



Advanced musculoskeletal physiotherapists in post arthroplasty review clinics: a state wide implementation program evaluation

Paula Harding^{a,*}, Angela Burge^a, Kerrie Walter^a, Bridget Shaw^b, Carolyn Page^b, Uyen Phan^c, Desiree Terrill^d, Susan Liew^a

^a The Alfred, 55 Commercial Road, Melbourne, 3004 VIC, Australia

^b St Vincent's Hospital, 41 Victoria Parade, Fitzroy, Melbourne, VIC, Australia

^c Royal Melbourne Hospital, 300 Grattan Street, Melbourne, VIC, Australia

^d Department of Health and Human Services, 50 Lonsdale Street, Melbourne, VIC, Australia

Abstract

Objective To evaluate outcomes following a state-wide implementation of post arthroplasty review (PAR) clinics for patients following total hip and knee arthroplasty, led by advanced musculoskeletal physiotherapists in collaboration with orthopaedic specialists.

Design and setting A prospective observational study analysed data collected by 10 implementation sites (five metropolitan and five regional/rural centres) between September 2014 and June 2015.

Main outcome measures The Victorian Innovation and Reform Impact Assessment Framework was used to assess efficiency, effectiveness (access to care, safety and quality, workforce capacity, utilisation of skill sets, patient and workforce satisfaction) and sustainability (stakeholder engagement, succession planning and availability of ongoing funding).

Results 2362 planned occasions of service (OOS) were provided for 2057 patients. Reduced patient wait times from referral to appointment were recorded and no adverse events occurred. Average cost savings across 10 sites was AUD\$38 per OOS (Baseline \$63, PAR clinic \$35), representing a reduced pathway cost of 44%. Average annual predicted total value of increased orthopaedic specialist capacity was \$11,950 per PAR clinic (range \$6149 to \$23,400). The Australian Orthopaedic Association review guidelines were met (8/10 sites, 80%) and patient-reported outcome measures were introduced as routine clinical care. High workforce and patient satisfaction were expressed. Eighteen physiotherapists were trained creating a sustainable workforce. Eight sites secured ongoing funding.

Conclusions The PAR clinics delivered a safe, cost-efficient model of care that improved patient access and quality of care compared to traditional specialist-led workforce models.

Crown Copyright © 2017 Published by Elsevier Ltd on behalf of Chartered Society of Physiotherapy. All rights reserved.

Keywords: Implementation; Advanced musculoskeletal physiotherapy; Ambulatory services; Hip and knee arthroplasty

Introduction

The burden of musculoskeletal conditions such as osteoarthritis affects over 1.7 billion people globally and is expected to rise [1]. A common treatment for end-stage osteoarthritis is arthroplasty surgery [2]. From 2003 to 2014, there has been a 73% increase in primary total hip arthroplasty

* Corresponding author at: The Alfred, P.O. Box 315, Prahran, VIC 3181, Australia. Fax: +61 3 90765430.

E-mail addresses: p.harding@alfred.org.au (P. Harding), a.burge@alfred.org.au (A. Burge), k.walter@alfred.org.au (K. Walter), bridget.shaw@svha.org.au (B. Shaw), carolyn.page@svha.org.au (C. Page), Uyen.Phan@mh.org.au (U. Phan), Desiree.Terrill@dhhs.vic.gov.au (D. Terrill), s.liew@alfred.org.au (S. Liew).

(THA), and 115% increase in primary total knee arthroplasty (TKA) operations performed annually in Australia [3]. Similar increases have been reported in other developed countries around the world [4,5].

This surge in arthroplasty operations has driven greater demand for post operative review appointments with medical specialists, exceeding capacity of outpatient departments of public hospitals. Consequently, patients experience long wait times and inconsistent time points for review appointments that frequently fall short of Australian Orthopaedic Association guidelines [6]. The guidelines recommend patients following arthroplasty have an initial post operative review between two and six months, then subsequent review between one and two years following surgery. Further reviews are recommended for patients as determined by activity levels and implant risk profile. In addition, utilisation of patient-reported outcome measures is recommended by the International Society of Arthroplasty Registries to evaluate surgical outcomes but, to date, has not been standard clinical practice in most Victorian public hospitals [7].

