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# Evaluating the outcomes of Australia's first all-age public hospital Sport and Exercise Medicine Outpatient Clinic: a retrospective cross-sectional study

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## ABSTRACT

**Objectives.** This study aimed to evaluate the outcomes of Australia's first public hospital all-age Sport and Exercise Medicine Outpatient Clinic (SEMOC). **Methods.** A retrospective cross-sectional study of patients referred to and reviewed in the SEMOC, during a study period from March to October 2023, was performed. Outcomes were the number of appointments, number of patients reviewed, proportion reviewed within Queensland Health recommended timeframes, patient satisfaction, proportion of Aboriginal and Torres Strait Islander patients, and the rurality of the patients based on the Modified Monash Model of remoteness. **Results.** There were 29 clinics, 472 allocated appointments, and 270 new patients referred to the SEMOC (1.7 appointments per patient). Almost a quarter (23.7%) of patients identified as Aboriginal and Torres Strait Islander peoples and a third (31.9%) were from rural or remote regions. Most (88.7%) patients referred during the study period were seen within the Queensland Health recommended timeframes, and almost all patients referred on for orthopaedic review were booked for surgery (93.6%). Over 90% of patients were satisfied with the quality of treatment they received and rated the overall service as good to excellent. **Conclusion.** A SEMOC public hospital model has been shown to be feasible for providing care to patients with musculoskeletal conditions, reaching patients who face barriers to health care, reducing wait times, and improving referral for surgery. The model may assist in meeting Australia's growing demand for orthopaedic and musculoskeletal medicine and expand within Australia's public hospital system to become a nationally accepted practice.

**Keywords:** Australia, exercise, health, hospital, musculoskeletal, orthopaedics, sport.

## Introduction

Musculoskeletal disorders account for the greatest proportion of persistent pain globally across geographical regions and ages, and are responsible for one in seven primary care presentations.[1] Many of these presentations are referred to orthopaedic departments for specialist input, however, the majority can be managed without the need for surgical intervention.[2] Early diagnosis and timely interventions prevent deterioration, improve functional outcomes, and ultimately reduce mortality and morbidity rates associated with these conditions. To enable these positive outcomes, patients must have timely access to relevant specialist services.

In Queensland, Australia, the annual number of specialist outpatient referrals and initial appointments increased by 53 and 36% respectively between 2015 and 2021.[3] These increases were driven by community demand and service disruptions from the COVID-19 pandemic and exceeded expectations based on population growth.[3] Consequently, the wait time between primary care referral and patients' initial specialist appointment increased during the same period. This delay in patient care is not reflected in specialist outpatient wait lists and is considered a 'hidden wait time'.[4] In Queensland,

the recommended wait time in the public health service is 30 days for urgent referrals (Category 1), 90 days for semi-urgent (Category 2), and 365 days for non-urgent (Category 3).[5] These criteria ensure patients are seen in their order of clinical priority.[6,7] Between 2015 and 2021, Queensland Health mostly met the wait time targets for Category 1 patients (83% in 2020–21). However, Categories 2 and 3 have been consistently below targets of 69% and 84%, even before the impact of the COVID-19 pandemic.[8] In addition, only 14–41% of Queensland orthopaedic outpatient specialist reviews result in surgical treatment. Where orthopaedic services have low rates of conversion to surgery, there is an opportunity to review the type of patients and conditions being referred and determine whether care could be provided by another healthcare professional.[9]

The Cairns and Hinterland Hospital and Health Service (CHHHS) provides care for a diverse population that faces geographical and structural inequalities to accessing timely health care.[10] Over 250,000 residents are spread across 142,000 km$^2$ in Far North Queensland, Australia. The proportion of Aboriginal and/or Torres Strait Islander residents is four times higher compared to wider Queensland (12 and 4%, respectively).[10,11] The CHHHS also provides specialist health services to almost 30,000 residents of the Torres and Cape region (TCHHS) over 130,000 km$^2$, with an even greater Aboriginal and Torres Strait Islander representation (67%).[12] A substantial proportion of CHHHS patient referrals currently exceed the recommended guidelines with only 74, 50, and 58% of referrals meeting the Category 1–3 guidelines respectively.[5,13] Given the needs of the population, relative to the barriers and existing backlog to services, novel strategies for delivering more timely care are required.

