM. Does inappropriate selectivity in information use relate to diagnostic errors and patient harm? The diagnosis of patients with dyspnea. *Soc Sci Med* 2013;91:32–8.
- [28] Tversky A, Kahneman D. Availability: a heuristic for judging frequency and probability. *Cogn Psychol* 1973;5:207–32.
- [29] Tversky A, Kahneman D. Judgment under uncertainty: heuristics and biases. *Science, New Series*. 1974;185(4157):1124–31.
- [30] Tversky A, Kahneman D. Judgment under uncertainty. In: Kahneman D, Slovic P, Tversky A, editors. *Judgment under uncertainty: heuristics and biases*. Cambridge: Cambridge University Press; 1982.
- [31] Lucchiari C, Pravettoni G. Cognitive balanced model: a conceptual scheme of diagnostic decision making. *J Eval Clin Pract* 2012;18:82–8.
- [32] Gordon R, Franklin N. Cognitive underpinnings of diagnostic error. *Acad Med* 2003;78(8):782.
- [33] Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. *Acad Med* 2003;78:775–80.
- [34] Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;Dec;19(6):349–57. Epub 2007 Sep. 14.
- [35] Reeves S, Kuper A, Hodges BD. Qualitative research methodologies: ethnography. *Qual Res BMJ* 2008;337:a1020.
- [36] Uotinen J. Senses, bodily knowledge and autoethnography: unknown knowledge from an ICU experience. *Qual Health Res* 2011;21(10):1307–15.
- [37] Wall S. An autoethnography on learning about autoethnography. *Int J Qual Methods* 2006;5(2):146–60.
- [38] Duncan M. Autoethnography: critical appreciation of an emerging art. *Int J Qual Methods* 2004;3(4):28–39.
- [39] Denzin NK, Lincoln YS. *Strategies of qualitative inquiry*. second ed. Thousand Oaks, CA: Sage Publications; 2003.
- [40] Anthony S, Jack S. Qualitative case study methodology in nursing research: an integrative review. *J Adv Nurs* 2009;65(6):1171–81.
- [41] Brannick T, Coghlan D. In defence of being native: the case for insider academic research. *Organ Res Methods* 2007;10:59–74.
- [42] Morse J. How different is qualitative health research from qualitative research? Do we have a subdiscipline? *Qual Health Res* 2010;20:1459–64.
- [43] Clandinin J, Connelly FM. Personal experience methods. In: Denzin NK, Lincoln YS, editors. *Handbook of qualitative research*. London: Sage; 1994.
- [44] Ellis C, Adams T, Bochner A. Autoethnography: an overview. *Hist Soc Res* 2011;36(4):273–90.
- [45] Anderson L. Analytic autoethnography. *J Contemp Ethnogr* 2006;35(4):373–95.
- [46] Gibbs G. *Learning by doing: a guide to teaching and learning method*. Further education unit. Oxford Polytechnic, now Oxford Brookes University; 1988.
- [47] Johns C. *Becoming a reflective practitioner*. third ed. Oxford: Wiley-Blackwell; 2009.
- [48] Guba EG. Criteria for assessing the trustworthiness of naturalistic inquiries. *Educ Commun Technol J* 1981;29(2):75–91.
- [49] Charmaz K. *Constructing grounded theory*. London: SAGE; 2014.

- [50] Rogan F, Shmied V, Barclay L, Everitt L, Wyllie L. 'Becoming a mother' - developing a new theory of early motherhood. *J Adv Nurs* 1997;25:877–85.
- [51] Strauss A, Corbin J. Basics of qualitative research. Newbury Park, CA: Sage; 1990.
- [52] Corbin J, Strauss A. Basics of qualitative research: techniques and procedures for developing grounded theory. fourth ed. Thousand Oaks, CA: Sage; 2015.
- [53] Etherington K. Becoming a reflexive researcher: using ourselves in research. London: Jessica Kingsley; 2004.
- [54] Atkins S, Murphy K. Reflection: a review of the literature. *J Adv Nurs* 1993;18:1188–92.
- [55] Clouder L. Reflective practice: realising its potential. *Physiotherapy* 2000;86(10):517–22.
- [56] Brannigan K, Moores A. A model of professional thinking: integrating reflective practice and evidence-based practice. *Can J Occup Ther* 2009;76(5):342–50.
- [57] Johns C. Becoming a reflective practitioner. second ed. Oxford: Blackwell Publishing; 2004.
- [58] Roche M, Haar JM, Luthans F. The role of mindfulness and psychological capital on the well-being of leaders. *J Occup Health Psychol* 2014;19(4):476–89.