Over the past decade in Australia, experienced advanced musculoskeletal physiotherapists (AMPs) have successfully delivered clinical services for patients with musculoskeletal conditions that include roles traditionally performed by medical specialists [8–14]. These services, including physiotherapy-led orthopaedic and neurosurgery screening clinics, and primary contact physiotherapists in emergency have been demonstrated to be safe, cost-efficient and achieve high patient satisfaction [8–14]. More recently, post operative arthroplasty review (PAR) clinics have been introduced. A PAR clinic conducted by AMPs, review patients following hip or knee arthroplasty surgery, instead of orthopaedic specialists. If the AMP assessment indicates a medical review is necessary, the orthopaedic specialist is consulted and, if required, ongoing patient care is transferred to the specialist. Three large metropolitan tertiary health services (Alfred Health, St Vincent's Health and Melbourne Health) were first in Australia to implement and evaluate PAR clinics, providing preliminary evidence that physiotherapists are a safe and effective alternative to orthopaedic specialists in this role [13,15,16].

In 2013, the Victorian Department of Health and Human Services (DHHS) funded the AMP Implementation Programme (the programme). The three health services with existing PAR clinics were appointed to lead a state-wide implementation of PAR clinics into the orthopaedic outpatient services across a diverse selection of hospitals varying in size and location (regional/rural/metropolitan), between September 2014 and June 2015. The objectives of the programme were to optimise skills of the existing physiotherapy workforce, provide orthopaedic patients with comprehensive high quality review following surgery in a timely manner, and to optimise orthopaedic specialists' time and expertise for new and complex patients.

The aim of this study was to evaluate the collective efficiency, effectiveness and sustainability of PAR clinics as a state-wide initiative.

Method

Context and setting

An 'expression of interest' process was undertaken by DHHS to select implementation sites across Victorian public hospital services. Non-recurrent funding was provided to 10 sites. An external evaluator with expertise in health economic evaluation provided an independent evaluation. This served as the main source of data for this study. This manuscript was prepared to comply with the Standards for Quality Improvement Reporting Excellence guidelines (SQUIRE 2.0) [17].

Study design

This prospective observational study utilised a mixed-methods approach, incorporating quantitative and qualitative data to evaluate the programme. Data was collected between September 2014 and June 2015 (implementation period).

Population

Ten implementation sites across Victoria (five metropolitan and five regional/rural centres). The inclusion criteria to be seen in the PAR clinic were patients who had undergone uncomplicated primary total hip and knee joint arthroplasty (replacement) surgery. The exclusion criteria included patients with the following conditions:

- Revision surgery for joint arthroplasty.
- Intra-operative fracture.
- Wound infections post surgery.
- Complicated post surgical inpatient stay.
- Joint arthroplasty for the management of conditions other than osteoarthritis e.g. tumours, haemophilia.
- Complicated medical comorbidities.
- Patient identified by the orthopaedic consultant at the time of surgery as inappropriate.
- Patient request.

Model of care

The PAR clinics were co-located with orthopaedic clinics; this enabled direct liaison with the orthopaedic specialist on the day if required. Each site appointed one to three AMPs. Recommended selection criteria were:

- Currently enrolled/completed relevant post graduate qualifications Master of Musculoskeletal Physiotherapy or equivalent, such as titled Australian Physiotherapy Association Musculoskeletal Physiotherapist).

- Minimum of 7 years of clinical experience working in the musculoskeletal physiotherapy area of practice.
- Commitment to undertaking the AMP workplace competency based training and assessment programme [18].

The model of care recognised the importance of succession planning from onset of the programme and all sites were encouraged, where possible, to recruit more than one physiotherapist. The introduction of the PAR clinic did not alter the existing model of care for the orthopaedic clinics.

Training and education

Four training days were held throughout the course of the project, providing information on evaluation and clinical training. The AMP Operational Framework [19] and Clinical Education Framework [18] previously used in the successful development, implementation and evaluation of AMP services were introduced at these sessions.

Data collection instruments and procedures

Data collected for evaluation was entered by implementation sites during the programme into a purpose-designed database. Additional data was sourced from final site reports. Data relating to baseline services was also entered into the database and was collected from the sites via a range of methods (where available) including appointment scheduling systems, retrospective audits of sample patient data, estimates of waiting times and time specialists spent with patients provided from consultations with outpatient staff. Consistent baseline data was not available at all sites. Where data was limited, it was extrapolated over the 12-month period.

Outcome measures

The project evaluation utilised the Victorian Innovation and Reform Impact Assessment Framework (VIRIAF) [20].

Efficiency

The cost per occasion of service (OOS) was determined prior to PAR clinic implementation and following service establishment. Patient wait time was valued using the average Australian hourly wage (AUD\$29.71 per hour) [21] and staff costs calculated according to time spent with different types of staff and pay rates (Appendix 1). Cost-efficiency was calculated as the difference between the baseline cost per OOS and the PAR clinic cost per OOS.

