

RESEARCH REPORT

“Pet things” and “penny drops”—Factors influencing clinicians' teaching of pelvic anatomy

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Abstract

Pelvic anatomy is considered challenging to teach and learn, partly because its complexity can make it difficult to conceptualize. Educational researchers recognize the value of a spiraling curriculum to develop clinically orientated anatomy knowledge for health professionals, but most studies have focused on the preclinical years. It is unclear how the complexities of pelvic anatomy are taught in the clinical setting by clinician educators. Understanding pelvic anatomy teaching from the perspectives of clinician educators is important because of their critical role in supporting medical students to become knowledgeable, safe practitioners. This study sought to examine factors that influence clinician educators' teaching of pelvic anatomy to medical students during clinical placement. Using established qualitative research methods, this exploratory study used semi-structured interviews with 10 participants from obstetrics/gynecology ($n=4$) and urology ($n=6$) in Australia. Interviews were transcribed, and data were analyzed using a reflexive thematic analysis framework. Two overarching factors were identified as influencing clinician educators' teaching: (1) how they defined the scope of knowledge, and (2) pedagogical understanding. Scope of knowledge was underpinned by patient safety considerations and guided by past experience and student aspirations. Pedagogical understanding also relied on experience and encompassed multiple teaching strategies, including approaches informed by sensitivities surrounding pelvic anatomy. Multiple factors influence how clinician educators define the scope of pelvic anatomy knowledge required of medical students. Clinician educators' awareness of syllabus and teaching approaches can enable them to support students to attain threshold concepts such as three-dimensional spatial relationships and sociocultural sensitivities associated with pelvic anatomy.

KEYWORDS

clinical educator, curriculum, gross anatomy, medical education, pelvic anatomy, work integrated learning

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INTRODUCTION

Pelvic anatomy is spatially and functionally complex. It is frequently reported as being difficult to conceptualize, making it a challenging component of medical education (Kramer & Soley, 2002). While it is well recognized that pelvic anatomy is challenging to teach and learn in the preclinical years (Kramer & Soley, 2002; Hall et al., 2018), there is a lack of studies investigating how this translates to the clinical placement environment. Specifically, little is documented about how clinician educators approach pelvic anatomy teaching in the clinical setting and, indeed, how any pre-clinical challenges are addressed in this environment. Enhancing our understanding of pelvic anatomy teaching in the clinical placement context is important because pelvic anatomy is fundamental for understanding reproductive and sexual health—an aspect of medicine that is as important for generalists as it is for specialties such as obstetrics, gynecology, and urology.

Changing trends in anatomy teaching in Australia and internationally have been extensively researched in the preclinical setting (Bergman et al., 2011; Estai & Bunt, 2016; Trautman et al., 2019; Pather, 2020). In recent times, decreased anatomy contact hours have been observed, driven by curriculum crowding due to emerging fields, a shift toward computer-generated technologies, and a de-emphasis on cadaveric dissection (Trautman et al., 2019). While substantial work has been undertaken to define appropriate anatomy syllabi for health professions students (Smith et al., 2016; Connolly et al., 2018), in Australia, the syllabus is the responsibility of individual medical schools (AMC, 2012).

Although there is great complexity and variation in the meaning of “integrated curriculum” (Kirkness et al., 2022), the idea of the integrated curriculum is generally supported in the literature (Harden, 1999; Evans & Watt, 2005; Fitzgerald et al., 2008; Bergman et al., 2011; Estai & Bunt, 2016) and is recommended by the Australian Medical Council (AMC, 2012). However, few studies detail how anatomy is taught in the clinical environment despite its importance in curriculum integration (Evans & Watt, 2005; Smith et al., 2019). Furthermore, little is known about whether the factors that influence anatomy teaching more broadly are consistent with those that influence clinician educators' pelvic anatomy teaching. This study examined the perspectives of clinicians who teach pelvic anatomy to medical students in the clinical setting.

