CrossMark

Implementation of Questionnaire-Based Risk Profiling for Clients in a Workers' Compensation Environment: An Example in Australian Physiotherapy Practice

Darren Beales[1] · Luke McManus[2] · Jay-Shian Tan[1,3] · Craig Elliott[4] · Tim Mitchell[1]

Abstract

Purpose This study investigated the implementation of a risk profiling process for physiotherapy clients with a compensable musculoskeletal problem. Implementation targeted personal (clinician) and external (organisational) factors to facilitate behavioural change with regard to the use of formal, questionnaire-based risk profiling. *Methods* A theoretical construct was developed for formal questionnaire-based screening to be implemented across 12 private, metropolitan physiotherapy clinics. To target personal (clinician) factors, a multimodal educational procedure was developed focused on use of the ten-item Orebro Musculoskeletal Pain Screening Questionnaire (OMPSQ-10). To target external (organisational) factors, an administrative process was enacted to ensure routine completion of the OMPSQ-10 by compensable clients. Global practice behaviour with regard to the use of formal risk profiling was complete pre- and post-implementation. *Results* Pre-implementation physiotherapists understood the potential usefulness of formal risk profiling, but the large majority did not routinely have clients complete these types of questionnaires. Post-implementation there was a significant positive shift in behaviour to more frequent use the OMPSQ-10 for new compensable clients. *Conclusions* The results provide initial support for the use of a framework to develop an implementation strategy to increase physiotherapist adherence to the use of guideline recommended risk profiling questionnaires in clinical practice.

Keywords Screening questionnaires · Physiotherapy · Musculoskeletal pain

Introduction

In Australia, return to work rates at 7–9 months following a compensable work injury, for those having at least 10 days off work, have hovered between 83 and 87% over the last two decades [1]. This suggests a good outcome for most. However, those that do not return to the work place within this time frame represent a significant proportion of the burden

✉ Darren Beales
  D.Beales@curtin.edu.au

1 School of Physiotherapy and Exercise Science, Curtin University, GPO Box U1987, Perth, WA 6845, Australia

2 Life Ready Physio and Pilates South Perth, 240 Canning Highway, South Perth, WA 6152, Australia

3 Flex Physiotherapy, 100 Murdoch Drive, Murdoch, WA 6150, Australia

4 LifeCare, 202 Cambridge Street, Wembley, WA 6014, Australia

on compensation systems. Musculoskeletal injuries and disorders account for 90% of serious compensation claims in Australia (claims resulting in total absence from work for at least one working week) [2]. The cost of these claims has been escalating over time [2], which is a global phenomenon [3]. Thus, models of care for musculoskeletal compensation claims espouse early identification of claimants at higher risk of longer term work absenteeism, as this practice can inform management to reduce long term absenteeism [4].

Questionnaire based tools have been developed to assist in the identification of people with musculoskeletal injuries and disorders who have higher risk of poorer return to work outcomes. Potential advantages of this approach include reduced medicalisation of people with low risk problems, shift of resources to those more in need of care, increase emphasis on the biopsychosocial management of musculoskeletal disorders, assist clinicians with less experience in their understanding of overall client presentation, and facilitate multidisciplinary communication and team care [5, 6]. There is emerging evidence that this can

lead to better outcomes for the injured person as well as reduce primary (medical costs and lost wages) and secondary (lost productivity) expenses associated with compensation claims [7–9]. Disadvantages may be mis-classification for some individuals [10], and risk stratification alone does not necessarily provide insight into individually relevant factors [6].

Anecdotally, the use of such screening tools in clinical practice is limited. As an example, in a survey of 173 stakeholders in the management of injured workers in Western Australia, only 39% reported regular use of formal risk assessment/screening questionnaires [11]. Other specific investigations of the uptake of screening questionnaires in the management of compensable, work-related musculoskeletal pain appears to be lacking in the literature. However, indication of this practice being limited aligns to broader indications of the inconsistencies and difficulties in implementing evidence informed, guideline-based models of care into clinical practice [12].

