

# **CLINICAL THINKING- DOES YOUR CHOICE OF UNIVERSITY MAKE A DIFFERENCE?**

**M Harris, Bsc (Clinical Science)**

**Dr. Annie Carter MB,BS, Grad. Dip.Ocu. Health, BA(Hon), Grad. Dip Tert. Ed.**

**Dr. Melainie Cameron B.App.Sc (Ost),/M.H.Sc (Research)**

**Victoria University  
School of Health Science (Osteopathy)  
City Flinders Campus  
Masters Degree (Osteopathy)**

## **ABSTRACT**

### **Background:**

Currently two osteopathic courses exist in Melbourne. The course at RMIT, until last year offered a double Bachelors degree and has undergone several revisions, whilst the course at VU is a Bachelors degree followed by a Masters course. Whether a difference exists in the clinical thinking of students, depending on their choice of university, has not been investigated.

### **Objective**

To determine whether a difference exists between the clinical thinking of fifth year osteopathic students dependent on their university of choice.

### **Method**

Nine fifth year students, four from RMIT and five from VU took part in the study. The study consisted of two parts. An examination which followed the model of a Victoria University Clinical Practicum Four case history assessment and a focus group where the students discussed among their student peers the thinking and criteria they used to answer each of the sections of the examination.

### **Discussion**

Although students of both universities considered similar differentials for the given case, substantial differences existed in the thought processes behind the generation of the differentials. Several possible reasons were identified for this Furthermore most participants focused upon a musculoskeletal osteopathic diagnosis and merely considered a pathological diagnosis fleetingly indicating the need for osteopathic examinations to be tailored to include not only biomechanical diagnosis but also systemic investigations .

## INTRODUCTION

Potential osteopaths in Melbourne have two choices for their professional education. The osteopathic course at Victoria University (VU) has been running for nine years, and since its inception, has been a Bachelors degree followed by a Masters degree.

At Royal Melbourne Institute of Technology (RMIT), formerly Phillip Institute of Technology, the osteopathic course has been running since 1986 and over this period has undergone several revisions. Initially RMIT offered a Bachelor of Applied Science (Osteopathy) then, in 1991, the curriculum changed to a double bachelor program, B.App.Sc, B.O.Sc. In 2002 RMIT osteopathy students entered the B.App.Sc (Complementary Medicine) which will be followed by a yet to be named two year Masters program.<sup>1</sup>

Both the VU and RMIT courses are the same duration and are accepted by the Osteopaths Registration Board of Victoria. Each course includes osteopathic science subjects providing exposure to a range of osteopathic diagnostic methods. These classes include exposure to the history and principles underlying osteopathic beliefs, as well as explaining how osteopathic diagnostic methods can be integrated into patient management.

There are, however, some differences between the two courses. Although both courses are predominantly presented in a teacher- focused format, VU has, for the past five years, had one final year subject presented in a modified problem based (student focused) style. Furthermore, until recently the course at VU was the only one which included a minor thesis. At present, anecdotal information is that the RMIT student clinic has the greater number of patients, potentially allowing RMIT students

to gain a more diverse appreciation of clinical presentations as a consequence of their greater clinical experience. Given the greater patient numbers, the RMIT fifth year students may therefore have more experience of diagnostic thinking compared to that of their VU counterparts. However, increased patient numbers does not necessarily mean greater diversity of patient complaints. In contrast, although VU students see fewer patients although they spend a similar time in the clinic, they should have increased time to discuss their clinical experience with both their peers and their clinicians, which, it could be speculated, may also be beneficial for the development of their diagnostic thought processes.

The aim of this project was to examine whether osteopathic students differ in their diagnostic thinking according to which of the two Melbourne universities they studied at. In this study ten fifth year students (five from RMIT and five from VU) were to be involved. A study by Hardy et al<sup>2</sup> found that examinations provide a powerful indicator of clinical competence as well as an accurate measure of whether the goals of the particular course had been achieved. This conclusion is supported by Ryan –Wenger<sup>3</sup>, who stated that the Clinical Reasoning Case Study is a powerful tool for teaching and evaluating the clinical reasoning process and that this method could be used with any student health care provider.

