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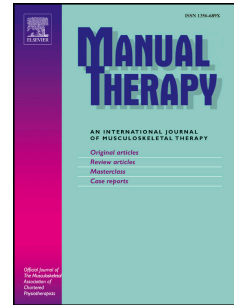
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# Accepted Manuscript

Providing services for acute low-back pain: a survey of Australian physiotherapists

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**Title:** Providing services for acute low-back pain: a survey of Australian physiotherapists

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**ABSTRACT**

**Objective:** To determine whether physiotherapists avoid lumbar x-rays for acute non-specific low back pain and advise people to stay active.

**Methods:** We conducted a cross sectional survey of Australian physiotherapists. 880 physiotherapists were randomly sampled from Victoria (495), South Australia (158), and Western Australia (227). Physiotherapists were asked which investigations they would order and interventions they would provide for five acute LBP presentations described in vignettes. Four of the five vignettes represented people who would not require a plain lumbar X-ray and would benefit from advice to stay active; one described a patient with a suspected vertebral fracture and would require a plain X-ray. Participants selected from a list of response options or provided free text responses

**Results:** Questionnaires were completed by 203 of 567 potentially eligible physiotherapists (response rate 36%). Across the four vignettes where an X-ray was not indicated, 75% (95%CI 71% to 78%) of physiotherapists reported they would practice concordant with the guidelines and not order an X-ray, and 62% (95%CI 57% to 66%) provided advice to stay active.

**Conclusions:** Most physiotherapists report intended compliance with recommendations in Australian CPGs regarding avoiding the use of X-rays and providing advice to stay active for people with simple acute low back pain, given a vignette based scenario. The majority of respondents reported that they would not advise bed rest. Possible opportunities to further enhance compliance need to be developed and tested to reinforce the role of CPGs in informing physiotherapy practice.

### Significance and Innovations

- Guideline dissemination does not guarantee compliance.
- Vignettes provide a strategy for examining clinicians' concordance with guideline recommendations.
- The majority of surveyed physiotherapists intended to manage acute low back pain in a way that was concordant with guideline recommendations.
- There are opportunities to further enhance guideline concordant management, and strategies need to be developed and tested.

## INTRODUCTION

Evidence-based clinical practice guidelines (CPGs) aim to support decision-makers in selecting and implementing best practices. They are typically constructed to provide advice to practitioners regarding practices that are recommended based on reliable research and, in the absence of evidence, they may also include expert opinion regarding sensible options.

In 2003, a CPG for treatment of acute low back pain (LBP) [1] was endorsed by Australia's National Health and Medical Research Council (NHMRC). This CPG covered management of many acute musculoskeletal conditions, including acute LBP. The guideline defined acute pain as an episode of pain (regardless of severity), with an absence of sciatica or red flags<sup>1</sup> present for less than three months [1]. It was developed by a multidisciplinary team and endorsed by eight professional bodies including the Australian Physiotherapy Association. The guideline was constructed based on evidence for best practice in the diagnosis and treatment of acute non-specific LBP by primary care providers and distributed to all primary healthcare providers in Australia.

Dissemination of guidelines however, does not automatically result in their uptake. Many guidelines include generic advice regarding their implementation. Measuring and understanding current practice, and barriers and enablers to recommended practice, has a key role in the development of strategies to engage practitioners in adopting CPG recommendations[2].

This study of the current practices of Australian physiotherapists with respect to clinical behaviours recommended by the CPG for acute LBP was conducted as part of a larger study, 'Improving the care for people with acute low-back pain by allied health professionals (the ALIGN trial)' [3]. The ALIGN study was designed to gather data on barriers and enablers to the uptake of the guideline using a theoretical approach, develop a targeted, theory-

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<sup>1</sup> In the Guidelines, 'red flags' refers to physical features that may indicate serious but relatively uncommon conditions or diseases requiring urgent evaluation. Example provided were tumours, infection, fractures and neurological damage.

informed implementation strategy to address identified barriers and enablers and subsequently test its effect in a cluster randomised controlled trial [3].