Reasons for suboptimal use of evidence informed models of care and clinical guidelines to assist with the management of work-related musculoskeletal disorders are complex and multifactorial [13]. Broadly speaking, the barriers might include personal (for example beliefs and attitudes [14]), guideline-related (for example poor guideline quality [15]) and external factors (for example organisation culture [16]) [17, 18]. Given the multifactorial nature of these barriers, implementation strategies to facilitate behavioural change in clinicians might be more successful if they are multifaceted in nature. Fischer et al. [17] have postulated a 'Knowledge-Attitude-Behaviour Framework' for this purpose. This model espouses the need to improve knowledge and attitudes, with implementation strategies developed for specific settings and target groups. A structured approach to model of care/guideline implementation is required that includes identification of the target for behavioural change, a conceptual analysis of barriers and enablers, consideration of modes of delivery, and assessment of change post-implementation [19].

The purpose of this study was to investigate the implementation of a risk profiling process for clients with a compensable musculoskeletal problem, presenting for physiotherapy management. The aims of the study were threefold; (i) to explore use of questionnaire-based screening for formal risk profiling of compensation clients in private physiotherapy clinics, (ii) implement change by targeting personal (clinician) and external (organisational) factors, and (iii) assess potential behavioural change across physiotherapy clinics with regard to the use of these questionnaires. A successful outcome from this process would provide a practical guide for physiotherapy (or other) clinics engaged in the compensation arena to align their processes to evidence informed models of care for risk profiling injured workers.

Methods

Study Design

A pragmatic, observational design was used for this study, with observations made pre- and post-implementation of a model to facilitate use of risk profiling questionnaires in clinical practice. Ethical approval for the study was provided by the Curtin University Human Research Ethics Committee.

Setting

The study involved 12 private physiotherapy clinics in the metropolitan area of Perth, Western Australia. None of these clinics had a formal procedure for the use of screening questionnaires.

Procedure

An overview of the procedure is provided in Fig. 1. A theoretic construct (implementation map) was developed, aligned to the principles outlined by French et al. [19].

Target for Behavioural Change

The gap in evidence-informed practice related to the lack of formal risk profiling of compensable clients in physiotherapy clinics. A clinic wide strategy was required, transferrable across clinic settings, to facilitate use of formal risk profiling by physiotherapists for new compensable clients.

Barriers and Enablers

Literature review provided little insight into the adoption of formal risk profiling in clinical management of compensable clients, other than the industry report previously prepared by the authors indicating low uptake [11]. General barriers to poor implementation/uptake of guideline informed practice were reviewed. Based on this literature [19], and the experience and knowledge of the implementation team, key barriers to the use of screening questionnaires were identified as: lack of time as perceived by the clinicians; lack of clinician knowledge on the utility of screening questionnaires; and lack of clinician knowledge on how to use screening questionnaires to inform clinical decision making.

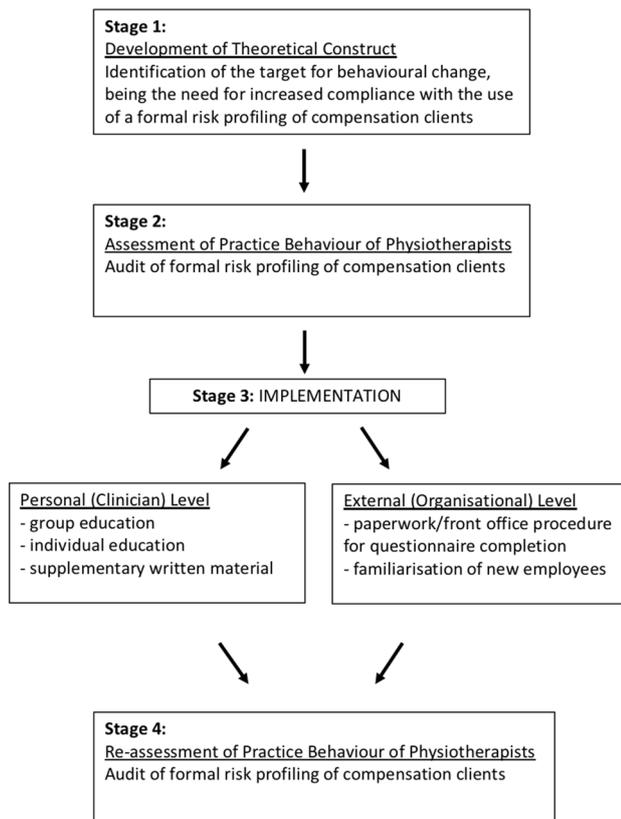To enable increased compliance to the use of a formal screening procedure, it was determined strategies

Fig. 1 Procedural flow for implementing a risk profiling process for clients with a compensable, musculoskeletal problem presenting for physiotherapy

simultaneously targeting personal (clinician) and external (organisational) factors were required.