With both of these ideas in mind, each participant was asked for a comprehensive written response to a case study. In completing the case study, participants were required to develop, and explain their reasons, for choosing four differential diagnoses. The participants were also asked to list their diagnostic choices in ascending numerical order: one being the most likely and four being the least likely. The highest ranked diagnosis was considered as the participant's working diagnosis.

Immediately after the case study, two separate focus groups took place, one including only VU students and the other including only RMIT students. The discussion undertaken in the focus group addressed the differential diagnoses proposed by each student and explored the processes by which they eliminated, or included, these from their final list. The working diagnosis, and discussion about how it was determined, provided an introduction to understanding the clinical thinking processes of these students, and offered an opportunity to compare both universities in diagnostic thinking.

Clinical thinking is the process by which health care practitioners gather information, interpret it and then translate that information into the provision of patient care. One important component of clinical thinking is developing a diagnosis (diagnostic thinking)<sup>4,5</sup>.

Traditional osteopathic diagnosis has revolved around the osteopathic concept of somatic dysfunction, defined as 'impaired or altered function of related components of the somatic (body framework) system'<sup>6</sup>. Several models have been used to explain the skill of diagnostic thinking to osteopathic students Greenman<sup>6</sup>, a well known osteopathic authority, stated that a structural diagnosis, which is the form a diagnosis often takes in osteopathic practice, uses the traditional physical diagnostic methods of observation, palpation, percussion and auscultation. Greenman continued by saying that structural diagnosis of the musculoskeletal system should never be done in isolation and should always be performed within the context of a comprehensive history and physical evaluation of the patient. He suggested that the three essential diagnostic criteria for the presence of somatic dysfunction, are asymmetry and an abnormality in both range of movement and tissue texture.

DiGiovanna<sup>7</sup> states that tissue texture changes are a significant diagnostic tool and also advocates the search for somatic dysfunction when making an osteopathic diagnosis. DiGivanna expands on Greenmans diagnostic criteria by advocating the acronym T.A.R.T. (T standing for tissue texture change, A standing for asymmetry, R denotes restriction of motion and T represents tenderness).

Although students of both universities are exposed to a plethora of diagnostic methods informally these two models are the major osteopathic diagnosis paradigms that are reinforced within the student clinic by the clinic history taking sheet and clinician expectations.

Also relevant to this research is the model of therapist development in which Skovholt and Ronnestad<sup>8</sup>, identified eight stages in the maturation of a therapist. This model attempts to explain how, with more experience, the therapist increases his/her diagnostic ability and confidence within the clinical setting. Skovholt and Ronnestad categorized therapists in their middle years of training as being at the “imitation of expert” stage. At this point student therapists model themselves upon experts in practice and attempt to apply the basics in a rigid fashion. It is this stage that is probably most likely to be exemplified by the fifth year students.

In a simplistic world (not cognizant of individual student differences), if Greenman’s concrete approach to diagnosis was strictly followed, and if students were at the same stage of maturation, it could be expected that there would be minimal variation in student diagnosis independent of which university was attended.

As well as different ideas about the key elements of a sound diagnosis there is also the issue of variation in how students learn, and apply knowledge to such a multifaceted task. At present there is limited research about the complex cognitive processes which are involved in clinical decision making. One difficulty with

analysing diagnostic reasoning is that it involves mental processes not detectable to the observer <sup>4</sup>.