- [59] Flavell JH. Metacognition and cognitive monitoring: a new area of cognitive-developmental inquiry. *Am Psychol* 1979;34(10):906–11.
- [60] Flavell JH, Miller PH, Miller SA. Cognitive development. fourth ed. Upper Saddle River, NJ: Prentice Hall; 2002.
- [61] Jankowski T, Holas P. Metacognitive model of mindfulness. *Conscious Cognit* 2014;28:64–80.
- [62] Patel VL, Groen GJ. Knowledge based solution strategies in medical reasoning. *Cogn Sci* 1986;10:91–116.
- [63] De Neys W. Bias and conflict: a case for logical intuitions. *Perspect Psychol Sci* 2013;7(1):28–38.
- [64] Schraw G, Moshman D. Metacognitive theories. *Educ Psychol Rev* 1995;7:351–71.
- [65] Penney JN. The biopsychosocial model of pain and contemporary osteopathic practice. *Int J Osteopath Med* 2010;13:42–7.
- [66] Thomson O. Emotional processing and its relationship to chronic low back pain. *Int J Osteopath Med* 2013;16:240–1.
- [67] Thomson OP, Petty NJ, Moore AP. A qualitative grounded theory study of the conceptions of clinical practice in osteopathy – a continuum from technical rationality to professional artistry. *Man Ther* 2014;19(1):37–43.
- [68] Spadaccini J, Esteves JE. Intuition, analysis and reflection: an experimental study into the decision-making processes and thinking dispositions of osteopathy students. *Int J Osteopath Med* 2014;17:263–71.
- [69] Synnott A, O'Keeffe M, Bunzli S, Dankaerts W, O'Sullivan P, O'Sullivan K. Physiotherapists may stigmatise or feel unprepared to treat people with low back pain and psychosocial factors that influence recovery: a systematic review. *J Physiother* 2015;61:68–76.
- [70] Trede F, Higgs J. Reframing the clinician's role in collaborative clinical decision making: re-thinking practice knowledge and the notion of clinician-patient relationships. *Learn Health Soc Care* 2003;2(2):66–73.
- [71] Trede F, Higgs J. Collaborative decision making. In: Higgs J, Jones M, Loftus S, Christensen N, editors. *Clinical reasoning in the health professions*. third ed. Oxford: Butterworth Heineman; 2008.
- [72] Kahneman D. Thinking fast and slow. London: Penguin Books Ltd; 2011.
- [73] Shah AK, Oppenheimer DM. Heuristics made easy: an effort-reduction framework. *Psychol Bull* 2008;134(2):207–22.
- [74] Trowbridge RL. Twelve tips for teaching avoidance of diagnostic errors. *Med Teach* 2008;30:496–500.
- [75] Croskerry P, Singhal G, Mamede S. Cognitive debiasing 2: impediments to and strategies for change. *British Medical Journal Quality and Safety* 2013;22:65–72.
- [76] Mezirow J. Fostering critical reflection in adulthood: a guide to transformative and emancipatory learning. San Francisco: Jossey-Bass; 1990.
- [77] Brookfield S. Becoming a critically reflective teacher. San Francisco: Jossey-Bass; 1995.
- [78] Baird M, Winter J. Reflection, practice and clinical education. In: Rose M, Best D, editors. *Transforming practice through clinical education, professional supervision and mentoring*. vols. 143–59. Edinburgh: Elsevier; 2005.
- [79] Ibiapina C, Mamede S, Moura A, Eloi-Santos S, van Gog T. Effects of free, cued and modelled reflection on medical students' diagnostic competence. *Med Educ* 2014;48:796–805.
- [80] Silverman D. Doing qualitative research: a practical handbook. London: Sage; 2013.
- [81] Schön DA. Educating the reflective practitioner: toward a new design for teaching and learning in the professions. San Francisco: Jossey-Bass; 1987.
- [82] Roulston K. Data analysis and 'theorizing as ideology'. *Qual Res* 2001;1(3):279–302.
- [83] Thomson OP, Petty NJ. C.M. Ramage, Moore, A.P. Qualitative research: exploring the multiple perspectives of osteopathy. *Int J Osteopath Med* 2011;14:116e124.
- [84] Sandelowski M. The problem of rigor in qualitative research. *Adv Nurs Sci* 1986;8:27e37.
- [85] Lincoln YS, Guba EG. Naturalistic inquiry. Beverly hills. California, London: Sage; 1985.
- [86] Ericsson KA, Simon HA. Protocol analysis: verbal reports as data. Cambridge: MA: MIT Press; 1984.