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Abstract

The study aimed to quantify the clinical activity profile of physiotherapy students within a regional student-led musculoskeletal clinic. A retrospective clinical audit examined all occasions of service (OOS) delivered during 2018. Demographic data and student to clinical educator (CE) ratio were also collected. Descriptive statistics were used to describe patient demographics. The average OOS per student per week between student to CE ratios (i.e., 2:1 and 3:1 group) were analysed using a repeated measures ANOVA. A total of 214 clients were included (mean age 40.9 years (SD 20.4) with 66.5% being female (n = 133)). The shoulder (19.3%) was the most assessed/treated region, followed by the knee (18.9%), and ankle/foot (16.2%). Analysis revealed a main effect of week ($p<0.001$), but not for student to CE ratio ($p=0.125$). There was no interaction of week by student to CE ratio ($p=0.528$). Post hoc analysis revealed the average OOS per student per week was lower for week 1 than in weeks 2, 3, and 4, with a small but statistically significant decrease in average OOS from week 4 to 5. Overall, students attending a regional student-led musculoskeletal clinic see a variety of clinical presentations, from clients across the lifespan, with increasing OOS across the placement.

I INTRODUCTION

Clinical workplace learning, also known as 'clinical education', is a mandatory requirement of the physiotherapy curricula within Australia, providing an opportunity for students to integrate their theoretical knowledge and clinical skills within a real-life clinical environment (Australian Physiotherapy Council, 2017). While the majority of clinical placements are offered within metropolitan regions (Dean et al., 2009), it is estimated that 'private practice' settings make up only nine percent of clinical placements within Australia (Wells et al., 2019), yet approximately 50% of the physiotherapy workforce are employed within private practice (Commonwealth of Australia, 2021). With increasing student numbers in undergraduate physiotherapy programs and a shortage of private practice clinical placement opportunities, many universities are becoming reliant on student-led musculoskeletal clinics to provide clinical education within private practice settings (Johnston et al., 2017).

Student-led musculoskeletal clinics are typically associated with a university and function similar to that of a private practice, but are run by student physiotherapists under the supervision of fully qualified physiotherapists known as 'clinical educators' (Mishan & Dragatsi, 2017). Student-led clinics often run at a significant cost to their respective university and are, therefore, used to supplement clinical education and provide low-cost health services to the local community. Compared to private practice where patient care may be prioritised over student learning, student-led musculoskeletal clinics are designed to maximise student learning opportunities (Meah et al., 2009). As such, students completing clinical education within student-led musculoskeletal clinics may manage lower patient numbers, compared to private practice or hospital outpatient departments; however, this is balanced out by longer appointment times that allow for greater student to clinical educator interaction and reflection (McBride et al., 2018; Mishan & Dragatsi, 2017). Furthermore, the pathways for patient referral also differ between outpatient departments, private practice, and student-led clinics, which not only influence the number of patients managed by students, but also the type of the clinical conditions they manage. Despite a relatively low cost per appointment associated with student-led musculoskeletal clinics, the reduced number of patients may impact on the clinical activity profile of students, especially when supervised during a higher student to clinical educator ratio. Quantification of the student clinical activity profile is, therefore, important to assess student learning and job readiness, while also allowing comparison to other clinical education settings.

Clinical activity profiles may refer to, but are not limited to, the total number of clients being attended, known as occasions of service (OOS), patient demographics (age, sex, and the anatomical region affected), and the number of students allocated to a clinical educator, known as student to clinical educator ratios (Stoikov et al., 2019; Stoikov et al., 2018). Although the clinical activity profile of students completing clinical education within a hospital department musculoskeletal outpatient setting has been reported (Stoikov et al., 2018), there is limited data for student-led university clinics or private practice settings that host students. To date, only one study has reported on OOS for private practices that host pre-registration physiotherapy students (Forbes et al., 2021). In this study, although OOS per clinic were not different when students were hosted and not hosted, it was not clear how many OOS were attributed to students, compared to clinic staff (Forbes et al., 2021). Within a hospital department outpatient setting Stoikov et al. (2018) showed that the number of student OOS gradually increased over the first 4 weeks of clinical education, reaching an average of 18 OOS per week at the end of week 4. Not surprisingly, the average duration of each OOS gradually decreased over the 4 weeks (Stoikov et al., 2018). Importantly, the average number and duration of the OOS in that study were not influenced by the student to clinical educator ratio (Stoikov et al., 2018). Similar findings were also reported by Forbes et al. (2021) for private practice settings that hosted students, whereby student to clinical educator ratios had no impact on overall OOS per clinic. While these data provide a useful snapshot of the typical clinical education experience within hospital and private practice settings, the findings may not be extrapolated to student-led musculoskeletal clinics. Furthermore, the nature of the clinical experience, including patient demographics (i.e., age, sex, and anatomical region), were not reported.

