Dissecting the Role of Sessional Anatomy Teachers: A Systematic Literature Review

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Running Title: Dissecting the Role of Sessional Teachers

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ABSTRACT

Worldwide there is a growing reliance on sessional teachers in universities. This has impacted all disciplines in higher education including medical anatomy programs. The objective of this review was to define the role and support needs of sessional anatomy teachers by reporting on the (1) qualifications, (2) teaching role, (3) training, and (4) performance management of this group of educators. A systematic literature search was conducted on the 27 July 2017 in Scopus, Web of Science, and several databases on the Ovid, ProQuest and EBSCOhost platforms. The search retrieved 5,658 articles, with 39 deemed eligible for inclusion. The qualifications and educational distance between sessional anatomy teachers and their students varied widely. Reports of cross-level, near-peer and reciprocal-peer teaching were identified, with most institutes utilizing recent medical graduates or medical students as sessional teachers. Sessional anatomy teachers were engaged in the full spectrum of teaching-related duties from assisting students with cadaveric dissection, to marking student assessments and developing course materials. Fourteen institutes reported that training was provided to sessional anatomy teachers, but the specific content, objectives, methods and effectiveness of the training programs were rarely defined. Evaluations of sessional anatomy teacher performance primarily relied on subjective feedback measures such as student surveys (n = 18) or teacher self-assessment (n=3). The results of this systematic review highlight the need for rigorous explorations of the use of sessional anatomy teachers in medical education, and the development of evidence-based policies and training programs that regulate and support the use of sessional teachers in higher education.

Key words: gross anatomy education; medical education; undergraduate education, sessional teachers; systematic review; anatomy demonstrators; anatomy tutors; teaching assistants

INTRODUCTION

Medical student anatomy education has undergone a metamorphosis over the past 20 years, moving from a largely didactic model to a more multimodal blended learning model. In addition, anatomy is rarely taught in isolation, as reports suggest increased vertical and horizontal integration of anatomy in medical curricula (Vidic and Weitlauf, 2002; Turney, 2007; Alsaggaf et al., 2010; Doornik et al., 2017). There are many driving forces contributing to this reform including a decline in the number of hours dedicated to anatomy teaching (Drake et al., 2009; Craig et al., 2010), technological advances (McMenamin et al., 2014; Trelease, 2016), and a desire to adopt more clinically relevant and student-centered approaches to teaching (Drake et al., 2009; Cowan et al., 2010). The ongoing evolution of anatomy education has challenged medical educators to interrogate current teaching practices and to adopt evidence-based approaches to anatomy teaching and learning (Collins, 2008; Bergman et al., 2011; Johnson et al., 2012). Attention has largely focused on 'how' anatomy education is delivered to medical students, 'when' it is delivered and 'how much' anatomical knowledge is required for students to function in their future role as clinicians. The question of 'who' should be responsible for delivering anatomy education has been hotly debated in opinion pieces (Ramsey-Stewart, 2014; Burgess et al., 2015; McMenamin et al., 2016), but otherwise overlooked in the current literature.

The limited reports that are available suggest that anatomy educators in medical programs are a diverse group. Permanent academics may be medically qualified, allied health professionals or scientists (McMenamin et al., 2016) and are often supported by a team of sessional teachers who contribute to the education of medical students on a short-term or temporary basis. As the number of students entering tertiary education continues to rise

(Bryson, 2004, 2013; Knott et al., 2015), and permanent academics face pressure to dedicate more time to research (Lueddeke, 1997; Park, 2004), all disciplines in higher education have become increasingly reliant on sessional teachers (Kimber, 2003; Percy et al., 2008; Landrum, 2009; Cowley, 2010; McKay and Brass, 2011; Heath et al., 2015).

Sessional teachers are typically engaged on a short-term, temporary or casual basis and are considered to be a flexible and cost-effective alternate to employing additional permanent academics (Campbell, 2001; Kimber, 2003; Park, 2004; Gottschalk and McEachern, 2010; Halcomb et al., 2010; Meixner et al., 2010; Bryson, 2013). In Australia, reports suggest that sessional teachers may be responsible for up to half the teaching load in higher education (Junor, 2004; Percy et al., 2008). This heavy reliance on sessional teachers has proven to be a global trend, with similar figures being reported in the United Kingdom and United States (Lueddeke, 1997; Schmidt, 2008; Bryson, 2013).

The definition of sessional teachers and their role within the higher education system varies widely between disciplines and across continents. The absence of a clear definition for sessional teachers largely stems from the fact that they are “defined by what they are not” (Davis, 2009). Sessional teachers are “not regular faculty” and “not in permanent or tenured positions” (Langenberg, 1998; Percy et al., 2008). The term ‘sessional teacher’ is commonly used in Australia to highlight the temporary and flexible nature of these positions, but a wide range of terminology is used to describe sessional teachers including tutor, teaching assistant, demonstrator and casual academic (Table 1). This variation in terminology often reflects the varying teaching roles that sessional teachers adopt. It is well established that sessional teachers perform the full spectrum of teaching-related duties, from marking student assessments, to assisting students in face-to-face classes and even the development

and coordination of entire units of study (Percy et al., 2008). The wide range of teaching roles and varying levels of responsibility assigned to sessional teachers highlights that there is no consensus in the literature as to how sessional teachers should be defined or how they are engaged.