Recently some work has been done in exploring how clinical skills are conveyed by health educators, what is learnt by student health practitioners, and what impact different learning situations have. One study, undertaken by Sobral <sup>9</sup>, involved four years of consecutive sampling of clinical clerkship medical students. It aimed to determine whether the diagnostic ability of medical students - as appraised by the Diagnostic Thinking Inventory (DTI)- was influenced by the way the learner acquired his/her basic knowledge. Results revealed that higher scores of the DTI measures were associated with different learning experiences. In addition, t-tests showed that students with an integrated teaching background and problem-based learning (PBL) experience obtained significantly higher scores for structure in memory, again supporting the contention that differences within osteopathic diagnosis could exist between different universities. However current research surrounding integrated teaching and PBL, including Sobrals' study, involve extensive PBL experiences. As VU offers only one subject in a modified problem based (student focused) style occurring in the osteopathic students fifth and final year of study, its impact may be minimal to non-existent.

## **METHOD:**

### **Participants:**

A total of nine fifth year students took part in the study. Four from RMIT and five from VU, the only inclusion criterion being that the students had to be studying fifth year osteopathy at either VU or RMIT. Ethics approval was granted by the Faculty of Human Development Ethics Committee at Victoria University. All participants signed informed consent forms and were free to withdraw from the study at any time without prejudice.

### **Procedure:**

Data collection was conducted over two days at the City campus of Victoria University Melbourne, Australia and the Stephenson Centre at Xavier College, Melbourne Australia. Each session lasted approximately one and a half hours.

Prior to taking part all students received the same cover letter written in plain English explaining the purpose of the study, the procedure of the study and the eligibility requirement.

The study consisted of two parts. Part one was administered under university examination conditions. The examination followed the model of a Victoria University Clinical Practicum Four case history assessment. It consisted of a brief case history and was divided into four sections. Each section of the exam had a specific question and contained the relevant information required for that section to be answered. After a given time period (10 minutes) participants were instructed to progress to the next question. The questions within the case exam focused on:

Determining additional historical information required,

Discussing aspects of the systemic enquiry, and



Outlining any physical examinations that the participant might deem to be required.

The participants were also instructed to formulate a list of the four most likely differential diagnoses, and to produce a working diagnosis. Each exam paper was identifiable only by seat number to maintain confidentiality.

Stage two comprised a focus group which took place immediately after stage one. The students discussed, among their student peers, the thinking and criteria they used to answer each of the sections and specifically how they generated their differential diagnoses and their eventual working diagnosis. Each focus group comprised students from one university only. A trained mediator (Edwina Ryan, osteopathic lecturer at RMIT and VU) facilitated both focus groups. The focus groups ran until ideas were being recycled. All discussions were audiotaped (Dictaphone). Individuals were identified by codes for comparison of their written and verbal responses.

Data collected from the RMIT students was analysed by Matthew Harris. The information gathered from the RMIT focus group and RMIT written paper was tabulated separately. The information from both was compared. Then the most comprehensive responses to each of the four questions derived from both sources was considered in comparison with a list of ideal responses formulated by Sara Lewellin and Matthew Harris. Sara Lewellin reviewed the VU data. At each step of this process the analyses occurred separately without any dialogue between the two researchers. After the individual university's data had been separately evaluated the investigators worked together to draw comparisons between the two universities.

## DISCUSSION

The case was based upon a fictitious patient named Greta and constructed around various potential causes of Temporomandibular (TMJ) joint pain. Greta was a 42 year old mother who presented with sharp stabbing pain in the region of the jaw. At no point during the case history was enough information given for students to be able to make a definitive diagnosis at that point. As the participants progressed through the case history more information was given which alluded to the possibility that Greta's jaw pain may have been more than that of a simple mechanical dysfunction. For example, apart from the jaw pain, Greta complained of both bowel disturbance and bladder urgency as well as a steady deterioration in vision. All participants within the study, independent of the university attended, suggested TMJ dysfunction with associated upper cervical somatic dysfunction as the number one differential. However, participants attending VU stated that in addition to a primary mechanical diagnosis of TMJ dysfunction, they would also have considered the possibility of the patient having multiple sclerosis, a trend not seen among the RMIT participants. (All five participants from VU included Multiple Sclerosis as one of their top two differentials, whereas only one RMIT student placed Multiple Sclerosis in his/her four most likely differentials.)