Consideration of Modes of Delivery

At the personal (clinician) level, a multimodal educational procedure was developed, with a recent systematic review supporting the efficacy of this approach to knowledge translation [20]. This included a group-based teaching and learning session of 90 min duration and one-to-one education for those who missed the group session or wanted more input. This training was supplemented with a written resource. The education was provided by two of the researchers (LM, DB). Education focused on the evidence for formal risk profiling to predict poorer return to work outcomes in compensable clients [21–23]. The 10-item Orebro Musculoskeletal Pain Screening Questionnaire (OMPSQ-10) [24] was adopted as the screening questionnaire for implementation into the physiotherapy clinics. There is emerging evidence that screening with the OMPSQ-10 can improve outcomes for people with musculoskeletal disorders [4, 9]. Advantages include its brevity and not being body region specific [5], and therefore it is suitable for application in clinical

groups such as compensation clients where there would be a mixture of body area injuries. Education included: familiarisation with the OMPSQ-10 including scoring for risk categorisation; potential for mis-categorisation including the temporality of questionnaire results [10]; interpretation at total score and individual question levels; and an overall emphasis on using the questionnaire to assist with clinical reasoning to establish management pathways [5, 25], rather than the questionnaire result being the sole indicator of the individual client's management pathway. Further, physiotherapists were encouraged to use the OMPSQ-10 as a reassessment tool. While there has not been validation of the use of the OMPSQ-10 in this manner in terms of understanding what might be clinically meaningful changes, reassessment would at least provide some formal review of client status.

At the organisational level, clinic managers at each of the 12 physiotherapy clinics were responsible for oversight of the implementation program. The OMPSQ-10 was added to the patient information form for new clients with a compensable claim, and completed at the initial appointment, prior to being seen by a physiotherapist. It was not added to the paper-work of private (non-compensable) clients. Once completed, the unscored OMPSQ-10 was provided to the physiotherapist at the start of the consultation. The clinic managers were also responsible for orientation of any new physiotherapists employed at their sites to the process for utilisation of the OMPSQ-10 and associated educational material.

Assessment of Physiotherapists and Targeted Behaviour

In the 14 days prior to the formal risk profiling process implementation, physiotherapy clinic staff responded to an online questionnaire. Firstly, the profile of the physiotherapy clinics was established based on staff age, sex, years of experience, the number of physiotherapists with formal post-graduate training, beliefs using the Back Beliefs Questionnaire [26] and estimated compensable client caseloads. Then the physiotherapists were asked "Do you think screening tools are important in physiotherapy?" (scored on an 11-point scale, 0 = Not Important At All, 10 = Critically Important). To establish practice behaviour with regard to the use of formal risk profiling questionnaires, physiotherapists were asked "Do you use a questionnaire based screening tool(s) (eg. Orebro Questionnaire, STarT Back) routinely as part of your assessment of (a) Compensable Patients, and (b) Private Patients" (with responses of Never, Seldom, Sometimes, Frequently or Always). To establish how physiotherapists might use the information garnered from risk profiling questionnaires, they were asked how important or useful screening tools were for: formulating a diagnosis; establishing contributing factors to a disorder; formulating a prognosis; guiding treatment and management strategies; indicating when referral to other

practitioners is required; helping with patient education; and assisting communication with other stakeholders (scored on an 11-point scale, 0=Not Useful At All, 10=Critical).

A tally of the new compensable (workers compensation and motor vehicle accident) clients attending the participating physiotherapy clinics was kept during the 3 months after implementation of the formal risk profiling process. At the 3-month post-implementation point, the same initial questionnaire was again completed by the physiotherapy staff across the 12 clinics. In addition, they were asked if they completed the pre-implementation questionnaire, as an estimate of staff changes across the implementation period.