MATERIALS AND METHODS

Method

As this study aimed to examine the lived experiences of clinician educators, an interpretivist paradigm was used to frame the study. In contrast to positivist epistemologies that rely on quantifiable observations, an interpretivist epistemology aligns with our research focus on understanding the subjective meanings and perspectives of clinicians regarding their teaching decisions and

methods, and assumes that reality and knowledge are socially constructed (Denzin & Lincoln, 2000; Brown & Duenas, 2020). A social constructivist ontology recognizes that social and contextual factors influence teaching practices and educational experiences. A qualitative methodology was, therefore, deemed most appropriate for multiple realities to be captured and analyzed. Additionally, because the research topic is relatively novel, as demonstrated by the paucity of literature on the subject, an exploratory design was used. Consistent with accepted approaches in qualitative research (Cleland, 2017), this was coupled with an inductive approach to interpretation.

Setting

The study was conducted through an Australian university following approval from the Southern Adelaide Clinical Human Research Ethics Committee (Approval number: 210.20). The university's four-year postgraduate medical course is co-located with a teaching hospital. The course is divided into a predominantly preclinical phase for the first two years, where basic science, anatomy, and simulation-based clinical skills are taught. During the final two “clinical” years, medical students rotate through five-week specialty placements, working in small groups (up to five students) and allocated to a clinical team for the duration of the rotation. Students become part of the medical team during each placement, contributing to patient care. During placements, while there is no defined syllabus, clinicians provide “bedside” teaching and tutorials where practicable. This teaching is largely clinician-dependent. Clinicians are also engaged in assessing students' knowledge, skills, communication, and professionalism. Performance in these domains is assessed via a 7-point scale following observations of students in various clinical situations. Anatomy knowledge is not specifically assessed but, rather, is integrated with students' learning on clinical placements. Clinicians at all levels of training supervise medical students on clinical placements.

In Australia, Trainee Medical Officer (TMO) refers to any doctor in training and encompasses interns in their first year of training following medical school with provisional registration, Resident Medical Officers (RMOs) who have obtained general registration following at least one year of clinical practice, and Registrars with at least three years of clinical experience in a public hospital. Doctors appointed as Registrars are typically enrolled in a specialty training program (AMA, 2017). While Junior Medical Officer (JMO) is technically a synonym for TMO, in practice, the term refers to interns and RMOs.

In this study, we use the term “clinician educators” to refer to clinicians who also educate medical students and other doctors during the course of their clinical role. This encompasses both clinicians who are affiliated with the university and those who have no additional training in educational principles. We recognize that this term may have a more specific meaning of clinicians who have further training in education (Stoddard & Brownfield, 2016) but do not use it as such in this article.

Participants

The intent of this study was to obtain rich descriptions of clinicians' experiences of teaching pelvic anatomy. As not all medical specialties have a focus on pelvic anatomy, a purposive sample was deemed most appropriate in obtaining informed perspectives from different specialties and levels of clinical and teaching experience. The intention of this approach was to obtain a sample of participants that were reflective of the diverse clinician educator workforce. Guiding the purposive sample were several selection criteria (i.e., participants were selected on the basis that they work in Australia, use pelvic anatomy in their day-to-day practice, and supervise medical student clinical placements). Given that a specific, relatively small subset of clinicians were sought for participation, purposive sampling was combined with snowball sampling, which has utility when recruiting hard-to-reach populations (Parker et al., 2019) as can be the case with busy clinicians.

Participants were recruited via email using the investigators' professional networks. Information about the study was also distributed via flyers in staff rooms and public areas; however, no participants were recruited in this manner. After the initial expression of interest, eligible participants were provided with the Participant Information and Consent Form. Consent was confirmed again prior to, and following, data collection.

Ten participants with varying years of clinical experience were recruited to the study from specialties including urology, obstetrics, general practice (family medicine), obstetrics, gynecology, and gynaecological oncology (see Table 1). All participants were involved in teaching and supervising medical students as part of their clinical duties. Eight clinicians were involved in supervising medical students on clinical placements from the same university and two clinicians taught students who came from different universities, which have different formal syllabi. Consistent with qualitative research, the sample size for this study was guided by data adequacy and the ability to obtain rich, meaningful and nuanced accounts of the lived experiences and perceptions of participants (Hennink & Kaiser, 2022).