Studies exploring the use of sessional teachers in higher education have largely focused on educators who are 'employed' on a sessional basis. This includes teaching staff with "atypical" employment contracts (Bryson, 2013) who are "employed on an hourly basis" (Percy et al., 2008) or "paid on the basis of actual hours worked" (Halcomb et al., 2010). Identifying sessional teachers is inherently challenging due to the variability in their teaching roles and the terminology used to describe them. In Australia, a government-funded national report concluded that universities are unable to accurately report on the number of sessional teachers in their employ or their contribution to higher education (Percy et al., 2008). Most studies attempting to estimate the size of the sessional teacher workforce have relied on employment records or personnel data from human resource departments (Percy et al., 2008; May, 2011; Bryson, 2013). However, this approach likely underestimates the number of sessional teachers as it overlooks educators who work on a voluntary basis or hold informal positions that are non-contracted. As stated by Bryson (2013) many sessional teachers "appear to be 'invisible' to personnel systems". Limiting investigations to sessional teachers who are 'employed' could thus be masking additional groups of teachers who contribute to the education of tertiary students on a sessional basis but are not university employees.

Universities have traditionally recruited sessional teachers internally from their ranks of postgraduate students or externally by engaging industry experts and practitioners (Kimber, 2003; Halcomb et al., 2010). As the number of sessional teachers continues to rise, universities are moving beyond these traditional sources and engaging an increasingly diverse group of sessional teachers who vary widely in age, background, qualifications and teaching experience (Kimber, 2003; Percy et al., 2008; Davis et al., 2009; Halcomb et al., 2010). While the engagement of sessional teachers offers significant benefits to universities in terms of workforce flexibility (AUTC, 2003; Gottschalk and McEachern 2010; Halcomb et al., 2010), concerns have been raised regarding the training, support and quality of education delivered by this diverse group of educators (Percy et al., 2008; TEQSA, 2012).

The recruitment of sessional teachers is often described as 'ad-hoc' and may not be subject to the same rigorous selection processes that are utilized when appointing permanent academics (Herbert et al., 2002; Rothwell, 2002; Schmidt, 2008; Peters et al., 2011). In addition, teachers engaged on a sessional basis rarely have teaching qualifications and may lack the skills required to engage students and effectively facilitate learning (Coombe and Clancy 2002; Duffy et al., 2008; Halcomb et al., 2010; Peters et al., 2011). In Australia, several national reports have highlighted the lack of training and professional development opportunities for sessional teachers (AUTC, 2003; Percy et al., 2008), and raised concerns that the widespread lack of support for sessional educators poses a risk to the quality of teaching and learning in universities (Percy et al., 2008; TEQSA, 2012; Knott et al., 2014).

These concerns are echoed internationally highlighting the global scale of this issue (Kurdziel and Libarkin 2003; Knight et al., 2007; Schmidt, 2008; Bryson, 2013).

While there is evidence that sessional teachers have been utilized in medical anatomy programs since the 1950s (Koshi and Holla, 2001), the precise role of sessional anatomy teachers and their contribution to medical student education remains largely undefined. In response to recent calls for discipline-specific investigations into the utilization of sessional teachers (Percy et al., 2008; Heath et al., 2015), the authors of this review conducted a systematic literature review that centered on the following research question: How are sessional anatomy teachers utilized in medical programs? The objective of this review was to define the role and support needs of sessional anatomy teachers by reporting on the (1) qualifications, (2) teaching role, (3) training, and (4) performance management of this group of educators.

MATERIALS AND METHODS

Search Strategy

A systematic literature review was conducted in accordance with PRISMA guidelines (Moher et al., 2009) and the stepwise approach recommended by Cook and West (2012). A comprehensive search strategy was developed in collaboration with a research librarian by identifying medical subject headings (MeSH) and keywords pertaining to the search concepts "sessional teachers" and "anatomy education". The sensitivity and precision of the search strategy were evaluated using a list of key articles identified in preliminary 'scoping searches'. If a key article was omitted from the search results, the search terms and strategy were carefully revised to ensure all relevant articles were captured. The development of the search strategy was thus an iterative process. Electronic searches were conducted in Scopus (Elsevier, Amsterdam, The Netherlands), Web of Science (Clarivate Analytics, Philadelphia, PA) and in several databases on the Ovid® (Ovid MEDLINE®, Embase, PsycINFO®; Ovid

Technologies, Inc., New York, NY), ProQuest (ERIC; ProQuest, LLC, Ann Arbor, MI) and EBSCOhost (CINAHL Plus; EBSCO Information Services, Ipswich, MA) platforms. The search strategy was adapted for each database as outlined in the Supporting Information (Appendix 1) and included all citations published from inception to 28 July 2017. To identify any additional relevant studies that were omitted from the electronic searches, the reference list of each article subjected to full-text review was also hand-searched.

Eligibility Criteria

Articles were eligible for inclusion in the systematic review if they focused on the use of sessional anatomy teachers in undergraduate or graduate medical programs. Anatomy education may be integrated both horizontally and vertically in the medical curriculum and is often taught in conjunction with other disciplines such as histology, embryology and pathology. This review focused specifically on topographic anatomy education, defined as the study of the macroscopic structure of tissues and organs and the relationship between them. Articles reporting solely on histological, embryological or pathological education were not eligible for inclusion. The unique nature of topographical anatomy education, in particular dissection and cadaver-based activities, provides educators with rich opportunities to teach and assess a wide range of transferable skills. Only studies focusing on topographical anatomy education with the aim of improving anatomical knowledge were included in this review. Articles reporting on the development of surgical skills, clinical examination skills, clinical reasoning skills or professionalism in isolation from anatomy content knowledge were excluded. Studies that utilized imaging technologies, such as ultrasound, were included in the review if the primary aim was to teach students topographic anatomy.