In 2023, Cairns Hospital launched Australia's first public hospital-based Sport and Exercise Medicine Outpatient Clinic (SEMOC) to treat musculoskeletal conditions and reduce health inequities.[3,9]

The study aimed to evaluate SEMOC's effectiveness compared to usual care by assessing wait times, access for patients who face healthcare barriers, and patient satisfaction.

## Methods

### Study design

This was a single-centre retrospective cross-sectional study of patient and clinic records that were collected from a SEMOC that commenced in January 2023. The SEMOC was based within the orthopaedic department of the Cairns Hospital in Far North Queensland, Australia. Twenty-nine SEMOCs were conducted between March and October 2023 (i.e. the study period) (Fig. 1). Patient and clinic records from these clinics were reviewed in December 2023, and these records formed the basis of the current study. The reporting of information in this study followed the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) statement.[14]

### Patient selection

All patients in the SEMOC were referred to the Orthopaedic Outpatient Department of the Cairns Hospital by medical practitioners in the community or the local hospital and health service. These referrals were triaged by an orthopaedic consultant and/or asport and exercise medicine (SEM) physician at the Cairns Hospital to determine appropriateness for initial management in the SEMOC (see Fig. A1). Referral to the SEMOC was a clinical decision, with reference to Queensland Health Clinical Prioritisation Criteria for Orthopaedics.[6] The category of triage allocated was based on these criteria, which consider the acuity of the condition, the referral information, and nature of the condition, as is standard practice for Queensland Health outpatient orthopaedic clinics.[7]

Patients referred to SEMOC were placed on a waitlist, and then allocated an appointment. Patients were reviewed in-person, or via telehealth, by an SEM registrar or consultant. The details of care provided to all patients at the SEMOC were documented in their records.

The patient records for the current study were selected in two stages. First, the records for all new patients who were seen since the establishment of the SEMOC (January 2023) and had a follow up during the study period (March to October 2023) were included in the initial number of allocated appointments (Fig. 1). Second, the analysis of clinical outcomes was limited to only new patients who had their first consultation during the study period. The decision to limit analysis of clinical outcomes to the study period was to accommodate for the clinic operating procedures being established prior to the study period. From this point onward, the patient care pathways and outcomes were considered as an accurate representation of the clinic going forward.

Patient records that were incorrectly documented and duplicate records were excluded from analyses (Fig. 1). There were no other inclusion or exclusion criteria.

### Data collection

Patient data for the study were sourced from Cairns Hospital casemix records and the Integrated electronic medical record system. This included personal identifiers, demographics, and clinic outcomes. Feedback was collected via Google Forms. Data were securely stored on Queensland Health servers, de-identified for analysis, and anonymised in publications.

### Outcome measures

The primary outcome measures of this study were the total number of SEMOC appointments allocated in the study period, the number of patients reviewed, the characteristics