Data collection and analysis

Data were collected via individual semi-structured interviews with clinician educators. Interviews explored perceptions of the factors influencing clinician educators' pelvic anatomy teaching to medical students on clinical placement. Interviews are purposeful, deliberate conversations (Kvale, 1996) that can provide rich data to examine the human experience (Polkinghorne, 2005). Additionally, interviews facilitate knowledge creation through the interaction between the researcher and participant (Brown & Duenas, 2020) and enable in-depth explorations of individuals' lived experiences.

An interview guide was developed by the first author to identify topics for discussion and their sequence (Kvale, 1996). Questions were developed using insights obtained from the literature (e.g., DiCicco-Bloom & Crabtree, 2006) and guided by the overarching research question. To enhance the quality and coherence of the data collection tool, interview questions were piloted with two volunteers and refined using an iterative process. Interview questions prompted participants to share demographic information, discuss their career trajectory, and explore their views on pelvic anatomy knowledge required for a medical student. Interviews also prompted discussions of a potentially sensitive nature (e.g., observed mistakes or near misses).

Interviews were conducted online and in-person by the first author between July 2021 and February 2022. Interviews were between 20 and 60 minutes in duration. Data saturation, the point at which sufficient data have been collected for conclusions to be drawn, is a common guiding principle to assess adequacy of purposive samples in qualitative studies (Hennink & Kaiser, 2022). The saturation point was defined during data collection and initial analysis wherein no new meanings were derived from the interview data. All three researchers were involved in this process, looking beyond identified codes to determine whether other insights could be gained. In our study, although saturation was reached after eight interviews, a further two interviews were analyzed. This is consistent with other qualitative studies (Hennink & Kaiser, 2022) wherein saturation was reached after a relatively narrow range of interviews.

TABLE 1 Demographics of clinicians interviewed.

| Participant identifier | Clinical experience (years) | Age (years) | Gender | Current clinical role | Formal teaching position in addition to clinical role |
|------------------------|-----------------------------|-------------|--------|--|---|
| 1 | 11–20 | 31–40 | Woman | Obstetrics and Gynecology Consultant | Yes |
| 2 | 11–20 | 31–40 | Woman | Urology Consultant | No |
| 3 | 11–20 | 41–50 | Man | Urology RMO | No |
| 4 | 11–20 | 41–50 | Man | Urology Consultant | Yes |
| 5 | 1–5 | 21–30 | Man | Urology RMO | No |
| 6 | 6–10 | 31–40 | Man | Urology Registrar | No |
| 7 | 11–20 | 41–50 | Man | Urology Consultant | Yes |
| 8 | 11–20 | 41–50 | Woman | Rural General Practice Obstetrics Consultant | Yes |
| 9 | 21+ | 61–70 | Man | Obstetrics Consultant | No |
| 10 | 11–20 | 31–40 | Woman | Gynecological Oncology Consultant | No |

With participant permission, interviews were audio-recorded. Six interviews were transcribed by the first author and, due to time constraints, the remaining four interviews were transcribed by a paid transcription service. All transcripts were reviewed for accuracy against the audio recordings. Additionally, interview transcripts were sent to participants for member checking prior to analysis.

Following data collection, interview transcripts were interrogated to examine participants' experiences, meanings, and realities in teaching pelvic anatomy to medical students on clinical placement. Transcripts were interpreted using reflexive thematic analysis—a form of thematic analysis that builds on Braun and Clarke's (2006) previous work. Reflexive thematic analysis acknowledges the researcher's role in creating meaning from the data, underpinned by their theoretical assumptions and analytical skills (Braun & Clarke, 2019). It involves six recursive phases that guide the researcher through a rigorous process of interrogation and engagement with the data (Braun & Clarke, n.d.). These phases are: (1) familiarization with the dataset; (2) coding; (3) generating initial themes; (4) developing and reviewing themes; (5) refining, defining, and naming themes; and (6) reporting (Braun & Clarke, n.d.).