There is no consensus in the literature as to how sessional teachers should be defined or how they can be engaged. The authors of the current review built upon the work of Percy et al. (2008) who defined sessional teachers as “higher education instructors not in permanent or tenured positions”. To be classified as a sessional teacher five key criteria needed to be met: Firstly, sessional teachers must be assigned a formal teaching role and responsibilities. As sessional teachers can be responsible for the full range of teaching related duties (Percy et al., 2008), this included but was not limited to: assisting in laboratory sessions, giving lectures, facilitating tutorials, marking assessments and the development of educational activities or resources. Leadership positions, for example leading a group of peers through a peer-assisted learning activity or organizing a group project, were not classified as teaching roles.

Secondly, sessional teachers must have comparatively advanced knowledge of the subject when compared to their student learners. Individuals who had previously completed the anatomy course, were one or more years advanced in their education, or were industry experts/practitioners, were deemed to have advanced knowledge and were eligible for inclusion. Peer-teachers who participated in laboratory or training sessions that their peer-students did not participate in, were also deemed to have comparatively advanced knowledge.

Thirdly, sessional teachers must be engaged on a short-term, temporary or casual basis. Notably, this criterion accepted sessional teachers who were utilized on a full-time, part-time, casual or non-contractual basis. No importance was placed on the regularity of

teaching, number of hours taught, or whether or not remuneration was provided.

Individuals with short-term (< 1 year), casual or temporary teaching positions were included. Individuals with permanent, continuing or tenured positions were excluded. It was assumed that any academics described as 'faculty members' were employed on a permanent or ongoing basis.

Fourthly, sessional teachers must teach more than one session. This criterion was introduced to distinguish between sessional teachers and 'guest instructors' who may deliver a single lecture or contribute to a single teaching session. Although sessional teaching by nature is often irregular and intermittent, it was expected that sessional teachers would be engaged for more than one session. Individuals who taught more than one topographic anatomy class were eligible for inclusion. Individuals who taught a single class were classified as 'guest instructors' and excluded from the review.

Finally, sessional teachers must be engaged as teachers for the entire session. Individuals who adopted a teaching role for part of a session, but not the entire session, were excluded. To distinguish between independent teaching sessions that were scheduled back-to-back, it was deemed that any change in student numbers, student cohort or educational activity marked the start of a new teaching session.

Only primary research articles, theses, and descriptive reports were included in the systematic review. Letters to the editor, opinion pieces, review articles, conference abstracts and other published materials not subject to peer-review were excluded. As the published descriptions of sessional teachers were found to be highly nuanced, only articles

published in English were eligible for inclusion in the systematic review. The decision to exclude foreign language articles stemmed from concerns that linguistic interference could result in a loss of meaning or misinterpretation of translated texts (Franco Aixelá, 2009). No publication date or geographical restrictions were applied.

● **Screening of Citations and Full-Text Articles**

Search results were exported to the bibliographic software program EndNote™ (Clarivate Analytics, Philadelphia, PA) and duplicates were removed by the main author (D.R.). To aid the screening process the citations were exported to Microsoft Excel® (Microsoft Corp., Redmond, WA) and organized in a spreadsheet that allowed the reviewers to track the number of articles screened at each stage and document reasons for exclusion. Screening of citations and full-text articles was conducted in three stages: (1) title screening, (2) abstract screening, and (3) full-text screening (Figure 1). Two reviewers (D.R. and M.L.) independently screened the articles at each stage. Consensus between the two reviewers was not required during stage one or two. Two negative votes would exclude an article, but a single positive vote would advance an article to the next stage of screening. Articles could only be excluded during stages one and two if there was a clear reason to do so. If the title or abstract did not provide enough information to exclude an article it would advance to the next stage of screening. During stage three the full-text of each remaining article was thoroughly screened by the reviewers. To advance and be included in the final review, articles needed to meet all of the predetermined eligibility criteria outlined in the previous section. Consensus between the reviewers was required for stage three and any disagreements were discussed at length by the two primary reviewers (D.R. and M.L.). In the

event that the two reviewers were unable to reach a consensus, a third reviewer (Q.F.) was utilized.

Data Extraction

A data extraction form was developed by the researchers using Microsoft Excel® (Microsoft Corp, Redmond WA). Data extracted from the articles included basic geographic information (country and institute of origin) and data related to the use of sessional teachers (qualifications, teaching-related duties, recruitment and selection processes, training and support structures, evaluation of teaching performance and personal motivation / benefits). One reviewer (D.R.) extracted the data from each included study and a second reviewer (M.L.) checked the extracted data for accuracy and completeness. Disagreements between the two reviewers were discussed until a consensus was reached. If the reviewers were unable to reach a consensus regarding the extracted data, a third reviewer (Q.F.) was utilized.

Duplicate Publications and Risk of Bias

Duplicate publication refers to the publication of content that is identical or overlaps substantially with the content of a previously published article (Higgins and Green, 2011). The inclusion of duplicated data may introduce bias into systematic reviews (Liberati et al., 2009) and overestimate the frequency or effect of the variables under investigation (Tramèr et al., 1997; von Elm et al., 2004). To identify duplicate publications, the reviewers compared the institute of origin, author names and anatomy course details of each included article. If multiple articles reporting on the same anatomy course at the same institute were identified, the extracted data was combined to avoid duplicate publication bias. Articles

arising from the same institute, but reporting on different anatomy programs were reported separately.