Analysis

Analysis was performed with the use of STATA v15.1 statistics package (StataCorp, USA) and R-Studio Version 1.1.456 (RStudio, Inc, USA). Descriptive statistics were calculated for pre- and post-implementation profiling data, compared with two sample t-tests for continuous data and Pearson's Chi square for categorical data. Pre- and post-data for responses to questions relating to perceived importance of screening questionnaires and level of use of these questionnaires were ordinal, but unpaired. The data had to be considered dependent, as some participants were involved in both pre- and post-surveys. Given these data characteristics, a robust measure of location was performed using the principle of 'all possible comparisons' [27, 28]. This was performed with R-Studio supplemented with the 'WRS' library (https://dornsife.usc.edu/labs/rwilcox/software/) and the 'orddom' library (https://cran.r-project.org/web/packages/orddom/orddom.pdf). The 'loc2dif' command was used to compute the difference for all possible comparisons between pre- and post-responses for each question. This provides information about the typical difference between any pre- and post-responses (given matching wasn't possible). The output provides the median of the differences between all the possible comparisons of pre-and post-responses. The 'wmwpb' command was then used to provide a 95% confidence interval (95% CI) and significance value for the median estimate. This command was used as the pre- and post-sample sizes were unequal. The 'probability of superiority' (PS) was then used an estimate of the effect size (via the 'dmes' command), as a probability that any given participants response would have changed from pre- to post-intervention. Alpha value of 0.05 was used to determine statistical significance.

Results

Table 1 profiles 12 physiotherapy clinics by reporting the makeup of the staff at the two time points pre- and post-implementation of the formal risk profiling process.

Table 1 Profile of the physiotherapy staff working at the participating 12 physiotherapy clinics pre- and post-implementation of a model to facilitate use of risk profiling questionnaires in clinical practice

	Pre-implementation (n=63)	Post-implementation (n=44)	p values
Age (years)	32.2 (10.9)	30.9 (10.4)	0.519
Sex (male)	28 (44%)	24 (55%)	0.304
Experience (years)	8.3 (9.9)	6.8 (9.8)	0.434
Post-graduate training	21 (33%)	8 (18%)	0.083
Back Beliefs Questionnaire	39.5 (4.1)	39.7 (4.57)	0.808
Percentage of caseload as compensable (%)			
0	11 (17%)	5 (11%)	0.539
25	42 (67%)	30 (68%)	
50	10 (16%)	8 (18%)	
75	0 (0%)	1 (2%)	

Reported as mean (standard deviation) or number (percentage)

Pre-implementation, two of the 65 physiotherapists surveyed were missing responses for the Back Beliefs Questionnaire and therefore excluded from the analysis. Post-implementation, three of the 48 physiotherapists surveyed were missing the Back Beliefs Questionnaire and another was missing general responses, and these four subjects were also excluded from the analysis. Of the remaining 44 physiotherapists who provided post-implementation data, 37 had provided pre-implementation data. There were no statistical differences for the demographics between these two time points, though there was a lower percentage of physiotherapists with post-graduate training at follow-up. Thus, analysis was performed comparing the 65 physiotherapist who provided pre-implementation data with the all 44 who provided post-implementation data.

Three hundred and fifty-eight new compensable clients attended the 12 physiotherapy clinics during the 3 months period between data collection points.

The majority of physiotherapists perceived value in the use of risk profiling questionnaires in clinical practice, and this remained the case at the three month post-implementation follow-up (Fig. 2; Table 2, median pre/post difference of all possible comparisons=0, 95% CI − 1 to 0, p=0.526, PS=49%). Pre-implementation, the use of risk profiling questionnaires was fairly low for both compensable and non-compensable (private) clients (Fig. 3). There was a significant positive shift in behaviour across clinics to more frequent use of questionnaires post-implementation for new compensable clients (Fig. 3a; Table 2, median pre/post difference of all possible comparisons = − 1, 95% CI − 2 to − 1, p=0.006, PS=69%). The negative values for the median and confidence interval equates to an increase in self-reported use of screening for compensable clients,
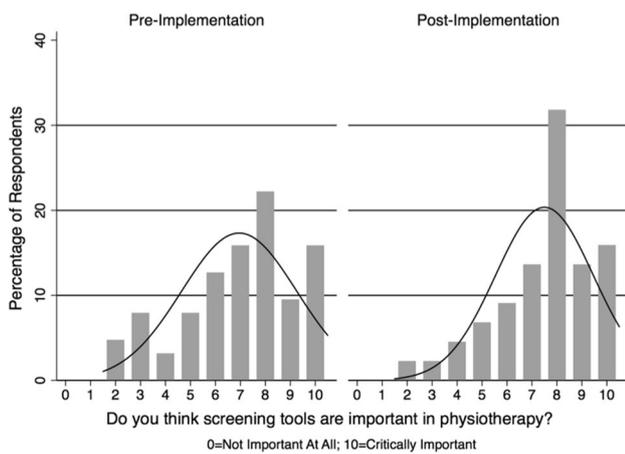
Fig. 2 Most physiotherapists attributed a moderate to high level of importance to the use of risk profiling questionnaires in clinical practice pre- and post-implementation of the model of care for formal risk profiling

with a 69% likelihood that post-implementation score would exceed that of the pre-implementation. For private clients, there was a reduction in the number of physiotherapists reporting they never used screening tools (Fig. 3b), but this was not statistically significant (Table 2, median pre/post difference of all possible comparisons = 0, 95% CI − 1 to 0, p = 0.674, PS = 47%).