To account for the increase in service provision over the implementation period, savings attributable to PAR clinics were forecast for a 12-month period using data collected from the final four-month period (March to June 2015), selected as representative of ongoing clinic activity.

Effectiveness and sustainability

The value of an increase in orthopaedic specialist capacity was measured by the average reduction in amount of specialist time across all planned OOS, using the average wage rate of the specialist (Appendix 2). If the AMP liaised with the orthopaedic specialist on the day regarding an abnormal assessment finding (e.g. wound, excessive pain or X-ray finding), this was considered an ‘unscheduled consultation’. The time spent by the orthopaedic specialist on the day was recorded on the excel database (Appendix 1, Table 2A). If a face-to-face follow-up appointment was required with the orthopaedic specialist, then a ‘scheduled appointment’ was made on a subsequent day.

Ethical approval

This study was approved by The Alfred Human Research and Ethics Committee (project number 420/14).

Results

All 10 implementation sites successfully implemented PAR clinics for the duration of the programme. The key domains according to the VIRIAF were assessed (Table 1). There was some variation between sites for post operative review time points as these were determined by each site’s orthopaedic department. Over a fortnight, up to six PAR clinics operated for 2 to 4 hours across all sites (Table 2). There were a total of 2362 planned OOS and 2057 patients seen across all sites between September 2014 and June 2015, resulting in an average attendance rate of 87% (Table 3).

Efficiency

For eight sites where baseline data was available to enable comparison, the average cost per patient OOS in the PAR clinic was \$35 (range \$-7 to 81) less than baseline services (Fig. 1). The average cost saving extrapolated across all 10 sites was \$38 per OOS (Baseline \$63, PAR clinic \$35), representing a 44% reduced pathway cost (Table 4, Appendix 1 for detailed costings). Over 12 months, up to \$21,000 per service could be saved with implementation of a PAR clinic utilising workforce redesign (Table 4).

Effectiveness

Access to care

An additional 3053 orthopaedic appointments were made available (Table 3). Available data at two implementation sites indicated a 38 to 93% reduction in wait days from referral to appointment for a specialist appointment (Site 2: 332 to 205 days; Site 4: 29 to 2 days). Following implementation, eight services met the Australian Orthopaedic Association

Table 1

Variables for evaluation of the advanced musculoskeletal physiotherapy implementation programme in post arthroplasty review clinics using the Victorian Innovation and Reform Impact Assessment Framework [20].

Indicator	Determinants	Source
VIRIAF Domain 1. Efficiency Change in cost per OOS	Staff types, time per OOS, wage rate ^a	Patient wait time and costs Database
VIRIAF Domain 2. Effectiveness		
2.1 Access to care	Average wait time between referral and scheduled appointment (new or review) for orthopaedic specialists Appointments available according to recommended review time points [6]	Number of days Post operative reviews at 2 to 6 months and 1 to 2 years Database
2.2 Safety & quality	Adverse events Change in proportion of PROM taken at recommended time points [7]	Hospital Riskman reporting systems Database
2.3 Workforce capacity	Value of increased orthopaedic specialist capacity Number of AMPs trained for PAR clinic	Total time spent by specialist per OOS at baseline and by AMP Total number of OOS, wage rate ^b Total number of AMPs who completed competency requirements Final site reports
2.4 Utilisation of skill sets	Number of orthopaedic specialist consultations on the day (unscheduled consult) and subsequent referrals to orthopaedics from AMP (scheduled appointment)	Total number from database Time taken by orthopaedic specialist on the day to consult with AMP
2.5 Patient & workforce satisfaction	Proportion of staff satisfaction Proportion of patient satisfaction	Anonymous online survey ^c Anonymous paper-based survey provided to patients attending PAR clinic ^c Web-based survey collated by external evaluator Paper based survey collated by external evaluator
VIRIAF Domain 3. Sustainability		
3.1 Stakeholder engagement	Support of model by medical staff and other stakeholders	Site interviews Implementation site final reports Site interviews conducted by external evaluator
3.2 Availability of ongoing funding	Continuation of PAR clinic beyond project funding	Follow-up with implementation sites Phone call from DHHS 6 months following project completion

Compared to baseline data where available.

VIRIAF = Victorian Innovation and Reform Impact Assessment Framework, OOS = occasion of service, PAR = post arthroplasty review, PROM = patient reported outcome measures, AMP = advanced musculoskeletal physiotherapist, DHHS = Department of Health and Human Services.