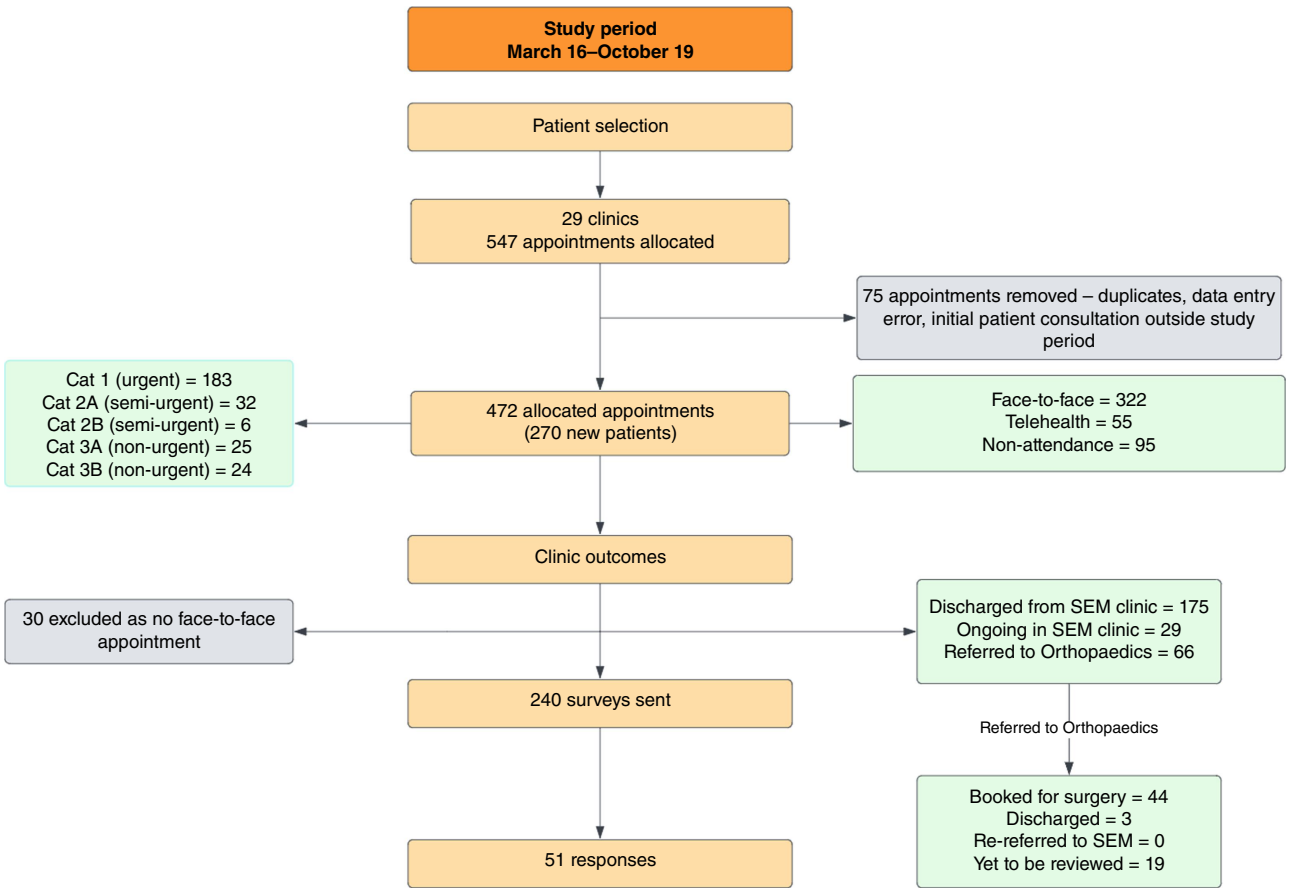


**Fig. 1.** Flowchart of patients who attended a Sport and Exercise Medicine (SEM) Outpatient Clinic in Far North Queensland, Australia, March 2023–October 2023.

of these patients (age, sex, and Aboriginal and Torres Strait Islander status), and rurality of residence. Clinic outcomes included number of patients seen by categories of triage (urgent, semi-urgent, and non-urgent) and percentage of patients seen within the Queensland Health recommended guidelines. To account for semi-urgent (Category 2) and non-urgent (Category 3) patients who had referrals that pre-dated the SEMOC, this category was sub-divided into two levels, 2A and 2B and 3A and 3B respectively. The patients in 2A and 3A had been referred directly to the SEMOC and triaged during the study period. The patients in 2B and 3B had an existing referral to the orthopaedic department outpatient waitlist prior to the commencement of the SEMOC. These patients had already been waiting for their appointment allocation and were re-triaged by the SEM physician when the clinic commenced.