The aim of this study was to report the clinical activity profile of students attending a student-led musculoskeletal clinic in regional Australia. To this end, we aimed to describe the patient demographics including the age, sex, and anatomical region affected, as well as examine the average OOS per student per week, and whether the student to clinical educator ratio affected the average OOS.

II METHODS

A *Study design*

A retrospective audit of physiotherapy clinical records was undertaken within the student-led musculoskeletal clinic of a regional university from January to December of 2018. A waiver of consent was obtained from Central Queensland University Human Research Ethics Committee to extract student data (Approval Number: 21458). To thoroughly examine the clinical activity profile of students, data from clients were also extracted. Prior to their initial appointment, all clients were asked to provide consent, or not, for their data being used for teaching and research. Central Queensland University Human Research Ethics Committee granted ethical approval to access the data retrospectively for all clients who had previously consented for their data being used for teaching and research (Approval Number: 21458). All data were de-identified prior to statistical analysis.

B *Setting*

The regional musculoskeletal student-led clinic within this study was initiated in 2016 and hosts students from Central Queensland University on 5-week clinical placements in their third and fourth year of their Bachelor of Physiotherapy (Honours). The clinic uses a student-led model whereby students manage their own case load of clients and clients are made aware of student involvement when scheduling their appointment (Forbes et al., 2021). Direct appointments with clinical educators are not available; however, during exceptional circumstances (e.g., unexpected student illness) the clinical educator will step in and assist. The student-led clinic has one full-time equivalent clinical supervisor and typically hosts two to three students per block. Clinical appointments are available for members of the local community, including university students and staff, and the clinic operates under a fee-for-service model at a discounted rate, with extended consultation times to allow for student and clinical educator interaction (i.e., 90-minute initial appointments and 60-minute follow-ups). In addition, students supervise weekly group-based exercise classes with a focus on falls and balance and spinal pain. Students typically shadow each other in the first week with close supervision from the clinical educator, which allows students to gain confidence and understand expectations regarding the clinical placement but does limit the number of individual OOS conducted early in the placement. In addition, in the early weeks of the placement, students are provided additional time to complete their notes and reflect on clinical strengths and areas requiring improvement based on clinical appointments and supervisor feedback. Over the 5-week clinical placement there are numerous non-clinical activities, including formalities such as orientation, mid- and end-unit feedback, and assignment presentations, as well as observational surgeries and involvement in community events (e.g., offering services at running festivals and sports carnivals) where possible. OOS for these additional activities (i.e., sporting events) have not been included in this study.

C *Participants*

All physiotherapy students who attended a clinical placement between January and December 2018 were included. Demographic data obtained included age, sex, and year of study (third or fourth year). The student to clinical educator ratio for each clinical placement was also recorded (i.e., number of students per educator).

D *Data collection*

Two researchers completed data extraction simultaneously to minimise potential errors, with two additional researchers used to resolve discrepancies. Retrospective screening of clinical records identified all clients who provided consent for their data to be included for teaching and research. Data relating to client demographics (e.g., age, sex, anatomical region affected) and OOS were extracted. For this study, an OOS was defined as a single interaction between a student physiotherapist and a client for an assessment and/or treatment. Group classes were considered as a single OOS to ensure we did not overinflate our OOS in accordance with Stoikov et al. (2018). Data were extracted over nine consecutive 5-week clinical placement blocks. To quantify the student clinical activity profile, student OOS per week per block were extracted separately. Any OOS completed by qualified clinical staff including classes (e.g., Pilates) were not included in this study.