^a Appendix 1.

^b Appendix 2.

^c Appendix 3.

minimum guidelines [6]; these were not met at any service prior to PAR clinic implementation (Table 2).

Safety and quality of care

No adverse clinical events were recorded. Patient-reported outcome measures, including a disease-specific measure and quality-of-life questionnaire, were recorded at recommended time points (average 95% of OOS) (Table 3). A baseline comparison found only one site previously recorded patient-reported outcome measures (43% of OOS).

Workforce capacity

Increased orthopaedic specialists capacity. The capacity of orthopaedic specialists to see new and complex patients was increased by 551 hours. Average orthopaedic specialist time saved was 14 minutes per OOS (range 7 to 28 minutes) (Table 3). The value of this time ranged from \$14 to \$64 per OOS. The annual forecast savings of increased surgeon capacity per PAR clinic was \$11,950 (range \$6149 to \$23,400) (Table 4).

Table 2

Site-specific post arthroplasty review clinic service format and post operative review time points.

Site	Descriptor	AMPs trained per site	Service format			Review time points	
			Clinics per fortnight	Clinic duration (hours)	AMP per clinic	2 to 6 months	1 to 2 years
1	Regional/rural	1	2	3	1	✓	✓
2	Metropolitan	2	2	4	2	✓	✓
3	Regional/rural	3	3	4	1	x ^b	✓
4	Regional/rural	1	2	4	1	✓	✓
5	Regional/rural	2	4	4	1	✓	✓
6	Metropolitan	3	6	4	1	✓	✓
7	Metropolitan	2	2	4	1	✓	x
8	Metropolitan	2	2	4	1	✓	✓
9	Regional/rural	1	2 (4 ^a)	4	1	✓	✓
10	Metropolitan	1	2	2	1	✓	✓

AMP = advanced musculoskeletal physiotherapist.

✓ = met review Australian Orthopaedic Association guidelines, x = did not meet review guidelines [6].

^a Second clinic per week commenced January 2015.^b Patients were seen by an orthopaedic specialist at six weeks following surgery.

Increased physiotherapy workforce. Eighteen physiotherapists were involved in this project and workforce retention for the duration of the project was 100%. Physiotherapists had a mean of 16 years of experience (range 6 to 33 years), 15/18 (83%) had completed relevant post graduate studies and one physiotherapist was enrolled in a higher degree. Two physiotherapists from two regional sites failed to meet the recommended selection criteria set by the lead sites. Twelve of the 18 (67%) physiotherapists had previously worked in other AMP clinics. Of the 10 sites, six sites trained more than one physiotherapist (Table 2), which enabled the PAR clinic to continue during planned staff leave and support succession planning.

Utilisation of skill set

Across eight sites (1598 OOS), there were 234 unscheduled consultations (15%) with orthopaedic specialist on the

day of the PAR clinics, and 122 (6%) referrals for a scheduled orthopaedic review appointment (Table 3). The most common reason for a scheduled referral to orthopaedics were review of another joint (36, 30%), suspected prosthesis loosening (19, 16%) or non-resolving pain (16, 13%).

Patient & workforce satisfaction

Workforce satisfaction. Across all 10 sites, 80 staff (48% response rate) involved in the PAR clinic (orthopaedic specialists and doctors, clinic nurses and administration staff) completed an anonymous online survey (Appendix 4). Results demonstrated the workforce believed the AMP role had or was expected to enhance patient quality of care (66, 83% strongly agree/agree), improved access to care (65, 81% strongly agree/agree) and by having a PAR clinic, specialists

Table 3

Site-specific post arthroplasty review clinic activity for implementation period.

Site	PAR clinics					Orthopaedics		PROM at recommended time points	
	Clinics	Available appointments	Booked appointments	OOS	Attendance	Unscheduled consultation	Scheduled appointment	Disease specific	Quality of life
1	40	346	215	173	80%	41 (24%)	3 (2%)	173 (100%)	173 (100%)
2	44	472	425	396	93%	32 (8%)	34 (9%)	263 (99%)	266 (100%)
3	37	152	115	95	83%	36 (38%)	4 (4%)	92 (97%)	92 (97%)
4	32	258	216	180	83%	27 (15%)	6 (3%)	180 (100%)	180 (100%)
5	67	511	359	344	96%	33 (10%)	13 (4%)	198 (100%)	198 (100%)
6	88	443	346	262	76%	–	14 (5%)	230 (88%)	245 (94%)
7	40	266	221	197	89%	–	19 (10%)	171 (87%)	171 (87%)
8	21	128	114	88	77%	7 (8%)	3 (3%)	78 (89%)	78 (89%)
9	53	313	227	209	92%	33 (16%)	6 (3%)	202 (97%)	195 (93%)
10	29	164	124	113	91%	25 (22%)	20 (18%)	108 (96%)	98 (87%)
Total	451	3053	2362	2057	87%	234 (15%)	122 (6%)	1695 (95%)	1696 (95%)

Data is n or % as indicated.