In the component of the study reported here, we investigated the uptake of two key guideline recommendations by primary care physiotherapists: i) that plain X-rays of the lumbar spine are not routinely recommended for people with acute non-specific LBP as they are of limited diagnostic value and provide no benefits in improving pain, function or quality of life, and (ii) that people with acute non-specific LBP should be advised to stay active as it produces a beneficial effect on pain, rate of recovery and function. These key recommendations are further supported in evidence reviews published subsequent to the guideline release [4-8].

This paper reports the conduct and results of a survey that aimed to determine if physiotherapists' practices were aligned with these two recommendations and to review how physiotherapists intended to support people in their management of acute LBP. A parallel study involving Australian chiropractors was concurrently conducted by the research team and is reported elsewhere [9]. The work was approved by the Monash University Human Research Ethics Committee (Approval number CF07/1060 -2007/0274).

## **METHOD**

### *Design*

This study was a cross sectional survey of physiotherapists in three states of Australia.

### *Sample size*

The sample size was calculated to identify factors (e.g. Knowledge, Beliefs about consequences) that were predictive of intention to perform a particular guideline-recommended behaviour (to avoid X-ray use and recommend physical activity), with the aim of using this information to develop the ALIGN implementation strategy (reported elsewhere). The sample size was calculated to detect a 0.5 difference in intention to perform a particular behaviour (measured on a 7-point Likert scale), between dichotomised factors (e.g. adequate knowledge vs inadequate knowledge), assuming an equal distribution of participants in each dichotomy, with 90% power. To detect this difference, a sample of 440



physiotherapists was required, assuming a standard deviation of 1.6 Likert scale points (based on results of a similar survey our research team had undertaken with general medical practitioners [10]) and a 5% significance level. We assumed that contacting double (i.e. 880) the number of physiotherapists would be sufficient to recruit the required number of physiotherapists, allowing for non-eligibility, non-contact, and non-response.

#### *Participants*

Physiotherapists were randomly sampled from three strata, defined by states in Australia (Victoria, South Australia, and Western Australia), with the same proportion of physiotherapists approached in each state. These states were chosen as other Australian State Registration Boards would not release contact details of their registrants for research purposes. The entire sample frame of 8493 (4913 Victoria, 1464 South Australia, 2116, Western Australia) was obtained from the relevant Physiotherapy Registration Boards. The numbers approached in Victoria, South Australia, and Western Australia were, respectively, 495, 158, and 227 (approximately 11% of the sampling frame). To be eligible to participate, physiotherapists had to provide services to people with acute LBP and be currently practising. No eligibility restrictions were placed on the type of specialist training the physiotherapist had undertaken.

#### *Survey instrument*

Five patient vignettes (Figure 1) were adapted from another study of acute LBP in a general medical practice setting [11]. The vignettes were designed to represent people with acute LBP who would typically present to physiotherapists. Vignettes for patients were based on the clinical presentation of acute LBP derived from the guideline, the Victorian evaluation of a media campaign for LBP [12] and from the North-East X-ray Utilisation (NEXUS) study in the UK, that evaluated the effectiveness of audit, feedback and educational reminders on ordering of lumbar spine and knee X-rays by GPs [13]. The physiotherapist and patient roles were designed to contextualise the vignettes.