RESULTS

Search and Screening Outcomes

The literature search retrieved 9,324 articles, plus 6 additional articles that were identified through reference list screening. After removing duplicates, 5,658 articles were subjected to title and abstract screening. In total, 5,344 articles were deemed ineligible and 314 articles advanced to full-text screening. After thoroughly reviewing the full-text of each article, the reviewers concluded that 39 articles were eligible for inclusion in the systematic review. A summary of the screening process and outcome is shown in Figure 1.

Characteristics of the Included Studies

The reviewed studies represent research from twenty-eight different institutes located in twelve countries. The majority of studies originated in the US ($n = 15$), UK ($n = 8$) or Germany ($n = 6$), with the remaining studies scattered across Mexico ($n = 2$), Canada ($n = 1$), Australia ($n = 1$), China ($n = 1$), India ($n = 1$), Denmark ($n = 1$), Tanzania ($n = 1$), Nigeria ($n = 1$) and South Korea ($n = 1$). Twenty of the included articles originated from the same eight institutes: Mayo Medical School ($n = 3$), the University of Manchester, UK ($n = 3$), the University of Southampton, UK ($n = 3$), the University of Tuebingen, Germany ($n = 3$), the Autonomous University of Nuevo Leon, Mexico ($n = 2$), Ulm University, Germany ($n = 2$), St. Louis University ($n = 2$) and the University of Iowa ($n = 2$). Due to substantial overlap and redundancy in the data extracted from these studies, data originating from the same institute was combined. One notable exception was the article by Hall et al. (2013) which

reported on a unique neuroanatomy program for advanced medical students and was considered separately from the other University of Southampton in UK articles by Hall et al. (2014) and Stephens et al. (2016). Most studies included in the systematic review reported on the delivery of anatomy education to first or second-year medical students (n = 26), with fewer studies focusing on the education of medical students in their third year or beyond (n = 3).

Analysis of the reviewed literature revealed three main variants of sessional teaching, as they relate to the degree of distance (and qualifications) between learner and teacher: (1) cross-level teaching, (2) near-peer teaching and (3) reciprocal-peer teaching. For the purpose of this review *cross-level teaching* was defined as teaching in which the teacher and student are at different educational levels, *near-peer teaching* was defined as teaching in which the teacher and student are at the same educational level but are separated by one or more years, and *reciprocal-peer teaching* was defined as teaching in which the teacher and student are at the same educational level and in the same year. Each of these variants will be considered separately throughout this paper.

Sessional Teacher Qualifications

The qualifications and educational distance between teachers and students varied across institutes (Table 2). Reciprocal-peer teaching was most commonly reported (n = 9), followed by near-peer teaching (n = 8) and cross-level teaching (n = 8). Three institutes reported utilizing a combination of both cross-level and near-peer teachers in the anatomy laboratory (Evans and Cuffe, 2009; Lachman et al., 2013) and supplementary tutorial sessions (Hall et al., 2014; Stephens et al., 2016). Cross level teachers were typically junior medical graduates

seeking surgical careers (n = 5) or graduate students (n = 3), although two reports describing the use of post-doctoral fellows were also identified (Cheng et al., 2011; Whelan et al., 2016). Near-peer teachers were medical students who were 1-4 years advanced in their training when compared to their learners. Notably, no reports of interprofessional education using allied health professionals as sessional teachers were identified in the literature.

Teaching Role and Duties

Sessional teachers performed a wide range of teaching-related duties in the reviewed studies, though a role for these teachers in dissection (n = 20) and prosection (n = 15) were the most commonly reported duties (Table 2). The teaching activities of reciprocal-peer teachers were limited to dissection and prosection in all reviewed studies. Anatomy programs utilizing cross-level and near-peer teachers reported the widest range of duties for their sessional teachers. These duties included conducting tutorials, developing course materials, designing and conducting student assessments and conducting educational research. Although most studies provided a brief description of the role of sessional teachers, there was a noticeable lack of detail around the specific activities and teaching-related duties of these educators. The reviewed literature suggests that sessional anatomy teachers primarily function within the anatomy laboratory, but it is unclear what role they fulfil within this space (practical instructor, group discussion facilitator, self-directed learning supervisor) or how extensively they contribute to anatomy education in medical curricula overall.

Recruitment and Selection

Limited information was available regarding the recruitment and selection of sessional anatomy teachers (Table 3). Articles reporting on selection processes typically focused on the recruitment of near-peer teachers ($n = 8$) or a combination of near-peer and cross-level teachers ($n = 2$). Interviews ($n = 2$) and practical demonstrations of teaching skills ($n = 2$) were the most commonly used selection tools, followed by reflective essays ($n = 1$) and research proposals ($n = 1$). Anatomical knowledge and/or academic merit was the most commonly cited selection criterion ($n = 6$), with several studies indicating a preference for high-performing near-peer students (Durán et al., 2012; Erie et al., 2013; Lachman et al., 2013; Reyes Hernandez et al., 2015; O'Neill et al., 2016). Enthusiasm for teaching was another key selection criterion ($n = 3$) with one study stating that teachers were selected purely based on their "enthusiasm and willingness to teach" rather than their anatomical knowledge (Stephens et al., 2016).