During Phase 1, interview data were read and re-read by the first author to facilitate familiarity with the content. Notes were made regarding initial observations, impressions, and insights. In Phase 2, succinct labels (i.e., codes) were generated during several coding rounds to capture key features of the data in relation to the research question. During this phase, samples of data were also analyzed by the second and third authors, and interpretations were discussed collaboratively and reflexively to develop more nuanced understandings of the data, as outlined by Braun and Clarke (2019). In Phases 3 and 4, codes were reviewed and collated to generate broader patterns of meaning (i.e., themes) (Braun & Clarke, 2006). This involved revisiting codes generated during Phase 2, coupled with ongoing collaborative discussions amongst the research team to ensure that themes addressed the research question. During Phases 3 and 4, themes were split, amalgamated, and some discarded. Quirkos software (Quirkos.com) was used to facilitate the organization of codes and themes. In Phase 5, detailed analyses of themes were developed by the first author, and the naming of themes was discussed with the research team. Lastly, during Phase 6, the analytic narrative was developed, drawing upon data to illustrate the themes (see Results). This analysis was then contextualized in relation to existing literature (see Discussion).

Reflexivity

The researchers have diverse professional backgrounds. The first author was a final-year medical student at the time of the study and also worked as an anatomy tutor for preclinical medical students at the institution where the study was conducted.

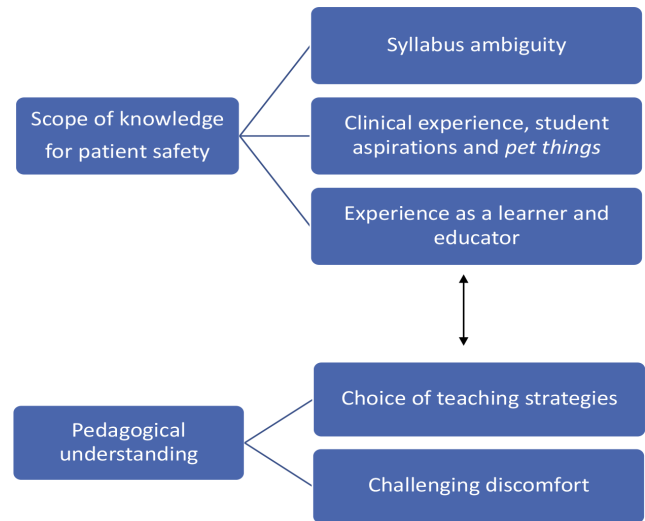


FIGURE 1 Factors influencing clinician educators' anatomy teaching when supervising medical students on clinical placement. These factors encompassed two major themes: how they defined the scope of knowledge that medical students require for safe patient care, and their own understanding of pedagogy. With some ambiguity regarding a defined syllabus, clinician educators' teaching was guided by students' career aspirations, and the knowledge that clinicians considered to be most important, informed by their experiences as a clinician, learner and educator. Pedagogical understanding included clinician educators' teaching and learning experiences, their choice of teaching strategies to support students' learning, and awareness of social and cultural sensitivities that influence learning.

The second author is a health professions education researcher with a background in qualitative research and works as a medical and health professions educator. The third author has a health professional background in physiotherapy and works as a medical educator, which includes anatomy teaching. All three authors contributed to the interpretation of the data, facilitating triangulation at the level of the analysis, ultimately enhancing the rigor of the study.

RESULTS

This study examined the factors influencing clinician educators' pelvic anatomy teaching in the clinical setting. Two key themes were identified during data analysis; namely, defining the scope of knowledge required of medical students during their clinical training; and the pedagogical understanding that informs clinicians' teaching. These themes, which include several identified sub-themes (see Figure 1) are now discussed with evidence from the interview data.