In terms of how the physiotherapists thought risk profiling questionnaires could be used, there were no changes from pre- to post-implementation (Table 2).

Discussion

Statement of the Main Findings

Use of risk profiling questionnaires in physiotherapy clinics for compensable clients with musculoskeletal pain at baseline was low. Implementation of a strategy aimed at addressing potentially modifiable personal (clinician) and external (organisational) factors had a positive effect on the engagement of physiotherapists in using risk profiling questionnaires across multiple clinics. This occurred in a 'real world' environment where there is an ongoing push for evidence informed clinical service delivery [4]. This would seem to be an important first step in capitalizing on the broader benefits that risk profiling might afford in clinical environments. Further work is needed to understand how the use of risk profiling tools then influences clinical decision making.

Strengths and Limitations

Strengths of this study include aligning the implementation strategy to a theoretic framework [19] in a 'real-world' clinical environment across multiple sites. There are inherent limitations in a study design with only two data collection time-points and no control sites, though an exploratory trial of this type is a necessary step towards more stringently designed trials and long-term implementation [29]. Reduction in the number of physiotherapists providing data post-implementation is also a potential limitation. The overall profile of the physiotherapy clinics did not change though,

Table 2 Physiotherapists indications of how they thought formal risk profiling questionnaires could be utilized in clinical practice and self-reported use pre- and post-implementation of a model of care to facilitate the use of these questionnaires

	Pre-implementation (n = 63)	Post-implementation (n = 44)	Median pre/post difference of all possible comparisons (95% CI)	p	Probability of superiority (%)
Screening tools are important	7 (6,9)	8 (6.5,9)	0 (− 1, 0)	0.526	49
Self-reported use of risk profiling questionnaires					
Compensable clients	2 (1,3)	4 (3,5)	− 1 (− 2, − 1)	0.006	69
Private clients	2 (1,2)	2(2,3)	0 (− 1, 0)	0.674	47
Risk profiling questionnaire are important or useful for…					
Formulating a diagnosis	4 (2, 6)	5 (3, 6)	0 (− 1, 0)	0.586	49
Establishing contributing factors to a disorder	8 (7, 8)	8 (7,9)	0 (− 1, 0)	0.588	48
Formulating a prognosis	8 (7, 8)	7.5 (7, 8.5)	0 (− 1, 0)	0.982	41
Guiding treatment and management strategies	8 (6, 8)	7 (7, 8.5)	0 (− 1, 1)	0.988	41
Indicating when referral to other practitioners is required	8 (7, 9)	8 (7, 9)	0 (− 1, 0)	0.848	45
Help with patient education	7 (6, 8)	8 (7, 9)	0 (− 1, 0)	0.72	47
Communication with third parties	8 (7, 9)	8 (7, 9)	0 (− 1, 0)	0.802	46

Reported as median (25th percentile, 75th percentile), higher values equate to more positive responses

CI confidence interval
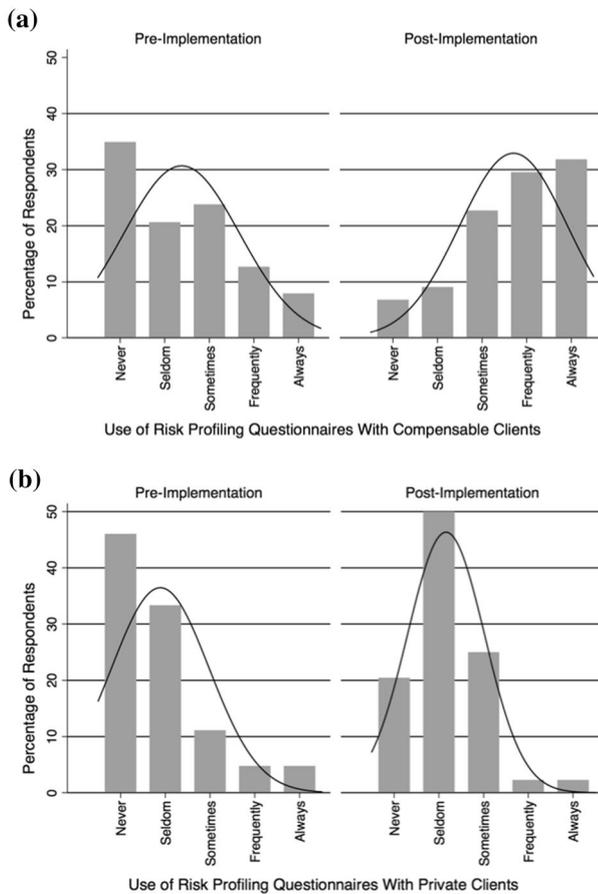
(a)