Additional clinic information included inward referral patterns (GP, hospital emergency department (ED), or peripheral centre), onward referral patterns (orthopaedics, conversion from orthopaedic referral to surgery), discharge rates from the SEMOC, injury patterns (i.e. area of body), and patient travel distance from residence to clinic for face-to-face appointments (kilometres, km).

Rurality was measured using a seven-point scale based on the Modified Monash Model (MMM) of remoteness.[15] Each patient was allocated an MMM category (i.e. 1–7) based on their postcode and suburb of residence. The available MMM categories included metropolitan areas (1), regional centres (2), large rural towns (3), medium rural towns (4), small rural towns (5), remote communities (6), and very remote communities (7). Distance travelled was calculated using Google Maps and Microsoft 365 Excel. First, each patient's postcode was entered into Google Maps and the distance by road was calculated from the centre of that postcode to the address of the Cairns Hospital. The total distance travelled per patient was calculated from the face-to-face in-person appointments. Telehealth and no-show appointments were excluded.

Patient self-reported outcome measures were collected via six questions to the electronic-based patient feedback survey. The questions were measures of satisfaction on five-point Likert scales, from 'strongly disagree' to 'strongly agree'. Additional qualitative questions were in free-text short-answer format, which allowed for collection of both quantitative and qualitative data.

### Statistical analysis

All data analyses were performed using Microsoft Excel 365. Proportions were calculated as a total of categories. Means and standard deviations (s.d.) were used to describe the dispersion of normally distributed continuous variables, and medians and interquartile ranges used otherwise.

### Ethics approval

Participant consent for study was waived through the quality assurance process of the CHHHS. This approval was provided by the Far North Queensland Human Research Ethics Committee [EX/2023/QCH/103308 (Nov ver 2) – 1777 QA].

## Results

There were 29 SEMOCs, with 472 appointments, averaging 16.3 patients reviewed per clinic (Table 1). The majority of appointments were conducted face-to-face (68.2%), with 11.6% then conducted via Telehealth (11.6%). The non-attendance rate was 20%. The number of new patient referrals from these appointments during the study period was 270, averaging 1.7 appointments per patient.

### Patient characteristics

Among the 270 new patients, 61.5% were male, the average age was 37.0 years (range 11–81), with the 25–34 year age group accounting for the largest number of patients (20.0%) (Table 1). Almost a quarter (23.7%) of patients identified as Aboriginal and Torres Strait Islander peoples. Most patients (68.1%) were from regional centres (MMS = 2), the remainder were from rural, remote, or very remote towns/communities (MMS = 4–7).

### Clinic outcomes

Among the 270 new patient referrals, over half (58.9%) were from community GPs, with the remainder (28.5%) from the Cairns Hospital ED, a peripheral hospital ED (8.9%), or an outpatient hospital specialist (3.7%) (Table 2).

Over half the 270 new patients were triaged as urgent (Category 1) (67.8%) at an average of 1.8 appointments per patient and wait time of 19.0 days (s.d. = 12.9) (Table 2). Most of these patients (88.0%) were seen within Queensland Health recommended guidelines. A smaller proportion of referrals were deemed semi-urgent ($n$ = 38, 14.1%) (Category 2). On average, these patients waited 121.3 days to be seen, with 71.1% seen within recommended timeframes with 1.8 appointments per patient. Most of these

**Table 1.** Clinic and patient sociodemographic information for patients who attended a Sports and Exercise Medicine Outpatient Clinic (SEMOC) in Far North Queensland, Australia, March 2023–October 2023.