Defining scope of knowledge

Clinicians' understanding of scope of knowledge affected their teaching of pelvic anatomy to students on clinical placement.

Clinicians framed pelvic anatomy knowledge within the broader context of their current clinical practice and in relation to patient safety. In clinical placements, there is little focus on pure foundational knowledge. Participants discussed syllabus expectations versus clinical practice and defined the scope of knowledge using experience and their understanding of student factors.

Syllabus ambiguity

Participants recognized that medical school aims to equip students with foundational knowledge upon which further knowledge can be built following graduation:

... at medical school, our job is to create safe early career doctors ... that's a different question to what they might be required to know as a safe surgeon.

(P1, Obstetrics Consultant)

From a curriculum perspective, however, some participants expressed uncertainty about the pelvic anatomy content that forms part of the formal medical school curriculum. Several junior and senior clinicians perceived this lack of clarity to stem from their limited involvement in formal medical student assessments, as one participant explained:

It's hard to gauge what level your medical school expects you to gain. So, I guess that's what I've never been sure of, is what level of the medical school is testing you at to then ensure that I test, and make sure that you guys [medical students] are at that level and have got that knowledge ...

(P2, Urology Consultant)

Despite having all been through medical school, participants noted that the students' pelvic anatomy syllabus was not clearly defined. This was attributed, in part, to the passing of time:

... we're sort of through [sic] ten years post school ... and I guess I probably forget what I knew in medical school, versus what I knew after my exams.

(P2, Urology Consultant)

Clinical experience, student aspirations, and *pet things*

In the absence of a defined syllabus, participants deferred to their experience in deciding what to teach. Specifically, they referenced past experiences as a learner and clinician, their own interests, their perceptions of students' interests, and knowledge they considered critical for patient safety as guiding factors. For example, one participant acknowledged the critical influence of the teacher's interest in guiding student learning:

[Teaching can be guided by] probably the pet things that their lecturer thinks they need to know ... There were some locations in South Australia where there will be a list circulating for medical students. If you're going to help the surgeon on his list, read up x y z. And you know, that probably shouldn't be the case, but it still is at the moment.

(P8, Rural GP Obstetrics Consultant)

On exploring the significance of these "pet things", the participant recognized that clinical experience influences and informs teaching decisions. In particular, the participant noted patient safety as a key motivator in ensuring their students develop requisite knowledge to provide safe care:

I think you'll find that's born out of experience ... And that will often shape people's experience: the things that go wrong.

(P8, Rural GP Obstetrics Consultant)

Participants recognized the student's interest in specialization as a key influence in what they prioritized in their teaching:

... we know that someone who's more interested in being a GP or a physician, you know, they don't ever need to know about the neurovascular bundle of the prostate, but they need to understand the pathology of it and how to appropriately manage these patients. So, anatomy is not as important to everybody.

(P2, Urology Consultant)

Selecting "pet things"—Experiences as a learner and educator

Participants referred to their own experiences as both learners and educators when describing useful resources that they incorporate into their teaching, making it often difficult to disentangle these experiences. For example, when discussing the use of patient educators, one participant first refers to their own experience before offering a teaching recommendation:

When I went to XX¹ Medical School, we had ... patient educators who came and did speculum exams with you. I think that was really useful. I guess it doesn't take long to just teach a part about catheters and you could combine it with male anatomy as well ... maybe O&G needs to take a more proactive role in teaching medical students as they come

¹De-identified.

through gynae [when] they're going to actually be seeing and touching these things.

(P10, Gynaecological Oncology Consultant)

This suggests that clinician background informs current practice as an educator. Similarly, another participant explained that their choice of teaching tool was informed by their experience as a learner:

I have done a lot of ultrasound-guided things like terminations and miscarriages and things that you do inside the uterus. Ultrasound has been a big influence in my understanding of the anatomy and also how to teach the anatomy.