The formality and rigor of the selection process varied across institutes. Evans and Cuffe (2009) described a formal semi-structured selection process whereby faculty members assessed the teaching skills and suitability of each applicant. At Ulm University in Germany the selection process was more informal and simply involved circulating a list of applicants so lecturers could individually select their preferred near-peer teachers (Horneffer et al., 2016). None of the reviewed articles described the recruitment or selection process for cross-level teachers, with the exception of Willan et al. (1998, 1999) who reported that demonstrator positions at the University of Manchester in UK were advertised in international medical journals. Reciprocal-peer teachers were utilized on an alternating or rotating basis, thus ensuring that all students within a cohort adopted the role of teacher.

Consequently there are no recruitment or selection policies to report for the reciprocal-peer teaching studies.

Training and Support

Fourteen institutes reported that training was provided to sessional anatomy teachers (Table 4). The content covered in teacher training sessions could be broadly classified into four categories: (1) basic and advanced dissection skills, (2) teaching skills and pedagogy, (3) anatomical information, and (4) learning objectives for upcoming teaching sessions. The specific content and objectives of sessional teacher training were rarely described, precluding deeper analysis of the training programs.

Meetings with faculty members ($n = 5$) were the most common support offered to sessional teachers. These meetings typically occurred on a regular weekly basis and focused on briefing and/or preparing sessional teachers for upcoming teaching sessions. Five institutes included a formalized teaching skills program (Prentice et al., 1976; Evans and Cuffe, 2009; Cheng et al., 2010; Shiozawa et al., 2010a,b; Horneffer et al., 2016; Walser et al., 2017) and three institutes included formal workshops designed to develop technical dissecting skills (Shiozawa et al., 2010a,b; Durán et al., 2012; Horneffer et al., 2016). The teaching skills program implemented at the University of Tuebingen in Germany utilized a combination of presentations, group discussion, practical exercises and video recording to train sessional teachers prior to the anatomy course (Shiozawa et al., 2010a). The 'Train the Tutor' program introduced at Ulm University in Germany included a two-day preparatory workshop followed by several activities designed to provide sessional teachers with ongoing support (Horneffer et al., 2016; Walser et al., 2017). These activities included the completion of a

semi-structured 'teaching log' and access to expert coaching (Horneffer et al., 2016; Walser et al., 2017). This focus on ongoing mentorship and/or reflective practice was reported in several studies (Prentice et al., 1976; Evans and Cuffe, 2009; Erie et al., 2013; Hall et al., 2013; Lachman et al., 2013). The degree of supervision offered to sessional teachers varied across institutes. Near-peer and reciprocal-peer teachers were mostly supervised by faculty or more senior sessional teachers. No supervision was described for programs that utilized only cross-level teachers.

The quantity of training offered to sessional teachers differed across teaching variants. Near-peer teachers were offered the most training with six out of eight institutes describing sessional teacher training programs. Institutes utilizing cross-level teachers or reciprocal-peer teachers were less likely to report on sessional teacher training. Notably, two articles arising from institutes that used a combination of near-peer and cross-level teachers reported solely on the training provided to near-peer teachers (Evans and Cuffe, 2009; Erie et al., 2013). It is unclear if the cross-level teachers at these institutes received the same training as their near-peer colleagues.

Two articles were identified that described training sessions for reciprocal-peer teachers (Han et al., 2015; Manyama et al., 2016). Due to the nature of the alternating dissection model introduced at the remaining seven institutes it was difficult for the review authors to determine if training was provided to the peer-teachers. Under the guidance of faculty, reciprocal-peer teachers dissected a specific region of the body and were subsequently responsible for presenting this dissection to their peers. It is unclear if time spent dissecting under the guidance of faculty should be counted as training for the subsequent peer-

teaching session. Notably, there were no reports of reciprocal peer-teachers receiving training in teaching skills or pedagogy, with one article specifically stating that peer-teachers “were not prepared for peer tutoring through extra-education” (Han et al., 2015).

The effectiveness of teacher training was only evaluated in three of the reviewed articles.

Shiozawa et al. (2010b) used a prospective, controlled, randomized, single-blinded study design and found that students rated the technical and didactical competencies of sessional teachers higher following teacher training. The formalized training program at the University of Tuebingen had the greatest impact on competencies related to conveying complex practical instructions and supporting student learning (Shiozawa et al. 2010b). The training program also influenced student learning behaviors as students taught by trained teachers were more likely to engage in cooperative learning (Shiozawa et al., 2016). In comparison, Horneffer et al. (2016) found that the ‘Train the Tutor’ program at Ulm University had no impact on student evaluations of teacher performance. Despite this, students taught by trained sessional teachers obtained consistently better examination results and lower rates of failure (Horneffer et al., 2016). The impact of sessional teacher training on teacher performance and student learning behaviors was not explored in the other reviewed studies.

Performance evaluation

The performance of sessional anatomy teachers was evaluated at twenty institutes (Table 5). Although the methods for evaluating teaching varied, these evaluations primarily relied on subjective feedback measures such as student surveys (n=18) or teacher self-assessment (n=3). Faculty observation of teaching was reported at four institutes (Prentice et al., 1976; Evans and Cuffe, 2009; Lachman et al., 2013; Walser et al., 2017), but details were not

provided on the methods of observation or evaluation. When student feedback was collected, performance evaluations largely consisted of group evaluation where students rated the overall performance of a cohort of sessional teachers (n=16). Individual evaluations of sessional teachers, whether by students or faculty members, were only reported at six institutes.

The frequency of performance evaluation was inversely correlated with the educational distance between teachers and learners. The majority of institutes that utilized reciprocal-peer or near-peer teachers reported that teacher performance was evaluated.