| Clinic and patient information | *n* | % |
|---|---|---|
| Clinics | 29 | |
| Appointments | 472 | 100.0 |
| Mean (per clinic) | 16.3 | |
| Attendance | | |
| In-person | 322 | 68.2 |
| Telehealth | 55 | 11.7 |
| Non-attendance | 95 | 20.1 |
| New patients referred | 270 | 100.0 |
| Gender | | |
| Male | 166 | 61.5 |
| Female | 104 | 38.5 |
| Age (years) | | |
| Mean (s.d., min–max) | 37.0 | 15.9, 11–81 |
| Age groups (years) | | |
| 1–17 | 35 | 13.0 |
| 18–24 | 42 | 15.6 |
| 25–34 | 54 | 20.0 |
| 35–44 | 50 | 18.5 |
| 45–54 | 47 | 17.4 |
| 55–64 | 27 | 10.0 |
| 65+ | 15 | 5.6 |
| Aboriginal and Torres Strait Islander status | | |
| Aboriginal and Torres Strait Islander | 12 | 4.4 |
| Aboriginal, not Torres Strait Islander | 36 | 13.3 |
| Torres Strait Islander, not Aboriginal | 16 | 5.9 |
| Neither Aboriginal or Torres Strait Islander | 204 | 75.6 |
| Not stated or unknown | 2 | 0.7 |
| Modified Monash Scale | | |
| Mean (s.d.) | 3.0 | 1.6 |
| Levels | | |
| 1 – Metropolitan areas | 0 | 0.0 |
| 2 – Regional centres | 184 | 68.1 |
| 3 – Large rural towns | 0 | 0.0 |
| 4 – Medium rural towns | 17 | 6.3 |
| 5 – Small rural towns | 44 | 16.3 |
| 6–7 – Remote communities | 25 | 9.3 |

**Table 2.** Clinic and patient information for patients who attended a Sports and Exercise Medicine Outpatient Clinic (SEMOC) in Far North Queensland, Australia, March 2023–October 2023.

| Clinic information for patients | No | % |
|---|---|---|
| New referrals | 270 | 100.0 |
| Referral source | | |
| General practitioner | 159 | 58.9 |
| Cairns ED | 77 | 28.5 |
| Peripheral site ED | 24 | 8.9 |
| Specialist | 10 | 3.7 |
| Number of patients | | |
| Cat. 1 (Acute, ≤30 days) | 183 | 67.8 |
| Cat. 2 (Sub-acute, ≤90 days) | 38 | 14.1 |
| 2A (new referral during study period) | 32 | 84.2 |
| 2B (referral from existing waitlist) | 6 | 15.8 |
| Cat. 3 (Chronic, ≤365 days) | 49 | 18.1 |
| 3A (new referral during study period) | 24 | 49.0 |
| 3B (referral from existing waitlist) | 25 | 51.0 |
| Total during study period (Cat 1, 2A, 3A) | 239 | 88.5 |
| Number of appointments (mean, s.d.) | | |
| Cat. 1 | 1.8 | 0.9 |
| Cat. 2 | 1.8 | 1.0 |
| Cat. 3 | 1.5 | 0.7 |
| Days waiting (mean, s.d.) | | |
| Cat. 1 | 19.0 | 12.9 |
| Cat. 2 | 121.3 | 144.2 |
| Cat. 3 | 310.1 | 267.9 |
| Appointment within QLD Health Guidelines | 212 | 78.5 |
| Cat. 1 | 161 | 88.0 |
| Cat. 2 | 27 | 71.1 |
| 2A | 27 | 84.4 |
| 2B | 0 | 0.0 |
| Cat. 3 | 24 | 49.0 |
| 3A | 24 | 100.0 |
| 3B | 0 | 0.0 |
| Total during study period (Cat 1, 2A, 3A) | 212 | 88.7 |
| Travel distance per appointment (km) | 240 | |
| 0–15 | 55 | 22.9 |
| 16–30 | 60 | 25.0 |
| 31–100 | 47 | 19.6 |
| 101–200 | 46 | 19.2 |
| 201+ | 32 | 13.3 |
| Median (quartiles 1–3) | 32 | 16–150 |
| Appointment outcomes | 270 | |
| Discharged from SEM clinic | 175 | 64.8 |
| Ongoing | 29 | 10.7 |
| Referred to orthopaedics | 66 | 24.4 |
| Booked for surgery | 44 | 66.7 |
| Discharged | 3 | 4.5 |
| Re-referred to SEM | 0 | 0.0 |
| Ongoing (not yet reviewed) | 19 | 28.8 |

Cat., Category

Category 2 patients were referred during the study period (2A, $n = 32$), with the majority ($n = 27$, 84.4%) seen in the recommended timeframe. The 49 non-urgent (Category 3) patients were evenly distributed into 3A and 3B categories. All Category 3A patients, who were referred and triaged during the study period, were seen in the recommended time, while none in the Category 3B met the recommended timeframe. When analyses were limited to the 239 patients who were referred during the study period (i.e. Categories 1, 2A, and 3A), 88.7% were seen within the recommended timeframe.