E *Statistical analysis*

Descriptive statistics (mean (SD) and n (%), respectively) were used to present student and client demographic data. Frequency plots were used to analyse the distribution of OOS for each body region (e.g., knee, shoulder, lumbar spine). To examine whether the student to clinical educator ratio influenced the average OOS per student per week, we performed a two-way repeated measure ANOVA using a within-factor of week (i.e., week 1, 2, 3 etc.,) and between factor of student to clinical educator ratio (i.e., 2:1 and 3:1). Where a significant main effect of week or student to clinical educator ratio, or interaction were detected, post-hoc pairwise comparisons were performed using Bonferroni corrections. Statistical significance was defined as an alpha of ≤0.05. Descriptive statistics were reported for all outcomes using the mean and standard deviation unless otherwise stated. Statistical analysis was completed using Statistical Package for the Social Sciences (SPSS) version 26 (IBM, Armonk, NY, USA).

III RESULTS

A *Participants*

A total of 24 undergraduate physiotherapy students completed a 5-week clinical placement within the 12-month study period. The mean age (SD) was 23.4 years (4.3), with 13 females (54%). Fourteen students (58%) were in fourth year and 10 students (42%) were in third year of study. Eighteen students (75%) completed their clinical placement with a student to clinical educator ratio of 3:1, with the remaining six students completing their placement with a 2:1 ratio.

B *Clients*

A total of 245 clients attended the student-led musculoskeletal physiotherapy clinic over the 12-month study period. Thirty-one clients were excluded from the study - 19 did not provide consent for their information to be used for teaching and research purposes and 12 were seen by qualified physiotherapy staff members. The remaining 214 clients attended a total of 1087 OOS, including 1028 clinical appointments and 59 student-run exercise classes. The mean (SD) age of the clients was 40.9 years (SD 20.4, range 10 to 84 years) with 133 females (66.5%). Of the 214 clients, 14 (6.5%) did not have data for an initial appointment. Of the 200 clients who were seen by a student, 36 (15%) had more than one initial appointment for more than one clinical complaint, resulting in a total of 240 initial appointments. Of these, 12 (5%) did not have clinical records that clearly stated which body region was assessed/treated. Table 1 shows the frequency data for the 228 initial appointments with a documented anatomical region seen by the student physiotherapists.

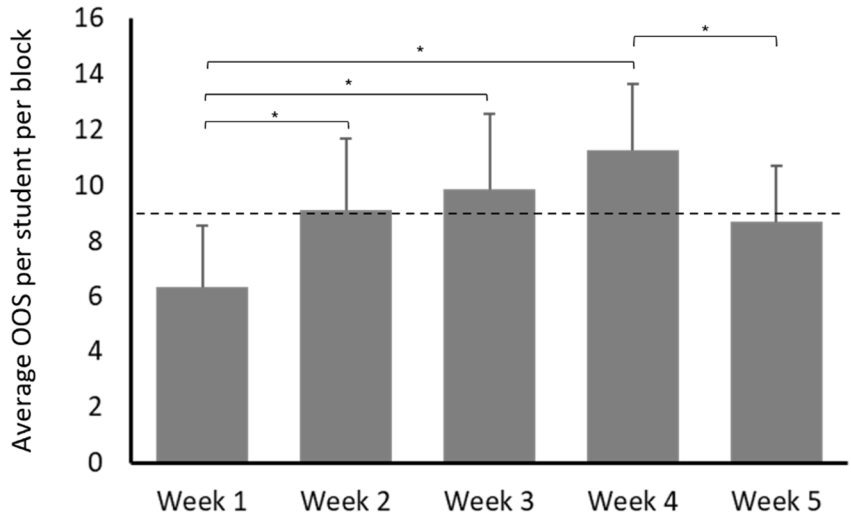
Table 1
Anatomical region assessed and treated by student physiotherapists during the study period (n = 228)