Comparatively, only three reports describing the evaluation of cross-level teachers were identified. In one instance, the evaluation consisted of a single Likert-scale question regarding teacher effectiveness (McBride and Drake 2011).

Six institutes reported that sessional teachers received feedback on their performance (Table 5). This feedback was largely derived from faculty members, but three studies also included feedback from student learners (Prentice et al., 1976; Erie et al., 2013; Hall et al., 2014). Feedback was provided on both a group and individual basis. No reports of performance management, or interventions to improve the teaching skills of sessional teachers who were found to be sub-par were reported in the literature.

Impact on sessional teachers

The sessional teacher experience was evaluated at thirteen institutes (Table 6). The most common theme emerging from these evaluations was the value to sessional teachers. The most commonly reported benefits to sessional teachers were teaching experience (n=9),

improved anatomical knowledge and improved communication skills (n=7). Sessional teachers also valued the opportunity to act as mentors to medical students (n=3) and some viewed sessional teaching as a positive career move (n=3).

DISCUSSION

Worldwide there is a growing reliance on sessional teachers in universities (Bryson, 2004; Percy et al., 2008; Landrum, 2009). This reliance has primarily arisen in response to rising student numbers, an issue that has impacted all disciplines in higher education including medical anatomy programs (Pryde and Black 2005; Joyce et al., 2007; Turney, 2007). Although sessional teachers are utilized in medical programs worldwide, their contribution to anatomy education has not been previously reviewed.

Sessional anatomy teachers require a strong background in the anatomical sciences and are typically sourced from medical disciplines or postgraduate training programs that are anatomically oriented. Of the articles reviewed in this study, the overwhelming majority utilized sessional teachers who were medical students or recent medical graduates.

Medically educated teachers are ideally placed to highlight the clinical relevance of anatomy (Ellis, 1993; Gossage et al., 2003; Fitzpatrick et al., 2003; Older, 2004; Lockwood and Roberts, 2007; McBride and Drake, 2011) and understand the unique stresses and challenges posed by the medical school curriculum (Lockspeiser et al., 2008; Rengier et al., 2010). For these reasons, medically-educated sessional teachers may be favored over teachers who hold other relevant qualifications. The utilization of anatomy teachers who lack medical training remains fiercely debated in commentary and editorial pieces (Burgess et al., 2015; McMenamin et al., 2016), but to date there are no objective studies comparing

the efficacy of medically-educated sessional teachers versus sessional teachers with other qualifications.

The identification of three variants of sessional teaching was a key finding of this review and reflects the variable educational distance between sessional anatomy teachers and their students. Cross level teachers were typically junior medical graduates or graduate students, near-peer teachers were medical students who were one or more years advanced in their training and reciprocal-peer teachers were medical students who taught peers within their own units of study and alternately adopted the role of 'teacher'. The discovery that students often function as sessional teachers within their own units of study was a significant finding not previously reported in the literature. While the utilization of 'students as teachers' is often borne from a desire to provide students with opportunities to develop teaching skills and deepen their anatomical knowledge (Hendelman and Boss, 1986; Krych et al., 2005; Yu et al., 2011), it was clear that several of the reviewed studies implemented reciprocal-peer teaching as a practical solution to cope with rising student numbers (Yeager and Young, 1992; Bentley and Hill, 2009) and a shortage of qualified anatomy faculty (Sandra and Ferguson, 1998; Han et al., 2015; Manyama et al., 2016). Manyama et al. (2016) even stated that reciprocal-peer teaching was a "financially efficient alternate to hiring more staff members". Arguably, in these instances, peer-teachers can also be categorized as sessional teachers. This was further emphasized by Sandra and Ferguson (1998) who described a central role for reciprocal peer-teachers in the delivery of anatomy education and stated that they were responsible for "teaching the other students all of the assigned material for that week". Given that sessional teachers are often referred to as 'hidden' or 'invisible' educators, it is perhaps unsurprising that the contribution of 'students as teachers' has been

overlooked in the current debate surrounding the use of sessional teachers in higher education.

As the authors conducted the systematic review it became clear that the population of sessional anatomy teachers was more diverse than originally anticipated and included groups of individuals who had not previously been identified as sessional teachers (Kimber, 2003; Percy et al., 2008). The fact that medical students in reciprocal-peer teaching positions met the criterion of “higher education instructors not in permanent or tenured positions” (Percy et al., 2008) created significant debate amongst the review team and highlighted the need to develop clear criteria outlining what does and does not constitute sessional teaching.

The value of teaching experiences for medical students is widely reported, with benefits ranging from an improvement in teaching and communication skills to deeper learning and enhanced anatomical knowledge (Evans and Cuffe, 2009; Yu et al., 2011; Erie et al., 2013). Many universities have thus incorporated elements of peer-teaching into their anatomy programs in an effort to promote more student-centered, collaborative and active approaches to anatomy education. It was therefore essential that the review authors developed a set of criteria that could distinguish between students who were functioning as sessional teachers and students who were engaged in peer-assisted learning (PAL) activities that included elements of peer-teaching. The review authors established a set of five key criteria that must be met for an individual to be classified as a sessional teacher: (1) Sessional teachers must be assigned a formal teaching role and responsibilities. (2) Sessional teachers must have advanced subject knowledge when compared to their students. (3)

Sessional teachers must be engaged on a short-term, temporary or casual basis. (4)

Sessional teachers must teach more than one session. (5) Sessional teachers must act as teachers for the entirety of the session. Applying these selection criteria resulted in the exclusion of studies where medical students were engaged in team-based or collaborative learning activities, gave short presentations to their peers, or acted as teachers for a single session or portion of a session. Only individuals with formal teaching roles, who were engaged on a short-term, temporary or casual basis and contributed substantially to the delivery of anatomy education in medical programs were classified as sessional anatomy teachers.