In the current study the RMIT osteopathic participants demonstrated some of the identified characteristics of the novice diagnostician. These included a tendency that Bordage and Lemieux<sup>10</sup> found in their group of 'weak diagnosticians,' namely an inability to relate relevant predisposing and epidemiological factors to the case. For example, Greta is a 42 year old generally healthy female, so it is unlikely that she suffers coronary heart disease unless she is diabetic or has significant risk factors which were not identified in any of the additional information provided<sup>11</sup>. Yet this

possibility seemed to be a major concern for the majority of participants regardless of university. RMIT B1 “..... I wanted to know about any previous heart attacks and chest pain. Um, any diagnosis of angina by the GP. Urrm, chest pain, tightness difficulty breathing, pain on exertion” and “ if she had a family history of heart stuff, like an infarction. Angina sort of refers to the jaw.”

Another close comparison to this current study was found in an article by Meyer and Cleary<sup>12</sup> who examined how medical students from the University of Adelaide varied in their conception of, and engagement in the diagnostic process. The researchers identified some different approaches to diagnosis by the immature clinician. The study found that young clinicians manifest several common flaws. These included errors in “data collection, disorganisation, or inaccessibility to the relevant knowledge base, as well as an inability to think probabilistically”. Similarly representative of these errors, one of the students from the VU focus group questioned the possible cardiac component of Greta’s jaw pain excessively, despite the fact that Greta’s jaw pain was not associated with exercise, her family history was clear of cardiovascular disease and her blood pressure was within normal range. This emphasis on a severe, life threatening diagnosis may reflect the inexperienced diagnostician’s concern not to miss the ‘red flag’, as overlooking such ‘red flags’ during a student’s educational career results in fail grades.

While there was a reasonably large number of differential diagnoses mentioned (eight), the RMIT participants did not demonstrate, either in writing or verbally, a systematic or methodical way of including or excluding any particular diagnosis. For example G1 mentioned cerebellar dysfunction as a possible diagnosis, an idea that was supported by B1, yet neither student explained why this diagnosis was possible, nor did they mention how they excluded it from their final list of four

most likely diagnoses. Similarly two participants suggested anaemia as a possible diagnosis for Greta's symptoms and requested an FBE to help eliminate this possibility. Neither student indicated which of Greta's symptoms prompted this consideration, nor why this diagnosis was not included amongst their final lists of four possibilities.

Such leaps in diagnostic thinking were not seen among the VU participants, who clearly identified, and explained, their thinking for either including or excluding any possible diagnoses. There are several possible reasons for these differences between the two populations.

RMIT students' previous experience with developing differential diagnosis is likely to have occurred within a specific osteopathic clinic context. It is quite possible that through their experience within the student clinics, students have learnt to develop tissue specific diagnoses and not explored, or considered, identifying underlying pathological processes. However VU students, who see fewer patients but spend a similar time within the student clinic, have increased time to discuss their clinical experience with both their peers and their clinicians, perhaps further developing their diagnostic rationale. Due to lack of clinical experience, students have yet to develop the ability to discern between relevant and irrelevant differentials and feel the need to mention all possible disease states. This deficit in prioritisation was also described by Skovholt and Ronnestad<sup>8</sup> in their Model of Therapist Development. This model, as noted above, categorised the middle years of training until graduation as the stage of imitation of experts, the so-called third stage in a therapist's development. In this stage the individual's working style is uncertain as the individual attempts to master the basics by applying a rigid systematic approach, based on their teachers' examples or behaviours.

VU participants may be more able to articulate, or demonstrate, a more systematic or methodical way of including or excluding differentials due to having a subject presented in a modified problem based (student focused) style which is specifically focused on clinical diagnosis and management. Sobral<sup>9</sup>, in his four year study of clinical clerkship medical students, showed that students with an integrated teaching background of problem based learning (PBL), obtained significantly higher scores for structure in memory.