Anatomical Region assessed and treated	Number (%)
Shoulder	44 (19.3%)
Knee	43 (18.9%)
Ankle/Foot	37 (16.2%)
L-Spine – Lumbar Spine	33 (14.5%)
C-Spine – Cervical Spine	21 (9.2%)
Pelvis/SIJ/Hip – Sacroiliac Joint	14 (6.1%)
Other (e.g., falls risk, Parkinson's Disease)	11 (4.8%)
Thoracic Spine	8 (3.5%)
Wrist/Hand	8 (3.5%)
Elbow	4 (1.8%)
Full Body	3 (1.3%)
Head	1 (0.4%)
Temporomandibular Joint	1 (0.4%)

C *Average OOS per students per week*

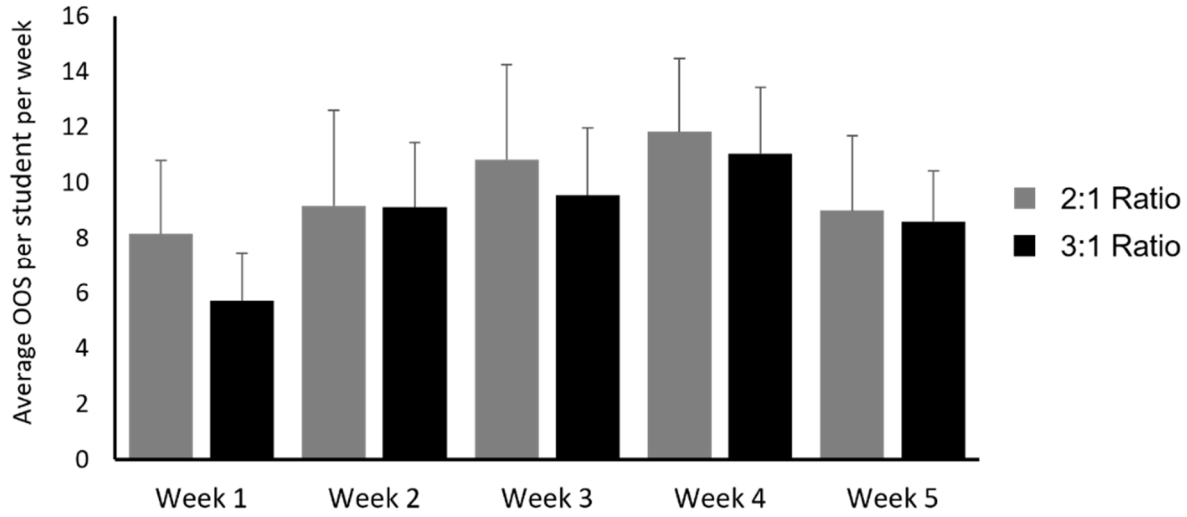
The average OOS per student per week were normally distributed using the Shapiro-Wilk test of normality. The mean (SD) number of OOS delivered by each student over a 5-week clinical placement block was 45.3 (6.8). There was a significant main effect of week (F=10.326, df=4, p<0.001, Figure 1), but not student to clinical educator ratio (F=2.545, df=1, p=0.125, figure 2), on the average number of OOS seen by the students. There was no interaction between week and student to clinical educator ratio on the average OOS (F=0.800, df=4, p=0.528, Figure 2). Post hoc analysis revealed that week 1 had significantly less average OOS compared to weeks 2, 3, and 4 (mean difference 2.2 OOS [95% CI 0.2 to 4.4], p=0.047, mean difference 3.3 OOS [95% CI 1.3 to 5.2], p<0.001, and mean difference 4.5 OOS [95% CI 2.7 to 6.4], p<0.001, respectively, Figure 1). Furthermore, week 4 had significantly more average OOS per student per week compared to week 5 (mean difference 2.6 OOS [95% CI 0.2 to 5.1], p=0.028, Figure 1).

Figure 1
Average occasions of service (OOS) per student per week. Data presented as mean and SD



* denotes statistical significance $p<0.05$. Dashed line indicates overall mean (9.3).