Although each teaching variant utilized sessional teachers with differing levels of anatomical knowledge, clinical expertise and teaching experience, sessional anatomy teachers were generally considered to be effective educators (Lockspeiser et al., 2008; Evans and Cuffe, 2009; Durán et al., 2012). Student perceptions of the quality of teaching provided by faculty and near-peer sessional teachers suggest that with adequate support and training sessional anatomy teachers are capable of performing at a level comparable to that of faculty (Durán et al., 2012). This reinforced the findings of a recent meta-analysis by Rees et al., (2016) which concluded that there is no significant difference in the knowledge or skills outcomes of medical students taught by peers as compared to faculty members.

Although the varying qualifications and experience of sessional teachers may not directly impact student knowledge outcomes (Rees et al., 2016), educational distance between teachers and students may still impact the student learning experience. Hall et al. (2014) and Stephens et al. (2016) compared student perceptions of anatomy teaching by recent

medical graduates and senior medical students. Although the overall quality of teaching was rated highly for both groups of educators (Hall et al., 2014; Stephens et al., 2016), senior medical students were rated higher in areas related to cognitive congruence (Hall et al., 2014). According to the theory of social congruence, the success of peer- and near-peer teaching is underwritten by the similar knowledge base and shared experiences of the teachers and students (Ten Cate and Durning 2007). This cognitive congruence allows peer-teachers to explain concepts at a level that students will understand and creates an environment where students feel more comfortable asking questions. The studies by Hall et al. (2014) and Stephens et al. (2016) suggest that even small increases in educational distance can impact the cognitive congruence between teachers and students. While further studies are required to determine the optimal educational distance between sessional anatomy teachers and their students, this review suggests that the impact of educational distance on the student learning experience should be considered when recruiting sessional anatomy teachers.

The recruitment processes and criteria for selecting sessional anatomy teachers were rarely described in the reviewed studies. This result was consistent with previous reports which suggest that the recruitment of sessional teachers occurs on a largely 'ad-hoc' basis (Herbert et al., 2002; Rothwell, 2002; Peters et al., 2011). Some anatomy departments used their close ties with medical clinics to recruit medically qualified sessional teachers (McBride and Drake, 2011), while others recruited sessional teachers internally from the ranks of their graduate or medical students (Durán et al., 2012; Manyama et al., 2016). Local availability is a major factor that determines who is recruited to sessional teacher positions (Bryson, 2013) and likely contributed to the variation in educational distance between sessional

anatomy teachers and their students. Another major factor that impacts the recruitment of sessional teachers is higher education policy. In Australia, the Tertiary Education and Quality Standards Agency (TEQSA) mandates that individuals in teaching roles must have “a qualification in a relevant discipline at least one level higher than is awarded for the course of study” (TEQSA, 2015). This policy supports the use of cross-level sessional teachers, but would not permit the use of near-peer or reciprocal-peer teachers. Studies demonstrating that peer-teachers can function effectively as sessional anatomy teachers (Lockspeiser et al., 2008; Evans and Cuffe, 2009; Durán et al., 2012) and positively impact the student learning experience (Hall et al., 2014; Stephens et al., 2016) call into question the validity of such policies. Ongoing research into the use of sessional anatomy teachers in medical programs could thus help to implement quality teaching and learning practices at a local level, and also inform the development of evidence-based policies that govern the recruitment and selection of sessional teachers at a national or international level.

Sessional anatomy teachers fulfilled the full spectrum of teaching related duties, from assisting students with laboratory activities to designing and assessing student coursework. Activities that required a higher level of responsibility (e.g. developing course materials, conducting educational research) were typically only assigned to sessional teachers who were two or more years advanced from their students. The stratification of responsibility based on the teacher’s level of anatomical knowledge and experience was observed in several studies (Durán et al., 2012; Reyes-Hernández et al., 2015; Strkalj et al., 2016). At the Autonomous University of Nuevo Leon in Mexico, sessional teachers were assigned to different tasks depending on their level of medical education (Durán et al., 2012; Reyes-Hernández et al., 2015). Challenging tasks such as leading small group sessions requiring

teachers to have a high degree of clinical knowledge and to function independently, were assigned to sessional teachers more advanced in their studies. Easier tasks conducted under the supervision of faculty members, such as assisting students with dissection, were assigned to sessional teachers with less experience. Although it is difficult to conclude from the current literature what teaching-related duties are most appropriate for sessional teachers at different points in their education, it is clear that the skills, knowledge and experience of sessional teachers is an important consideration when assigning teaching duties.

As most of the studies lacked detailed information on the training offered to sessional teachers it was difficult for the review authors to compare the content, frequency, duration, methods or intensity of training interventions. Despite this, the importance of preparing sessional teachers for their role as educators was emphasized by several studies (Lockspeiser et al., 2008; Shiozawa et al., 2010a, b; Durán et al., 2012; Naeger et al., 2013; Reyes-Hernández et al., 2015; Horneffer et al., 2016), highlighting the need for evidence-based training and professional development programs for sessional staff. Durán et al. (2012) and Horneffer et al. (2016) offered different training programs to sessional anatomy teachers based on their teaching-related duties. Horneffer et al. (2016) implemented two introductory training programs and required that sessional teachers complete a third more advanced teaching skills workshop before accepting more challenging roles that require independent teaching. It is likely that sessional teachers with different qualifications and levels of experience will require different levels of support. Further research is required to determine how training and support programs can be tailored to the profile and teaching role of sessional anatomy teachers.