Implementation period = September 2014 to June 2015.

PAR = post arthroplasty review, OOS = occasion of service (booked appointments minus the 'did not attend' and 'did not wait'), sites 6 and 7 commenced with a model of care requiring the physiotherapist to consult with the orthopaedic specialist for every patient and progressed to the full post arthroplasty review model subsequent to the implementation period and thus excluded from this analysis, PROM = patient reported outcome measures.

Table 4
Site-specific details for forecast cost savings and specialist capacity associated with post arthroplasty review clinic implementation.

Site	March to June 2015			Forecast over 12 months ^a					
	Available appointments	OOS	Clinic capacity	Cost savings			Increase in orthopaedic specialist capacity		
				Annual OOS	Saving per OOS ^b	Total annual savings	Time saved per OOS (mins)	Value of time per OOS	Total annual savings
1	172	144	84%	432	\$18	\$7776	13	\$54	\$23,400
2	231	220	95%	660	−\$7	−\$4620	12	\$24	\$15,921
3	61	43	70%	129	\$69	\$8901	13	\$48	\$6149
4	120	86	72%	258	\$81	\$20,898	28	\$64	\$16,615
5	243	180	74%	540	\$35 ^c	\$18,900	14 ^c	\$28	\$15,120
6	182	141	77%	423	\$31	\$13,113	11	\$28	\$11,881
7	101	91	90%	273	\$31	\$8463	7	\$14	\$3841
8	56	56	100%	168	\$35 ^c	\$5880	14 ^c	\$38	\$6384
9	174	125	72%	375	\$2	\$750	17	\$31	\$11,688
10	67	58	87%	174	\$54	\$9396	13	\$49	\$8498
Total	1407	1144	82%	3432	\$35	\$89,457	14	\$38	\$119,497

Data is n unless indicated, AUD\$.

OOS = occasions of service.

^a Annual OOS = number of OOS in 4 months (March to June) multiplied by 3 to provide estimate of annual OOS for 12 months.

^b Savings per OOS refer to Appendix 1, Table A1.2.

^c Sites 5 and 8 did not provide baseline data so average value from other sites used.

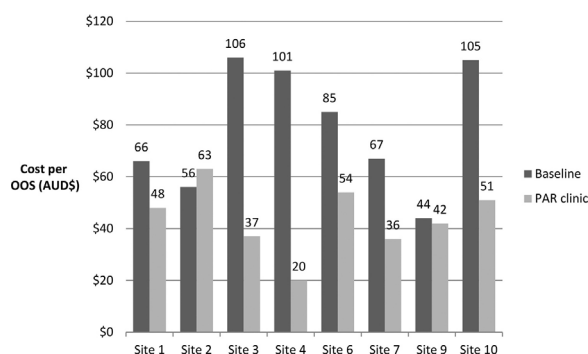


Fig. 1. Site-specific differences in cost per occasion of service for baseline services and post arthroplasty review clinics. Sites 5 and 8 did not provide baseline data.

had been able to see a higher proportion of more complex patients (53, 66% strongly agree/agree).

Patient satisfaction. A paper-based anonymous survey was completed by 444 patients (67% response rate). Patients reported high satisfaction with the experience of being cared for by the AMP⁹ (431, 97% strongly agree/agree), with expectations met (417, 94% strongly agree/agree) and clear explanations provided (426, 96% strongly agree/agree) (Appendix 3).

Sustainability

Stakeholder engagement

There was strong support for the AMP programme; only two PAR models reported challenges gaining stakeholder support. Both of these sites required specialists to consult

informally on every patient, a practice that was discontinued within a year following implementation.