Figure 2
Average occasions of service (OOS) per student per week relative to the student to clinical educator ratio. Data presented as mean and SD



IV DISCUSSION

This was the first study to describe the clinical activity profile of physiotherapy students undertaking clinical placements in a regional student-led musculoskeletal clinic. Our findings showed that students interact with a diverse range of clients across the lifespan and with a variety of anatomical areas. As expected, the average OOS per student per week increased over the first four weeks, before a small decrease from week 4 to week 5. We also found that the average OOS per student per week was not influenced by the student to clinical educator ratio. Taken together, our results showed that student-led musculoskeletal clinics provided a diverse mix of clinical presentations, which gradually builds in volume over the first four weeks and did not appear to be influenced by the student to clinical educator ratio. This information may be useful for other student-led clinics, private practices, universities, clinical educators, and the physiotherapy profession to benchmark student clinical activity and assess job readiness.

There are many reasons why clients may choose a student-led clinic over other health facilities including, convenience, cost, and perceived high-quality care (Forbes & Nolan, 2018). Clients choosing our student-led musculoskeletal clinic were on average 40.9 years (SD 20.4, range 10-84 years), with over one third of our clients (39%) under the age of 30 years. This younger clientele may reflect the high proportion of student clients that attend the clinic, and the clinics' engagement with local sporting competitions. Consistent with this theory, our clinic attended to a higher proportion of peripheral conditions, with the shoulder region being the most assessed and treated (19.3%), followed closely by the knee (18.9%), the ankle/foot (16.2%), and the lumbar spine (14.5%). Although there are no data available from student-led or private practice physiotherapy clinics to compare to, data from general practice (GP) suggest that low back pain is the leading musculoskeletal reason for a GP visit and referral to physiotherapy (Dennis et al., 2018; Holdsworth et al., 2006; Pollack et al., 2016). While some anatomical regions had very few client numbers, such as the temporomandibular joint (0.4%), this is consistent with epidemiological data, which suggest a lower proportion (~25%) of individuals with temporomandibular pain seek treatment (Milam, 2003). Overall, our data support that physiotherapy students attending a regional student-led musculoskeletal clinical placement assess and treat a variety of anatomical regions for patients across a range of ages. Although speculative, the high proportion of younger clientele within our clinic may skew student experiences towards injuries affecting the peripheral regions.

On average, students completed 45.3 (6.8) OOS across a 5-week clinical placement. Without accounting for non-clinical time, such as orientation, mid- and end-unit feedback, assignment presentations, extracurricular activities (e.g., observational surgeries), and public holidays, this equates to less than 2 OOS per student per day. This is lower than a similar study conducted within a hospital department musculoskeletal outpatient setting showing students attended to ~2.9 OOS per day per block (Stoikov et al., 2018). While direct comparison between a regional student-led clinic and hospital department musculoskeletal outpatient setting is questionable, it does highlight that our student-led clinic may not adequately prepare students for entry into the profession. The identified gap in OOS between student and qualified physiotherapist is further highlighted by the findings that new graduates attend on average 7.5 OOS per day in a hospital department musculoskeletal outpatient setting (Stoikov et al., 2019). In addition, data from private practices in mainly metropolitan areas shows an average of ~10 OOS per full-time physiotherapist when not supervising students (data estimated using mean OOS without students (182 OOS) divided by mean full-time equivalent staff (non-student period 3.52) divided by 5 days per week) (Forbes et al., 2021). However, these data include a mix of less experienced and highly experienced physiotherapists, limiting direct comparison to new graduates, for which there is no data for private practices. Irrespective of limitations regarding direct comparison between student-led clinics and a hospital department musculoskeletal outpatient setting, it is important to highlight potential explanations which may account for our lower OOS. First, total potential patient numbers likely differ between regional health clinics and metropolitan hospitals, based purely on differences in population density between regional and metropolitan areas. Second, our clinic is designed to prioritise student learning and, as such, allows extended appointment times of 90 minutes for initial appointments and 60 minutes for follow-ups. Previous work has shown the average length of a student OOS is 58 mins (95%CI 57.2–58.8) in a hospital department musculoskeletal outpatient setting (Stoikov et al., 2018); however, because we did not record the duration of each OOS, we do not know whether our actual OOS were in fact longer than those reported by (Stoikov et al., 2018). Finally, student-led clinics may provide additional learning activities (e.g., supporting sporting and other community events) which reduce the amount of time students are allocated to clinical appointments. These extra-curricular activities, which include observational surgeries, weekly tutorials, and coverage of local sporting events, are appreciated by the students and seen as a positive learning experience (Heales et al., 2021); however, they do come at a cost of less clinic time. Overall, students attending clinical placement within our regional student-led musculoskeletal clinic see on average less total OOS than a musculoskeletal outpatient clinic; however, evidence suggests that students attending student-led clinics may receive additional skills in business management, administration, marketing, and promotion