(P9, Obstetrics Consultant)

Pedagogical understanding

Clinicians described teaching strategies that they use to overcome challenges inherent in learning pelvic anatomy and noted the importance of clinical relevance to help students consolidate their learning. Additionally, participants noted the sensitivities and discomfort surrounding pelvic anatomy that can potentially impact students' learning.

Choice of teaching strategies

In reflecting on their own experiences of learning anatomy, and supporting students with their learning, participants described a range of teaching strategies they use to support students' understanding of pelvic anatomy. These strategies included the use of analogies, repeated exposure, and integrating theory with clinical practice.

Participants acknowledged that pelvic anatomy content is difficult to grasp. The complexity lies in the need to visualize three-dimensional structures that are otherwise difficult to present in two-dimensional images, as one participant explained:

... it can be really difficult for students to kind of wrap their brain around on a flat 2D picture what this 3D structure is and where things are in relationship to the pelvic floor and what that might mean and why it might be relevant in terms of clinical stuff.

(P1, Obstetrics Consultant)

To address this spatial-visual challenge, analogies were used to explain complex ideas to medical students. For example, when describing a technique for safer vaginal delivery, one participant used the analogy of a pizza to describe the properties of the perineum:

... perineum starts off as a wedge ... that wedge turns into a pizza ... It's like the person at the pizza shop with a lump, you spin around and gradually it becomes longer and longer and longer ... you give the perineum a chance to develop and then you let the baby be born by itself.

(P9, Obstetrics Consultant)

Participants also noted that the content is difficult to learn because of the level of detail associated with anatomy. Because of the complexities associated with the content, it was acknowledged that anatomical detail is easily forgotten:

I think most of them would go through [pelvic anatomy] prior in their preclinical years, but it's very, very easily forgotten

(P6, Urology Registrar)

As one participant explained, repeated exposure can facilitate a detailed understanding that accumulates over time:

... it's difficult for the vast majority of people to pick up detail initially. But with every year of training and every year of medical school, you usually pick up another layer of detail

(P2, Urology Consultant)

Participants recognized that for knowledge to be retained, it should be integrated with day-to-day practice. For example:

... most of that pelvic anatomy that I learned has left me already ... what's really stuck with me is what I use in my clinical practice

(P3, Urology RMO)

The ability to engage with "live" anatomical structures in clinical practice provided a context for consolidating understanding:

I think the first penny dropping moment with the pelvic floor was when I actually felt someone's pelvic floor that was in spasm so you could actually feel the coccygeus muscle like a piano string ...

(P10, Gynaecological Oncology Consultant)

Recognizing the importance of linking theoretical knowledge with practical application was also described in terms of how best to support students with their learning. For example, one participant explained the importance of early clinical exposure:

... link that learning to the clinical relevance at the same time so they can kind of make that link in their head of "Oh yeah, this is why I'm learning this. I'm not

just learning this to pass my exam, I'm learning it because [it's] going to make me a better doctor."

(P1, Obstetrics Consultant)

Challenging discomfort

Several participants described the potential emotional "discomfort" that students can experience in learning pelvic anatomy and specifically, performing a pelvic examination of "someone's intimate area" (P1, Obstetrics Consultant). One participant hypothesized about why students experience this discomfort:

... in this country, we are taught to be conservative about anything to do with the genitals ... I think for a lot of people, they are not taught to talk about their anatomy with the right terminology from an early age. We call it [the vulva] a flower or whatever.

(P1, Obstetrics Consultant)

The participant went on to discuss the impact of culturally and linguistically diverse backgrounds, citing their own experience, as well as their observations of students:

I do think there's a bit of a cultural component ... particularly from more of the Asian backgrounds, and this is for both genders. I'm half-Chinese, and we are definitely taught to be very deferent.

(P1, Obstetrics Consultant)

Related to the notion of health literacy, this participant suggested that using correct pelvic anatomy terminology could go some way to addressing students' discomfort:

... increasing students' comfort with talking about intimate anatomy will hopefully get rid of some of that discomfort that students feel when performing intimate examinations for the first time.