Ongoing funding

Eight sites secured ongoing funding to continue AMP roles in PAR clinics following the programme. Of the two remaining sites unable to continue the PAR clinic beyond the project, one was a regional site that included patient reviews at 8, 10 and 10 year+ post arthroplasty (41/174 patients, 24%) compared to the other nine sites who only reviewed patients up until five years post arthroplasty. This site decided to explore the use of telehealth for conducting reviews by the AMP rather than continue with face-to-face PAR appointments. This site also chose to recruit a physiotherapist who did not meet the recommended selection criteria set by the lead sites, which may have influenced the final decision relating to funding. The orthopaedic department at a second site was in a transitional phase awaiting a new director at the time of evaluation, delaying ongoing funding decisions. The AMPs utilised skills they obtained from the project and completed further training enabling them to be redeployed to other AMP services such as the Orthopaedic OsteoArthritis Hip and Knee Service.

Discussion

This evaluation of AMP roles in PAR clinics in 10 Victorian health services demonstrates a cost-efficient, safe, effective and sustainable model of care.

Access to care was increased, with an additional 3053 appointments available to patients (Table 3). Importantly,

patients were reviewed within the desired post operative review points in accordance with guidelines [6].

This is the first cost-efficiency evaluation undertaken for PAR clinics in Australia. A study from the United Kingdom used a simplistic calculation of cost effectiveness for a PAR clinic and reported cost savings of 7 pence per OOS [22] in contrast to our finding of \$38 per OOS in favour of the PAR clinic (Table 4).

These results are consistent with a study of a physiotherapy-led orthopaedic service operating in seven hospitals across Queensland, Australia [23]. Comans et al. [23] utilised a Markov model to estimate the quality-adjusted life years and healthcare costs for a physiotherapy-led orthopaedic clinic compared to usual orthopaedic care. This detailed economic modelling also found the AMP service to be a cost-effective addition to usual orthopaedic care.

Most sites had less or no administration time allocated to the PAR clinic compared to baseline services. The average administration time for PAR clinics was 3 minutes per OOS (10% of total clinical and administration time) compared to 9 minutes (43%) for baseline services (Appendix 1, Table A2). Utilisation of the usual administrative services in co-located clinics would allow further efficiencies with AMP time and reduce costs.

Quality of care was improved with the introduction of routine assessment of patient-reported outcome measures completed by the majority of patients. This is a key achievement in meeting best practice recommendations of the International Society of Arthroplasty Registries [7] to communicate important information about outcomes that matter to patients and assess the effectiveness of arthroplasty surgery.

Only 6% of patients seen in PAR clinics required a scheduled referral to orthopaedics, which suggests this is a patient population who infrequently requires the input of an orthopaedic specialist and therefore suitable to be managed by an AMP (Table 3). This result is consistent with a previous study that reported 8% of patients seen in an equivalent PAR clinic required re-referral to orthopaedics [22]. With extensive experience in the management of musculoskeletal conditions and additional training, this study supports AMPs as a suitable alternative to an orthopaedic specialist in this context [13].

The AMPs were committed to this new model, as demonstrated by 100% workforce retention for this programme. The professional development received via the training workshops and mentoring provided by the lead sites, and the opportunity to expand their scope of practice may have contributed to the high staff retention rate. These physiotherapists demonstrated they were competent (according to the competency-based training and assessment programme) [18] and safe (no adverse events). A number of sites were able to train more than one physiotherapist, a crucial factor for future succession planning. The competency assessment undertaken by the 18 physiotherapists was consistent and standardised across the 10 Victorian Health

Services thereby building a transferable, portable workforce of trained physiotherapists able to move between organisations.

Creating a flexible and sustainable workforce that optimises the full potential of highly skilled professionals is crucial to improving patient access and advancing quality, safety and innovation, and meeting the increasing challenge of an ageing population. The annual predicted total value of increased orthopaedic specialist capacity ranged from \$6149 to \$23,400 (Appendix 2, Table 4). Increased capacity provides potential to re-direct orthopaedic surgical care to more complex and urgent patient presentations, aligning the distribution and skill set of the healthcare workforce to match the needs of patients. Future research into impact of AMP services on orthopaedic specialist case mix and conversion rates to surgery is recommended.

Gaining the confidence of patients and staff is important with the introduction of new workforce roles. Consistent with previous studies evaluating AMP services, this study indicated high satisfaction in all categories across all workforce groups [12,24,25]. One year post funding, eight sites continue to operate PAR clinics, indicating sustainability of the AMP model.

There are limitations to consider in this study, including site-specific variations. This included differences in hourly wages of staff provided by sites, availability and accuracy of objective baseline data and slight variations in models of care. Data collection relied on AMPs accurately recording time spent with patients in the clinical environment. Baseline data used for comparison was collected by implementation sites retrospectively and averaged according to usual care. The response to the anonymous electronic workforce survey was low (48%) despite email reminders. This may be attributable to the broad distribution to outpatient staff, some of whom may not have actually had a direct role in the clinic and therefore not responded. Whilst engagement of an independent evaluator with expertise in health economic evaluation was a strength of this study, implementation sites were not blinded to the evaluation and were largely responsible for providing the data to the evaluator. This may have introduced bias to the results.