There were 240 patients who attended face-to-face appointments. Although half (47.9%) only travelled a 30-km round trip or less to attend their appointment, a third (32.5%) necessitated travel over 100 km (range 0–1996) (Table 2). Almost all of the 270 new patients seen in the SEMOC within the study period were discharged from the SEMOC service (89.3%), including referral to orthopaedics, with only a small portion (10.7%) remaining within the SEMOC for further review and assessment.

A quarter of the 270 new patients were referred to orthopaedics for consideration or surgical management (24.4%) (Table 2). Most of these patients were reviewed during the study period (i.e. 47, 71.2%) and among these, almost all (44) were booked for surgery. At the end of the study period, 19 patients had yet to be reviewed by orthopaedics. Among the 240 patients who had at least one face-to-face appointment during the study period (Table A1), the most frequent injury regions were the knee (62.1%), shoulder (20%), and foot or ankle (9.2%).

## Feedback survey

All 240 patients who had a face-to-face appointment were sent feedback surveys and 51 (21%) returned a response (Table 3). Almost all these patients (96.1%) rated the overall service as good to excellent, were satisfied with the quality

**Table 3.** Patient Feedback Survey results for patients who attended a Sports and Exercise Medicine Outpatient Clinic (SEMOC) in Far North Queensland, Australia, March 2023–October 2023.

| Patient satisfaction survey | *n* | % |
|---|---|---|
| Total surveys sent | 240 | |
| Survey responses | 51 | 21.3 |
| Satisfaction with quality of treatment | | |
| Very satisfied | 36 | 70.6 |
| Somewhat satisfied | 10 | 19.6 |
| Neither satisfied nor dissatisfied | 3 | 5.9 |
| Somewhat dissatisfied | 0 | 0.0 |
| Very dissatisfied | 2 | 3.9 |
| Satisfaction with outcome of treatment | | |
| Very satisfied | 30 | 58.8 |
| Somewhat satisfied | 12 | 23.5 |
| Neither satisfied nor dissatisfied | 6 | 11.8 |
| Somewhat dissatisfied | 1 | 2.0 |
| Very dissatisfied | 2 | 3.9 |
| Return for similar injury | | |
| Yes | 48 | 94.1 |
| No | 3 | 5.9 |
| Overall service rating | | |
| Excellent | 31 | 60.8 |
| Very good | 14 | 27.5 |
| Good | 4 | 7.8 |
| Fair | 1 | 2.0 |
| Poor | 1 | 2.0 |
| Likelihood to recommend | | |
| 10 | 31 | 60.8 |
| 8–9 | 13 | 25.5 |
| 6–7 | 3 | 5.9 |
| 1–5 | 4 | 7.8 |
| Mean (s.d.) | 8.9 | 1.8 |

Notes: satisfaction with quality of treatment = How satisfied were you with the quality of treatment delivered to you? Satisfaction with outcome of treatment = How satisfied were you with the outcome of your treatment? Return for similar injury = If you had a similar injury in the future, would you be happy to be treated in the Sport and Exercise Medicine Clinic again? Overall service rating = Overall, how would you rate the service you received from the staff at our office? Likelihood to recommend = How likely is it that you would recommend our clinic to a friend or family member?

of treatment (90.2%) and treatment outcome (82.3%), and would return to the clinic for a similar injury (94.1%). Their average likelihood of recommending the service to a friend or family member was 8.9 out of 10.