(P1, Obstetrics Consultant)

DISCUSSION

This study identified two key factors that inform the experience of clinicians involved in teaching pelvic anatomy to medical students in the clinical setting: (1) the scope of pelvic anatomy knowledge required for safe clinical practice; and (2) the pedagogical understanding that informs clinicians' teaching.

Our results highlighted that clinicians did not have a clear, consistent understanding of the scope of pelvic anatomy knowledge required for medical students in the clinical years. This is, perhaps, little surprise given the lack of consensus regarding the syllabus in Australia, which is ultimately the responsibility of the individual

medical school (AMC, 2012). In contrast, the UK proposed a national syllabus in 2016 (Smith et al., 2016) and a study following the introduction of this syllabus found that around half of anatomists changed their teaching after the syllabus was introduced (Smith et al., 2019). This suggests that a syllabus provides an important framework to guide clinical teaching, although it is worth noting that to date, the impact of the syllabus has only been evaluated in the preclinical setting (Smith et al., 2019). While it is likely that the introduction of the national syllabus similarly impacted clinical teaching, further research would be required to confirm this.

In the absence of reference to a standardized pelvic anatomy syllabus, participants relied upon their experiences as a learner, educator, and clinician to inform their understanding of what knowledge was required. Additionally, it seemed that both positive and negative experiences ("things that go wrong") were influential in guiding which "pet things" they perceived as important to teach. This more "ad hoc" approach to pelvic anatomy teaching makes sense given the complexities associated with teaching in a clinical setting which requires attention to various clinician, student and patient factors (AlHaqwi & Taha, 2015) within the environmental context (Koenigs et al., 2005). It is also important to remember that the clinical environment was not primarily created with education in mind (Koenigs et al., 2005), which means that teaching in this setting is more opportunistic in nature. It is not surprising, therefore, that clinicians relied on their past experiences and clinical cases when deciding what to teach.

During interviews, it became apparent that participants perceived pelvic anatomy to be difficult to learn for students. In particular, participants described the transition from two- to three-dimensional understanding as a key area of difficulty for students. This is consistent with the findings of other studies in which pelvic and neuroanatomy were identified as "problem topics" among students (Kramer & Soley, 2002; Hall et al., 2018). Our results extend beyond this conclusion, however, by identifying the learning strategies that participants used to understand key pelvic anatomy concepts. This included the use of analogies to explain complex concepts.

One of the participants referred to a learning experience that occurred in the clinical setting following cadaveric dissection as a "penny drop" moment. Such transformative learning has been described in the broader medical education literature as a "threshold concept"—a transformative, integrative, irreversible experience in which the learner transitions to a state of understanding following engagement with a troublesome concept (Meyer & Land, 2006; Neve et al., 2016). In the current study, we might consider the transition from two to three-dimensional understanding as a threshold concept where, once recognized, it cannot be unseen. The result is that the learner can then integrate the spatial relationship between organs. As the findings suggest, such "penny drop" moments can be created through the interaction between the learner's background knowledge and the environment. It also seems that exposure to the clinical context is important for integration to occur. While the study's findings support the application

of the threshold concepts framework to pelvic anatomy teaching and learning in clinical placement settings, it highlights the need to further examine the ideal circumstances which support students to grasp threshold concepts. Understanding such circumstances could provide a framework to support clinician educators to provide appropriate scaffolding and support for students in the clinical setting.

During data analysis, it became apparent that for clinicians, the distinctions between medical student knowledge, and the knowledge required of a trainee and consultant, were blurred. Different explanations may assist us to understand this. For example, using the threshold concepts framework, it is possible that after grasping a threshold concept (which, by its definition, is irreversible), it is difficult to remember what it felt like not to have that understanding. This, together with the fallibility of memory and the passing of time, may explain why participants found it difficult to identify the appropriate level of knowledge required of a medical student.