The importance of implementing ongoing training and development for sessional anatomy teachers was emphasized by several of the reviewed studies (Shiozawa et al., 2010a, Horneffer et al., 2016; Walser et al., 2017). It is argued in the wider literature that teachers in the higher education sector require systematic programs of development that incorporate reflective practice, formative evaluations, regular feedback and access to a wide range of developmental activities (Steinert et al., 2006; Hendry, 2009). While some studies offered sessional anatomy teachers ongoing support and training (Prentice et al., 1976; Erie et al., 2013; Lachman et al., 2013; Horneffer et al., 2016; Walser et al., 2017), others relied on single training interventions (Hansen and Krackov, 1994; Shiozawa et al., 2010a,b, 2016; Whelan et al., 2016). Shiozawa et al., (2010a) noted that training sessional teachers is both time and resource intensive, suggesting that a lack of appropriate resources may be limiting the implementation of more extensive training and support programs. This raises questions regarding the value that universities place on quality teaching and learning and highlights the importance of supporting and funding initiatives aimed at improving the quality of sessional teaching. Despite several anatomy programs providing detailed descriptions of the training and support they offer to sessional teachers, the effectiveness of these training programs was rarely evaluated. Moving forward, it is essential that anatomy programs evaluate the impact of sessional teacher training on both teacher performance and student learning.

The majority of reviewed studies included an evaluation of teaching performance, but these evaluations were largely subjective and based on student and teacher perceptions. Although eight institutes included an evaluation of reciprocal-peer teaching, the results were

confounded by larger changes to the anatomy teaching program. Reciprocal-peer teaching was typically introduced in conjunction with an alternating dissection schedule. The presence of this confounding factor meant the review authors were unable to determine what impact the performance of reciprocal-peer teachers had on student learning. The specific impact of peer-teaching, in the absence of alternating dissection, was not evaluated in any of the reviewed studies. Ensuring that sessional teachers have an appropriate level of knowledge and teaching ability is essential if the quality of the student learning experience is to be assured. Currently, a significant gap in the literature exists in relation to performance evaluation of sessional teachers and feedback mechanisms for these educators.

The positive impact of teaching positions on sessional teachers was a clear theme identified in the literature. Three studies examining the long-term impact of the sessional anatomy teacher experience (Willan et al., 1998; Koshi and Holla, 2001; Ocel et al., 2003) indicated that sessional teachers continued to value the experience of teaching anatomy and the transferable skills that were developed in sessional teaching positions. Several studies published in the 1990s (Willan et al., 1992, 1996, 1998) demonstrated that sessional teachers performed highly on surgical entrance examinations and were more likely to achieve a career in surgery than the general population of graduate doctors. Notably, most of these studies focused on medically qualified cross-level teachers, with only a single study examining the long-term benefits of near-peer teaching for medical students (Ocel et al., 2003). Sessional teacher positions clearly represent a valuable professional development opportunity that can be tailored to benefit both current and aspiring clinicians. In particular, the utilization of near-peer teachers may serve the double benefit of providing students

with teachers that share a high level of cognitive congruency, while providing the teachers with an opportunity to develop valuable skills that could later be used in clinical practice.

Limitation of the study

To authors' knowledge, this is the first systematic review reporting on the use of sessional teachers in higher education. The lack of consensus in the literature regarding how sessional teachers should be defined and how they can be engaged posed significant challenges for the review authors. In order to conduct the systematic review, the authors needed to clearly define what could be classified as sessional teaching and what could not. The authors acknowledge that the definition of sessional teachers is subjective and the inclusion/exclusion criteria described in this review may not be applicable to sessional teachers used in other disciplines beyond anatomy education.

While the authors endeavored to develop a comprehensive and sensitive search strategy, the wide variation in terminology used to describe sessional teachers made it difficult to search for, and identify, relevant articles. Despite screening over 9,000 articles only 40 articles reporting on the use of sessional anatomy teachers at 29 institutes were eligible for inclusion in the review. The data presented in this review thus represents a small portion of the medical schools that operate globally. There was considerable variability in the qualifications, teaching role, recruitment, training and evaluation of sessional teachers, suggesting that sessional anatomy teachers are a highly heterogeneous population.

CONCLUSION

Sessional anatomy teachers contribute significantly to anatomy education in medical programs, but there is little focus on the teaching role or support needs of these educators in the reviewed literature. A strong base in anatomy provides a safe foundation for clinical practice, so it is essential that anatomy educators turn the lens inward and rigorously examine 'who' should be teaching anatomy in medical programs. Localized investigations into the use of sessional anatomy teachers are required, with a focus on: (1) Defining the teaching role and activities undertaken by sessional anatomy teachers. (2) Exploring the training and support needs of sessional anatomy teachers. (3) Developing evidence-based approaches to address training and support needs. (4) Developing comprehensive and rigorous methods for evaluating sessional anatomy teacher performance and impact on student learning. (5) Evaluating the professional development needs of sessional anatomy teachers and linking the sessional teacher experience to career development.

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Accepted Article

FIGURE LEGEND

Figure 1: A summary of the screening process and its outcome. Out of 5,658 articles after removal of duplicates, 314 advanced to full-text screening and only 39 articles were eligible for inclusion in the systematic review.

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