## Discussion

This study evaluated Australia's first all-age public hospital SEMOC. We showed this model was a feasible option for providing care to patients with musculoskeletal conditions, operating with high efficacy and delivering positive patient-reported outcomes. Our SEMOC reached patients who face barriers to health care and reduced wait times for outpatient specialist clinic appointments. There were appropriate referrals made for surgical opinion, a low non-attendance rate, and high levels of patient satisfaction. This study supports the feasibility of a SEMOC to meet Australia's growing demand for specialist outpatient referrals for orthopaedic and musculoskeletal medicine.

### Clinical implications

Over 29 clinics, one SEM registrar and consultant reviewed over 15 patients per clinic. These clinics reached a higher proportion of Aboriginal and Torres Strait Islander patients compared to other specialist outpatient CHHHS clinics (24.5 and 20% respectively),[11] and a large proportion of patients from small rural towns (16.3%) and remote communities (9.3%). Aboriginal and Torres Strait Islander peoples face considerable systemic barriers to accessing appropriate health care.[16] Our SEMOC provides a potential model for addressing some of these inequities.

The SEMOC also saw almost 90% of patients within the recommended Queensland Health guideline wait times, after excluding those who had already breached their recommended wait time at referral. After this exclusion, the proportion of our Category 1, 2, and 3 patients who met the recommended timeframes (88.0, 88.4, and 100% respectively) was higher than the CHHHS (74.0, 50.0, and 58% respectively) and the Queensland Health targets. These results suggest that our SEMOC model has the potential to reduce wait times to be seen by a clinician, for all levels of clinical priority.

Our clinic was efficient in terms of the low number of patient appointments required before discharge, high patient satisfaction, and the high proportion of successful orthopaedic surgery referrals. Most of our patients (88%) were discharged within the study period, with less than two appointments per patient, indicating that issues were addressed and resolved promptly. Given that respondents to our study overwhelmingly rated the SEMOC as positive, these results suggest that the patients had a positive experience from their level of care. More than 90% of our patients who were referred to an orthopaedic surgeon for opinion were subsequently booked for surgery. This rate of successful conversion is higher compared to Queensland Health orthopaedic data, where surgery following specialist referral ranged from 14 to 41%.[9] Our higher conversion rate suggests that appropriate onward referrals were being made.

The study found a 20% non-attendance rate for appointments, lower than the 25% for other Queensland Health specialist outpatient appointments.[3] Reduced non-attendance can lower healthcare costs. Travel over 100 km for a third of

our patients may have affected attendance, leading to the use of Telehealth, which is now widely accepted practice, but lacks practical examination capabilities.[17]

## Conclusion

Our results suggest that a SEMOC model may be a feasible option for providing care to patients with musculoskeletal conditions and delivering positive outcomes by reaching patients who face barriers to health care, reducing wait times, improving referral for surgery, and lowering non-attendance. The implementation of SEMOCs within the wider Australian public hospital systems could allow the delivery of the SEM service to a greater number of people and become a nationally accepted practice.

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**Data availability.** Data are available via an appropriate and objective ethics approval process. Please contact the corresponding author for advice.