Conclusion

The state-wide implementation of AMP roles and establishment of PAR clinics across Victorian metropolitan, regional and rural centres has improved capacity and efficiency of the health system. PAR clinics increase capacity of orthopaedic specialists to see new and review orthopaedic patient appointments. Safe and high quality care was maintained and the average costs per patient appointment were reduced. With excellent patient satisfaction and state-wide benchmarking of patient outcome measures in place across all 10 health services, our findings provide strong evidence to

support this AMP model as an integral part of the solution to meeting public hospital demand. High workforce retention and continued operation of AMP roles in every health service demonstrates the model has been successful in creating a flexible and sustainable workforce. Optimising the talents of our skilled health professionals will be crucial to improving patient care and advancing safety, quality, and innovation into the future.

Key messages

What this paper adds to current literature?

- In Australia, for over a decade advanced musculoskeletal physiotherapists have been successfully delivering clinical services traditionally performed by medical specialists, but there is minimal literature evaluating the implementation of these services on a broader scale.
- Prior to this project, only three post arthroplasty review clinics had been introduced in Victoria; this paper presents evaluation of the implementation of 10 post arthroplasty review clinics across the state.
- This evaluation demonstrated successful implementation of post arthroplasty review clinics across 10 hospitals using a safe and cost-efficient model of care that improved patient access and quality of care compared to traditional models.

Acknowledgments

The authors would like to acknowledge all 10 sites involved in the project for their hard work in successfully implementing the PAR clinics and for their assistance with providing data for the evaluation.

Ethical approval: This study was approved by The Alfred Health Human Ethics Committee (project number 420/14).

Funding: This work was supported by the Victorian Department of Health and Human Services.

Conflicts of interest: The Victorian Department of Health and Human Services funded ten Victorian health services and three lead sites to participate in the project. The health economic evaluation and health researcher who is a co-author is employed by the Department but was independent of the funder.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.physio.2017.08.005>.

References

- [1] Horton R. GBD 2010: understanding disease, injury, and risk. *Lancet* 2013;380(January (9859)):2053–4.
- [2] Ethgen O, Bruyere O, Richy F, Dardennes C, Reginster JY. Health-related quality of life in total hip and total knee arthroplasty. *J Bone Joint Surg Am* 2004;86(May (5)):963–74.
- [3] Australian Orthopaedic Association. National Joint Replacement Registry: annual report. Adelaide: AOA; 2015. <https://aoanjrr.sahmri.com/annual-reports-2015>. [Accessed June 2016].
- [4] Kremers HM, Larson DR, Crowson CS, Kremers WK, Washington RE, Steiner CA, et al. Prevalence of total hip and knee replacement in the United States. *J Bone Joint Surg Am* 2015;97(September (17)):1386–97.
- [5] Culliford DJ, Maskell J, Beard DJ, Murray DW, Price AJ, Arden NK. Temporal trends in hip and knee replacement in the United Kingdom. *Bone Joint J* 2010;92(January (1)):130–5.
- [6] Arthroplasty Society of Australia. Position statement on the follow-up of hip and knee arthroplasty. Melbourne: AOA; 2008. https://www.aoa.org.au/docs/default-source/subspecialties/arthposfollow_200812.pdf?sfvrsn=2. [Accessed June 2016].
- [7] Rolfson O, Bohm E, Franklin P, Lyman S, Denissen G, Dawson J, et al. Patient-reported outcome measures in arthroplasty registries: report of the Patient-Reported Outcome Measures Working Group of the International Society of Arthroplasty Registries Part II. Recommendations for selection, administration, and analysis. *Acta Orthop* 2016;87(June (Suppl 1)):9–23.
- [8] de Gruchy A, Granger C, Gorelik A. Physical therapists as primary practitioners in the emergency department: six-month prospective practice analysis. *Phys Ther* 2015;95(September (9)):1207.
- [9] Desmeules F, Roy JS, MacDermid JC, Champagne F, Hinse O, Woodhouse LJ. Advanced practice physiotherapy in patients with musculoskeletal disorders: a systematic review. *BMC Musculoskelet Disord* 2012;13(June (1)):107.
- [10] Gill SD, Stella J. Implementation and performance evaluation of an emergency department primary practitioner physiotherapy service for patients with musculoskeletal conditions. *Emerg Med Australas* 2013;25(December (6)):558–64.
- [11] Guengerich M, Brock K, Cotton S, Mancuso S. Emergency department primary contact physiotherapists improve patient flow for musculoskeletal patients. *Int J Ther Rehabil* 2013;20(August (8)).
- [12] Harding P, Prescott J, Block L, O'Flynn AM, Burge AT. Patient experience of expanded-scope-of-practice musculoskeletal physiotherapy in the emergency department: a qualitative study. *Aust Health Rev* 2015;39(July (3)):283–9.
- [13] Large KE, Page CJ, Brock K, Dowsey MM, Choong PF. Physiotherapy-led arthroplasty review clinic: a preliminary outcomes analysis. *Aust Health Rev* 2014;38(November (5)):510–6.
- [14] Sutton M, Govier A, Prince S, Morphet M. Primary-contact physiotherapists manage a minor trauma caseload in the emergency department without misdiagnoses or adverse events: an observational study. *J Physiother* 2015;61(April (2)):77–80.
- [15] Cavka B. Joint replacement surgery reviews conducted by physiotherapists: a safe and effective model, Melbourne Health (report). Melbourne: Department of Health; 2014. <http://docs2.health.vic.gov.au/docs/doc/Joint-replacement-surgery-reviews-conducted-by-physiotherapists:-a-safe-and-effective-model-Melbourne-Health>. Available from the Office of the Director, Policy Coordination and Projects, Strategy and Policy, Department of Health 50 Lonsdale Street, Melbourne, Victoria, 3000.
- [16] Harding P, Sayer J. Implementing an Advanced Musculoskeletal Physiotherapy role in the Post-Operative Orthopaedic Outpatient Review Clinic: Final Report, Prepared for the Victorian Department of Health and Human Service, December 2010. Available from the Physiotherapy Department, The Alfred, 55 Commercial Road, Melbourne 3004.