Interestingly all participants, regardless of alma mater, decided that the most likely diagnosis for the case was TMJ and upper cervical dysfunction, without any exhaustive attempt to really consider if Greta's case was explicable by more than a mechanical diagnosis. This limited view on behalf of the participants may be attributed to the emphasis placed on structural osteopathic diagnosis by the respective courses. The Greenman model of diagnosis is one of the models used to explain the skill of osteopathic diagnosis to future osteopaths. The diagnostic entity sought by Greenman is that of somatic dysfunction. Greenman suggested that there are three essential diagnostic criteria for the presence of somatic dysfunction. These being asymmetry and abnormality in both range of movement and tissue texture. As the participants were provided with each of the entities of somatic dysfunction within the case it may have blinded them to the possibility of an alternative, or additional, non-mechanical diagnosis.

It is also possible that the emphasis on a biomechanical dysfunction diagnosis may have been due to the way in which the test case was written. Although multiple sclerosis was considered as a possible differential by some students, the written case did not indicate that a neurological examination was carried out. Seeing this, some students may have assumed that a neurological diagnosis was therefore considered

unlikely, and dismissed the possibility in their final diagnosis. This may indicate a flaw in the write-up of the example case, although it was pilot-tested before use, and no such ambiguity was identified during the pilot testing.

One limitation of this study was the focus group discussion, which was dominated by B1. This student offered responses of several sentences, in comparison with the three other participants who rarely responded with more than one sentence. In considering the possibility of B1's declarations suppressing the other participants from contributing, a comparison was made between the transcripts of the group discussion and the individual written responses. This analysis revealed that B1's ideas did not outweigh those of the other participants in the focus group.

Another flaw in this type of qualitative analysis is the inability to ascertain a clear understanding of each of the participants' logic. While it is the objective of the case to help expose the thought processes that contribute to making a diagnosis this can only be achieved through interpreting the participants' spoken word. For example RMIT G1 said "I was also wanting to ask about any recent respiratory tract infections. In case she had like an autoimmune thing going on, Sinusitis." In this example, did G1 simply make a mistake in referring to sinusitis as an autoimmune response instead of a hypersensitivity reaction, or is RMIT G1 posing two possible diagnoses? A similar example is provided by RMIT B1 who stated "and a general observation as well, any sort of local swelling is going to affect the nerves, ptosis". In this statement RMIT B1 could be referring to ptosis of the eyelid, but we can't be certain. What else could he be referring to? . If so this shows an error in his clinical interpretation of the anatomy relevant to this case. Greta's symptoms follow a trigeminal nerve pattern, not a facial nerve palsy. It is also possible that B1 was referring to Greta's general appearance and was referring to a protruding belly. These distinctions cannot be made

from the available data. Some educated assumptions are required to conduct the analysis, and these assumptions may be erroneous, leading to a false representation of the participants.

## CONCLUSION

Results indicate that although students of both universities considered similar differentials for Greta's complaint, there was substantial difference in the thought process behind the generation of these diagnoses. Several explanations are possible; including the introduction during fifth year of a modified problem based (student focused) subject into the VU course, and differences in the amount of time spent discussing and analysing cases in the respective clinics..

Another feature alluded to by this study is that most participants focused upon osteopathic diagnoses, and considered medical diagnoses only fleetingly. It is possible to attribute this oversight to student inexperience and conditioning (eg: diagnostic experience having occurred exclusively in an osteopathic clinic), but it may, as mentioned earlier, simply reflect the way in which the sample case was written.

Bearing these points in mind, it is important that osteopathic students are not only examined on mechanical diagnosis but are challenged to think systemically. Examinations within the university therefore need to be tailored to include not only mechanical diagnosis but also systemic enquiry. Thus providing students with the diagnostic reasoning to be safe primary health care practitioners.



## HISTORY

Greta Toolsworth is a 162cm, stout 65kg, 42 year old mother. She complains of pain around the jaw, which occurs when eating, brushing her teeth and talking. She experiences sharp stabbing pain with these movements. The pain occurs intermittently and usually only lasts for a few seconds. The pain is followed by a refractory period in which time no further pain can be elicited. She feels no pain between attacks.