(b)

Fig. 3 Physiotherapist self-reported use of risk profiling questionnaires in clinical practice pre- and post-implementation of the process for formal risk profiling compensable clients

other than a reduction in participants with post-graduate training post-implementation. The Back Beliefs Questionnaire scores where relatively positive, consistent with other cohorts of physiotherapist in Australia [30] and internationally [31]. Any new staff employed during the study were given individual education by the practice managers using the same template as the initial education session, but delivery of this could have differed. Unfortunately, we do not know the exact number of new staff employed over the data collection period.

Comparisons with the Literature

Use of risk profiling questionnaires pre-implementation by physiotherapists was poor, despite recognition of their potential value (Fig. 2) across multiple areas of practice (Table 2). This aligns specifically to the findings of a survey of key participants in the management of workers compensation in Australia [11] and more broadly reflects the poor uptake of clinical guidelines [12, 32].

We could not identify other single modality or multi-modal implementation models specifically designed for increasing the use of risk profiling questionnaires in clinical practice, though successful implementation of screening in other settings has been described [33–35]. One element of the implementation strategy was provision of written material to clinicians, which has been identified as useful in facilitating behavioural change of clinicians towards guideline recommended care for conditions including low back pain [36]. In general though, superiority of utilising individual implementation strategies versus strategies encompassing a multimodal approach, is unclear [37]. It is likely that optimum strategies are site and context specific. Therefore, it is advised that implementation projects follow a theoretic construct in their design [18, 37, 38]. The Theoretical Domains Framework [19] provided a good foundation for designing the implementation protocol of this study. Further to this, the implementation was backed by a desire for cultural evolution across the physiotherapy practice organisation, which is likely to be a key ingredient to any successful implementation program [39].

Positive behavioural shift in physiotherapists practice was demonstrated by increased frequency of use of the OMPSQ-10 with compensable clients. A shift was observed in the utilisation of the OMPSQ-10 in private patient group post-implementation, but this shift did not reach statistical significance (Table 2). Given that the risk profiling questionnaire was not systematically provided to the private clients, even this slight shift could represent a true behavioural change and might reflect increased perceived value by physiotherapists of risk profiling.

Implications of the Study

This study provides a potential blueprint of an implementation strategy for increased use of risk profiling questionnaires in clinical practices. It can be applicable for multi-site practices without significant cost, impost on administration or the need for significant infrastructure changes. The results suggest the process had good acceptance by physiotherapists. Pre-implementation physiotherapist thought screening tools were important, indicated they could be valuable across multiple aspects of practice (Table 2), but were still not routinely using them. This highlights the importance of an implementation strategy to create behavioural change rather than just educating people on the use of something expecting change to automatically follow.

Unanswered Questions and Future Directions

While self-reported use of formal risk screening improved, the exact penetration of this practice (by both physiotherapist and the clients) was unknown. From Fig. 3a it can be

surmised that there was not universal use of the OMPSQ-10 by all physiotherapists. Further information could be obtained from qualitative investigation targeting those who changed their clinical behaviour and those who did not. It is not known if the changes observed over the period of this study were sustained in the long term. Further, while there were indications of behavioural change, it is unknown what effect this might have had on patient management and outcomes. Despite clinical guidelines recommending the use of risk profiling questionnaires, mismatches of OMPSQ results with clinician opinions [5] and recommendations [40] have been observed, suggesting further investigation of their actual use in practice would be beneficial.

Conclusion

This study provides some initial support for the use of a framework to develop an implementation strategy to increase physiotherapist adherence to the use of guideline recommended risk profiling questionnaires in clinical practice, across multiple physiotherapy clinics. This aligns with calls for increased utilisation of contemporary models of care in the management of compensable clients with musculoskeletal pain [4]. Positive physiotherapist behaviour change occurred with an implementation strategy that minimised personal (clinician) and external (organisational) burden.