- [17] Ogrinc G, Davies L, Goodman D, Batalden P, Davidoff F, Stevens D. SQUIRE 2.0 (Standards for QQuality Improvement Reporting Excellence): revised publication guidelines from a detailed consensus process. *J Contin Educ Nurs* 2015;46(October (11)):501–7.
- [18] Harding P, Prescott J, Sayer J, Pearce A. Advanced musculoskeletal physiotherapy clinical education framework supporting an emerging new workforce. *Aust Health Rev* 2015;39(July (3)):271–82.
- [19] Department of Health and Human Services. Advanced musculoskeletal physiotherapy operational framework. Melbourne: DHHS; 2013. <https://www2.health.vic.gov.au/health-workforce/reform-and-innovation/supporting-workforce-reform/health-workforce-reform-implementation-taskforce>. [Accessed June 2016].
- [20] Department of Health and Human Services. Victorian innovation and reform impact assessment framework. Melbourne: DHHS; 2013. <https://www2.health.vic.gov.au/health-workforce/reform-and-innovation/supporting-workforce-reform/health-workforce-reform-implementation-taskforce>. [Accessed June 2016].
- [21] Australia Bureau of Statistics. 6302.0 — Average Weekly Earnings, Australia, Nov 2014. Released at 11:30 AM (CANBERRA TIME) 26/02/2015. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/6302.0Main+Features1Nov%202014>. [Accessed June 2016].
- [22] Walton MJ, Walton JC, Bell M, Scammell BE. The effectiveness of physiotherapist-led arthroplasty follow-up clinics. *Ann R Coll Surg Engl* 2008;90(March (2)):117–9.
- [23] Comans T, Raymer M, O’Leary S, Smith D, Scuffham P. Cost-effectiveness of a physiotherapist-led service for orthopaedic outpatients. *J Health Serv Res Policy* 2014;19(October (4)):216–23.
- [24] Kennedy DM, Robarts S, Woodhouse L. Patients are satisfied with advanced practice physiotherapists in a role traditionally performed by orthopaedic surgeons. *Physiother Can* 2010;62(October (4)):298–305.
- [25] Taylor NF, Norman E, Roddy L, Tang C, Pagram A, Hearn K. Primary contact physiotherapy in emergency departments can reduce length of stay for patients with peripheral musculoskeletal injuries compared with secondary contact physiotherapy: a prospective non-randomised controlled trial. *Physiotherapy* 2011;97(June (2)):107–14.

Available online at www.sciencedirect.com

ScienceDirect