Analogies were cited by participants as a mechanism to convey complex concepts to medical students. Analogies have utility in facilitating the reinterpretation of knowledge and also in conveying complex concepts (Bishop, 2006). In our study, one participant used the analogy of pizza dough to describe the way the perineum stretches in a woman giving birth, conveying a sense of movement over time. For an analogy to be effective, the base domain must be familiar (i.e., you need to understand the textural properties of pizza dough), and the analogy should be terminated before it ceases to make sense (Bishop, 2006). In this example, the analogy should only be used to describe the properties of the perineum in the context of childbirth.

In this study, we were not able to determine the extent to which certain teaching strategies were adopted by participants. Undertaking a frequency analysis could aid in determining the most common pelvic anatomy teaching strategies. This information could form the basis of a subsequent study and enhance our understanding of customary pedagogical practices used by those involved in teaching pelvic anatomy in clinical learning environments.

Two female obstetrician participants noted that students can experience discomfort in learning pelvic anatomy and discussing female sexual function with patients. These participants positioned these observations within the wider sociocultural context. A review of historical anatomy textbooks found that typical textbook descriptions of the clitoris before 2005 lacked detail and included inaccuracies (O'Connell et al., 2005). This is noteworthy as textbooks are a significant source of knowledge for medical practitioners. A study of young university-educated women from the University of Melbourne found that participants perceived hairless female genitals with no visible labia minora as the societal "ideal" and that they were often unclear about the correct terminology. These students are the demographic that are usually accepted into medical school in Australia, giving educators important insights into the baseline understandings that students may have on entering their medical education (Howarth et al., 2016). Despite the findings of our study coupled with the existing literature, little is known about how such

sensitives (which can impact the clinician, student, and/or patient) influence pelvic anatomy teaching in either the preclinical or the clinical setting, providing an avenue for further research.

Study limitations

This study sought to explore the perspectives of clinician educators who are involved in clinical teaching of medical students in the context of clinical placements. The study presents the perspectives of 10 clinician educators who supervise medical students in Australia. The small group of participants and limited geographic reach constitute limitations of this study.

This study used a qualitative methodology which explored participants' perspectives of teaching and learning pelvic anatomy from individual interviews, where participants were asked to describe their approaches to teaching and learning. It is recognized that although self-reports have utility in understanding the human experience, perceptions can evolve over time and all experience is filtered through the lens of participants' language, gender, roles, and interactions with the interviewer (Polkinghorne, 2005). Further research could, therefore, adopt an observational design to determine the extent to which clinicians incorporate the identified factors into their teaching.

In the current study, data analysis occurred following the completion of all participant interviews, limiting the opportunity to explore interesting findings, such as the influence of culture on pelvic anatomy teaching. Future studies could adopt an iterative approach to analysis, commencing at the conclusion of the first data collection event. This could then inform subsequent interviews and facilitate the exploration of additional topics based on previous interviews.

Purposive sampling was used to recruit participants for this study. Additionally, the study examined the perspectives of medical doctors who are currently working in clinical practice. Further research could adopt a more comprehensive sampling strategy to obtain perspectives from other medical specialties, together with other members of the health care team (i.e., physiotherapists) to further explore the role of interprofessional learning in the context of pelvic anatomy.

CONCLUSION

Learning pelvic anatomy entails unique challenges in both the preclinical and clinical settings. Clinician engagement with a clearly defined syllabus may improve clarity regarding the appropriate level of knowledge for medical students. Understanding pelvic anatomy requires learners to navigate various threshold concepts including the translation from two to three dimensions and overcoming social and cultural barriers to learning. In the clinical setting, clinicians support students to navigate these threshold concepts by using a range of teaching strategies to help students achieve clinically oriented pelvic anatomy knowledge required for

safe patient care. Identifying the threshold concepts that exist in the pelvic anatomy context, coupled with an increasing awareness of an accepted syllabus could support clinical teachers to provide more targeted scaffolding to enhance medical students' ability to learn the pelvic anatomy knowledge required for safe clinical practice as junior doctors. This study's findings also highlight the importance of teaching concepts that incorporate sociocultural sensitivities to ensure safe clinical practice.

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