Compliance with Ethical Standards

Conflict of interest At the time this implementation project took place, Darren Beales, Luke McManus and Craig Elliott were contacted physiotherapists for LifeCare Physiotherapy. LifeCare clinics were used as the implementation sites for this study. LifeCare had no input into the preparation of this manuscript. Jay-Shian Tan and Tim Mitchell had no potential conflicts of interest to declare.

References

1. The Social Research Centre. Return to work survey: 2013/14 summary research report (Australia and New Zealand). Canberra: Safe Work Australia; 2014.
2. Safe Work Australia. Australian workers' compensation statistics, 2013–14. Canberra: Safe Work Australia; 2016.
3. Punnett L, Wegman DH. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. J Electromyogr Kinesiol. 2004;14(1):13–23.
4. Beales D, Fried K, Nicholas M, Blyth F, Finniss D, Moseley GL. Management of musculoskeletal pain in a compensable environment: implementation of helpful and unhelpful models of care in supporting recovery and return to work. Best Pract Res Clin Rheumatol. 2016;30(3):445–467.
5. Beales D, Kendell M, Chang RP, Hamso M, Gregory L, Richardson K, et al. Association between the 10 item Orebro Musculoskeletal Pain Screening Questionnaire and physiotherapists' perception of the contribution of biopsychosocial factors in patients with musculoskeletal pain. Man Ther. 2016;23:48–55.
6. Linton SJ, Nicholas M, Shaw W. Why wait to address high-risk cases of acute low back pain? A comparison of stepped, stratified, and matched care. Pain. 2018;159(12):2437–2441.
7. Hill JC, Whitehurst DG, Lewis M, Bryan S, Dunn KM, Foster NE, et al. Comparison of stratified primary care management for low back pain with current best practice (STarT Back): a randomised controlled trial. Lancet. 2011;378(9802):1560–1571.
8. Foster NE, Mullis R, Hill JC, Lewis M, Whitehurst DG, Doyle C, et al. Effect of stratified care for low back pain in family practice (IMPaCT Back): a prospective population-based sequential comparison. Ann Fam Med. 2014;12(2):102–111.
9. Linton SJ, Boersma K, Traczyk M, Shaw W, Nicholas M. Early workplace communication and problem solving to prevent back disability: results of a randomized controlled trial among high-risk workers and their supervisors. J Occup Rehabil. 2016;26(2):150–159.
10. Newell D, Field J, Pollard D. Using the STarT Back Tool: does timing of stratification matter? Man Ther. 2015;20(4):533–539.
11. Mitchell T, Fretwell L, Hay J, Beales D. Knowledge and use of the 'Clinical Framework For the Delivery of Health Services' in Western Australia: summary report of a survey of workers' compensation stakeholders. Perth: Curtin University; 2015.
12. Vander Schaaf EB, Seashore CJ, Randolph GD. Translating clinical guidelines into practice: challenges and opportunities in a dynamic health care environment. N C Med J. 2015;76(4):230–234.
13. Loisel P, Buchbinder R, Hazard R, Keller R, Scheel I, van Tulder M, et al. Prevention of work disability due to musculoskeletal disorders: the challenge of implementing evidence. J Occup Rehabil. 2005;15(4):507–524.
14. Gardner T, Refshauge K, Smith L, McAuley J, Hubscher M, Goodall S. Physiotherapists' beliefs and attitudes influence clinical practice in chronic low back pain: a systematic review of quantitative and qualitative studies. J Physiother. 2017;63(3):132–143.
15. Lin I, Wiles LK, Waller R, Goucke R, Nagree Y, Gibberd M, et al. Poor overall quality of clinical practice guidelines for musculoskeletal pain: a systematic review. Br J Sports Med. 2018;52(5):337–343.
16. Carney M. Influence of organizational culture on quality healthcare delivery. Int J Health Care Qual Assur. 2011;24(7):523–539.
17. Fischer F, Lange K, Klose K, Greiner W, Kraemer A. Barriers and strategies in guideline implementation-A scoping review. Healthcare 2016;4(3). https://doi.org/10.3390/healthcare4030036.
18. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. Lancet. 2003;362(9391):1225–1230.
19. French SD, Green SE, O'Connor DA, McKenzie JE, Francis JJ, Michie S, et al. Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework. Implement Sci. 2012;7(1):1–8.
20. Al Zoubi FM, Menon A, Mayo NE, Bussieres AE. The effectiveness of interventions designed to increase the uptake of clinical practice guidelines and best practices among musculoskeletal professionals: a systematic review. BMC Health Serv Res. 2018;18(1):435.
21. Karran EL, McAuley JH, Traeger AC, Hillier SL, Grabherr L, Russek LN, et al. Can screening instruments accurately determine poor outcome risk in adults with recent onset low back pain? A systematic review and meta-analysis. BMC Med. 2017;15(1):13.