Greta's pain began six weeks ago, which she believes is related to a fall. Greta tripped while walking down some stairs in her apartment and as she fell bumped her head on the railing of the stairs. There was no bruising to her face, and she did not lose consciousness. She mentions that she has been feeling 'quite clumsy lately'. Greta has trouble remembering how long after this incident the jaw pain began. You do notice a yellowy, green bruise on her left arm.

Greta does not experience any other motor or sensory phenomenon in conjunction with her jaw pain. There is no pain at night. Greta has tried Nurofen for her pain but this does not seem to make any change.

Greta appears tired, but she explains that this is due to the stress of caring for two children and working full time as a librarian.

Additional Historical Information (including past medical history, family history, psychosocial factors)

List any additional information you would like to know about Greta, her health, and her family. Explain why these issues are relevant to her consultation today.

**Do not turn page until instructed to do so**

Greta has never smoked (Except for the occasional joint through her teen and early twenties). She enjoys a glass of red wine with her dinner at night but rarely drinks in excess.

Greta has no pain in any other sites however does get an “electric shock” type feeling when she bows her head on rare occasions. This does not seem to concern Greta as she says it occurs so infrequently she is not even sure it happens any more.

Greta frequents the gym twice a week but has not been attending of late as she is feeling tired and weak at the end of the day. Greta just recently had her glasses adjusted as reading a computer screen seemed to be affecting her eyes by the close of the day.

Greta has her own workstation at the library that has been ergonomically set up to her needs. Her work is mostly sedentary, but is mentally challenging. Greta enjoys her work even though she finds it slightly stressful of late.

Greta has a regular G.P. with whom she has an open and honest relationship. The GP delivered all of Greta’s children (12,19 and 20 years ago) and has monitored Greta for routine health issues (pap smears, breast exams, etc) for the past 25 years. Greta saw her GP concerning the jaw pain and he recommended the Nurofen. Greta has come to see you on her own accord as the anti-inflammatory has not helped.

Greta takes no regular medication. If she experiences a headache, or other mild complaints she takes a Panadol and goes to bed early.

## **Systemic Inquiry**

List the aspects of the Systemic inquiry you would like to ask Greta. Give a brief explanation of your reasons for asking these questions.

**Do not turn page until instructed to do so**

Greta does not have a cough, chest pain or shortness of breath; she has never had a lung condition or heart disease that she is aware of.

Greta describes her appetite as “healthy”. She has a stable weight; She eats a wide range of foods, including meat and dairy products. She has no abdominal pain although she does have bouts of constipation. Of more concern to Greta is her loss of bladder control and bladder urgency (although her mother assures her that this is not unusual after having three children)

Greta is not experiencing any other motor or sensory phenomenon.

Greta has had the strength of her glasses increased twice in the past year and comments on those nights when she does go to gym she finds it difficult to see the road on her drive home.

**Examination:**

You have the opportunity to examine Greta. What will you examine and why?

**Do not turn the page until instructed to do so**

On observation you notice that Greta has an increased thoracic kyphosis with a forward head carriage. She is extremely round shouldered. There are also several bruises on Greta's shins some yellow, some blue.

You have difficulty reproducing Greta's familiar pain with some movements triggering the pain and on subsequent retesting with the same movement no pain being elicited. You note that the right TMJ lags behind the left when Greta actively opens her mouth. Restrictions can be felt on passive right lateralization of the mandible. The right masseter and temporalis are hypertonic to palpate.

When testing range of motion in the upper cx spine you find very little restriction. The only finding present being decreased rotation at the AA joint. There is some hypertonia through the ant scalenes bilaterally.

## **Diagnosis**

List your four most likely differentials for Greta's pain. Number each differential. The differential label one (1) will be considered your working diagnosis. Next to each diagnoses write a brief explanation of your reasoning.



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