(Moore et al., 2003), as well as benefits to the local community receiving additional access to affordable high-quality health care (Stuhlmiller & Tolchard, 2015). Nevertheless, the gap between student OOS within a university student-led clinic and that expected of a new graduate may be substantial, and steps may need to be taken to bridge this gap, particularly for students completing their final clinical placements.

Consistent with clinical education data from hospital department musculoskeletal outpatient clinics (Stoikov et al., 2018), average OOS increased over the first four weeks and then declined in the final week, regardless of the student to clinical educator ratio. These findings suggest that an increase in the student to clinical educator ratio from 2:1 to 3:1 did not have a significant impact on the average number of OOS per week, suggesting the clinic was able to cope with the increased clinical education demands of an additional student. As expected, lower OOS in week 1 likely reflects non-clinical task requirements, such as clinical orientations and safety inductions, and the provision of peer-to-peer shadowing opportunities to support student confidence and independence. Students are also allocated longer consultation times and provided with more educator support, compared to the latter weeks (Stoikov et al., 2018), which may limit the ability to see additional clients. The increased number of OOS across the middle of the placement (i.e., weeks 3 and 4) may reflect one strategy that clinical educators use to prepare students for entry into the profession; however, as mentioned above, students on clinical placement attend to significantly less OOS than new graduates in a musculoskeletal outpatient clinic (Stoikov et al., 2019). Higher OOS may also reflect increased student confidence and independence as they refine their knowledge and skills within the clinical area. The decrease in OOS from week 4 to week 5 was expected and has been reported previously (Stoikov et al., 2018). One possible explanation is that there are less clinically active hours in week 5 compared to week 4 as students are required to provide patient handovers, present in-service assignments, and receive feedback on their performance. Overall, the increase in OOS per student per week highlights a growth in student confidence and clinical skills; however, the average caseload students experience during a student-led musculoskeletal clinical placement may not adequately prepare the students for new graduate positions within hospital outpatient settings (Stoikov et al., 2019) or private practice. Despite this, studies are needed that directly compare caseload experiences between student placements and new graduate positions within private practice settings.

There are several considerations that must be noted when interpreting this data. First, ~8% of clients were excluded as they did not provide consent. While the exact number of OOS excluded is unknown, using the average of 5.1 OOS per client (estimated from 1087 OOS divided by 214 clients), we estimate 95 OOS were excluded. In addition, we did not include OOS completed by our physiotherapy students at community events (e.g., running festivals, sporting competitions, etc) and included one exercise class as one OOS irrespective of the number of patients attending. Therefore, our OOS data likely underestimate the actual OOS our students perform. Third, we did not include data for the duration of each OOS, which might be beneficial in understanding whether the observed increase in OOS over the first four weeks of clinical placement was associated with a decrease in the time required by the students. Fourth, in our estimation of OOS per student per day, we did not account for non-clinical days due to staff and student illnesses or absences, patient cancellations and no-shows, outreach commitments, and public holidays. These factors play a substantial role in the operation of the student-led clinic and by not accounting for these factors we likely further underestimate our students true OOS. Finally, we chose to report clinical conditions by anatomical region and not clinical diagnosis, and so although students managed conditions across all body regions, the exact nature of the clinical presentations are unknown.

V CONCLUSION

In a student-led musculoskeletal clinic undergraduate physiotherapy students deliver, on average, 45 OOS over a 5-week clinical education block, with the number of OOS per week increasing over the first 4 weeks. The average number of OOS were not impacted by the student to clinical educator ratio and included a broad mix of ages and body regions.

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