22. Linton SJ, Gross D, Schultz IZ, Main C, Cote P, Pransky G, et al. Prognosis and the identification of workers risking disability: research issues and directions for future research. J Occup Rehabil. 2005;15(4):459–474.

23. Bergbom S, Boersma K, Linton SJ. When matching fails: understanding the process of matching pain-disability treatment to risk profile. J Occup Rehabil. 2014;25(3):518–556.

24. Linton SJ, Nicholas M, MacDonald S. Development of a short form of the Orebro Musculoskeletal Pain Screening Questionnaire. Spine. 2011;36(22):1891–1895.

25. Mitchell T, Beales D, Slater H, O'Sullivan P. Musculoskeletal clinical translation framework: from knowing to doing (e-book). Perth: Curtin University; 2017.

26. Main CJ, Waddell G. Beliefs about back pain. In: Waddell G, editor. The back pain revolution. 2nd ed. Edinburgh: Churchill Livingstone; 2004. pp. 221–239.

27. Wilcox R. Introduction to robust estimation and hypothesis testing. 3rd ed. Boston: Academic Press; 2012.

28. Wilcox R. Modern statistics for the social and behavioral sciences: a practical introduction. 2nd ed. Boca Raton: CRC Press—Taylor and Francis Group; 2012.

29. Grimshaw J, Eccles M, Tetroe J. Implementing clinical guidelines: current evidence and future implications. J Contin Educ Health Prof. 2004;24(S1):S31–S37.

30. Beales D, O'Sullivan P. Beliefs of Australian physical therapists related to lumbopelvic pain following a biopsychosocial workshop. J Phys Ther Ed. 2014;28(3):128–133.

31. O'Sullivan KJ, O'Sullivan PB, O'Sullivan L, Dankaerts W. Back pain beliefs in health care professionals are more positive after brief biopsychosocially orientated workshops. Physiother Pract Res. 2012;34:37–45.

32. Corson K, Doak MN, Denneson L, Crutchfield M, Soleck G, Dickinson KC, et al. Primary care clinician adherence to guidelines for the management of chronic musculoskeletal pain: results from the study of the effectiveness of a collaborative approach to pain. Pain Med. 2011;12(10):1490–1501.

33. Lambert AA, Drummond MB, Kisalu A, Moxley J, Keruly J, Moore RD, et al. Implementation of a COPD Screening Questionnaire in an outpatient HIV clinic. COPD. 2016;13(6):767–772.

34. Marben K, Marben C. Implementation of depression screening using the patient health questionnaire to identify at risk individuals, refer for depression management plan, and monitor effectiveness. Dev Med Child Neurol. 2015;57(S5):16–17.

35. Langstroth C, Wright C, Parkington T. Implementation and evaluation of a nutritional screening tool. Br J Midwifery. 2011;19(1):15–21.

36. Evans DW, Breen AC, Pincus T, Sim J, Underwood M, Vogel S, et al. The effectiveness of a posted information package on the beliefs and behavior of musculoskeletal practitioners: the UK Chiropractors, Osteopaths, and Musculoskeletal Physiotherapists Low Back Pain ManagemENT (COMPLeMENT) randomized trial. Spine. 2010;35(8):858–866.

37. Grimshaw JM, Thomas RE, MacLennan G, Fraser C, Ramsay CR, Vale L, et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. Health Technol Assess. 2004;8(6):iii–iv (**1–72**).

38. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implement Sci. 2009;4(1):50.

39. Davies HT, Nutley SM, Mannion R. Organisational culture and quality of health care. Qual Health Care. 2000;9(2):111–119.

40. Aravena HI. Utility of the Orebro musculoskeletal pain questionnaire as a screening and clinical decision support tool in workers' compensation claimants. Alberta: University of Alberta; 2014.