**Conflicts of interest.** The authors declare no conflicts of interest.

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## Appendix

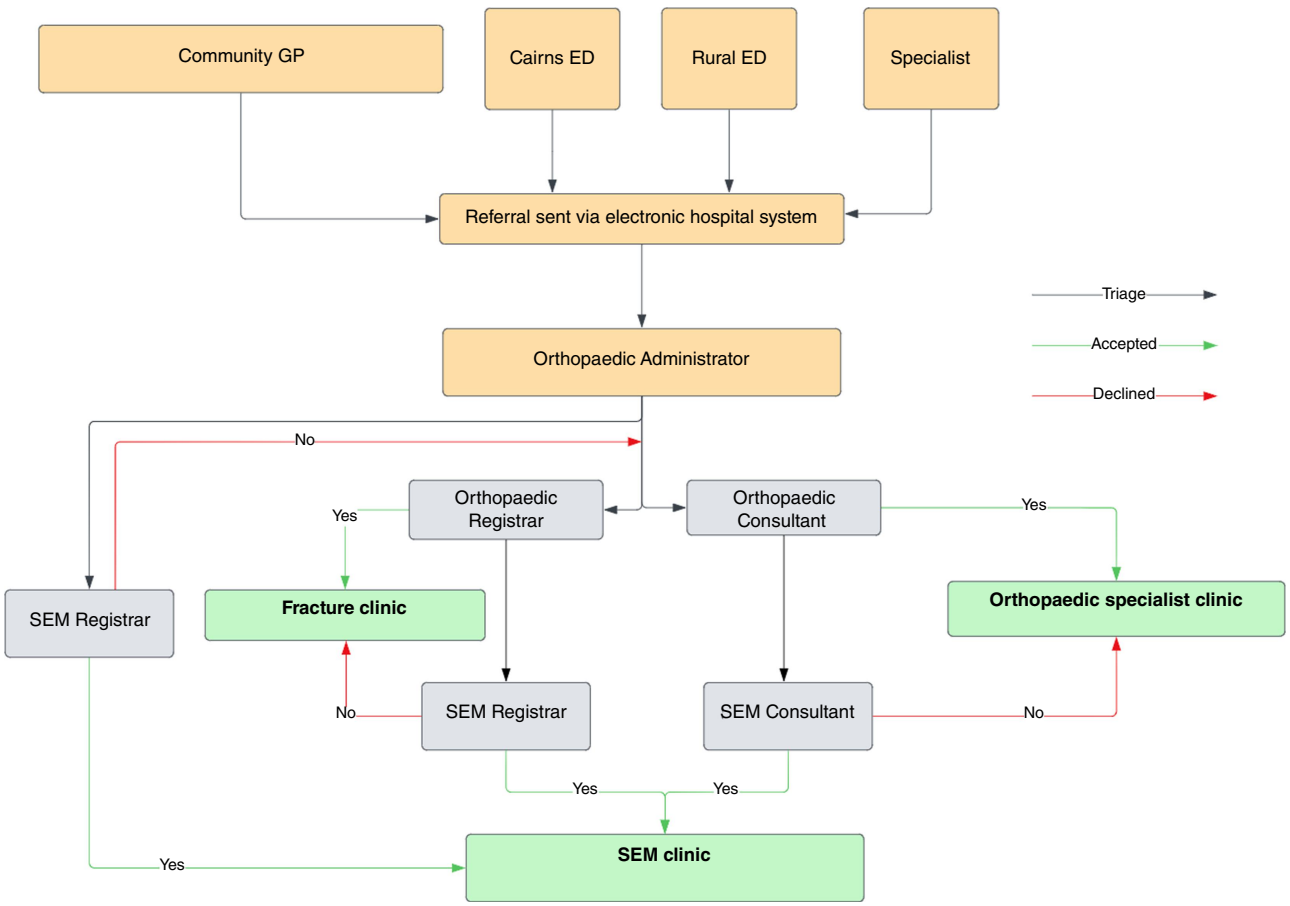


**Fig. A1.** Referral pathway for patients who attended a Sports and Exercise (SEM) Medicine Outpatient Clinic in Far North Queensland, Australia, March 2023–October 2023.

**Table A1.** Region of injury for patients who attended a Sports and Exercise Medicine outpatient clinic in Far North Queensland, Australia, March 2023–October 2023.

| Injury region | *n* | % |
|---|---|---|
| Knee | 149 | 62.1 |
| Shoulder | 48 | 20.0 |
| Foot or ankle | 22 | 9.2 |
| Elbow or arm | 10 | 4.2 |
| Thigh or lower leg | 7 | 2.9 |
| Back (thorax/lumber) | 2 | 0.8 |
| Neck | 1 | 0.4 |
| Groin or hip | 1 | 0.4 |
| Head | 0 | 0.0 |
| Wrist or hand | 0 | 0.0 |
| Pelvis | 0 | 0.0 |
| Total | 240 | 100.0 |