Four of the five vignettes represented people who would not require a plain lumbar X-ray and would benefit from advice to stay active as per guideline recommendations; one vignette described a person with a suspected vertebral fracture who represented patient

groups excluded from the population covered by the CPG and so would require a plain X-ray. Participating physiotherapists were asked to indicate the investigation(s) they would order for the patient described in each vignette, and which intervention(s) they would recommend or undertake (Figure 2). Investigations or interventions likely to be offered were developed as response options by two experienced physiotherapists (SG, JK) who were investigators on the project team. Participants could elect to choose “other” and provide a free text description of any investigation or treatment not included in response options. Eight randomly sampled Victoria physiotherapists were approached with a request to pre-test the five patient vignettes, complete the survey and provide feedback to the research team. Five obliged the request. Most modifications arising from this process were clarifications to reduce potential ambiguity. We interpreted responses to vignettes as a surrogate measure of actual behaviour based on the results of a systematic review examining whether clinicians’ intentions predicted their behaviour [14]. The review authors concluded that there was “encouragement for the contention that there was a predictable relationship between the intentions of a health professional and their subsequent behaviour.”

#### *Survey administration*

The Modified Total Design Method [15] was used for recruitment. The sampled physiotherapists initially received a letter from the research team inviting their participation. The letter was accompanied by an explanatory statement, consent form, and reply-paid envelope for returning the decision to opt-in or opt-out. A reminder letter was sent to non-respondents every two weeks for eight weeks after the initial letter. Both the fourth and eighth week reminder letters were accompanied by an explanatory statement, consent form, survey document and reply-paid envelope.

The Total Design Method usually provides invitees with a return mail card to signify that they do or do not wish to participate in the study. We replaced the return mail card with an option on the individual consent forms that served the same function.

#### *Analysis*

Double data entry was performed independently by two researchers (MP and Katherine Beringer). Results were compared and discrepancies resolved through discussion with a third researcher.

Respondent demographics were summarised using descriptive statistics. For each vignette, the percentage of physiotherapists indicating that they would order, undertake or recommend each investigation or intervention was calculated. Confidence intervals were calculated adjusting for the stratification variable (states in Australia). Exact binomial confidence intervals were calculated when the normal approximation was not valid [16]. Confidence intervals for the percentage of respondents indicating which investigation(s) and intervention(s) they would undertake across multiple vignettes (e.g. recommending advice to stay active across vignettes 1 to 4) were adjusted to allow for the correlation of responses within respondent. Analyses were undertaken using the *svy* commands in the statistical package Stata (StataCorp. 2007. Stata Statistical Software: Release 10.1. College Station, TX: StataCorp LP) with Taylor series approximation for the estimation of standard errors [17].

## RESULTS

The survey was administered in April 2009. Three hundred and thirteen (36%) physiotherapists approached were deemed ineligible to participate, mostly because they reported that they did not see people with acute LBP ( $n = 222$ ), were not currently practising ( $n = 63$ ), or mail was returned to sender ( $n=28$ ). An additional 5% ( $n =42$ ) responded to say they were not interested in participating. We received completed questionnaires from 203 of 567 potentially eligible physiotherapists, a response rate of 36%. Respondents primarily practised in an urban location (77%), had practiced (on average) for 15 years, and 61% were female (Table 1).

Table 2 presents a summary of the responses regarding investigations physiotherapists would order in each of the vignettes.

Across vignettes 1 to 4, where an X-ray was not indicated according to the guideline, 75% (95%CI 71% to 78%) of physiotherapists responded that they intended to not order an X-ray. For vignettes 1 and 4, overall compliance with guidelines was 89% and 84% respectively. In vignettes 2 and 3, where the patient pressured the physiotherapist for referral for additional

investigations, X-ray guideline adherence was 63% for both vignettes. For the vignette representing a patient group excluded from the guideline, and with the possibility of fracture, 79% responded that they would order an X-ray. Other treatments and care that physiotherapists indicated they intended to provide for each vignette are summarised in Table 3.

Across vignettes 1-4, 62% (95%CI 57% to 66%) of respondents indicated they would give advice to stay active (Table 3). For these vignettes, the most common responses made by physiotherapists were back exercises (78%), advice regarding alternative ways of moving (72%), mobilisation (71%), avoiding pain provoking movements (64%), and general exercise (55%). The percentages for vignette 5 for the same treatment options were advice to stay active 38%, back exercises 34%, advice regarding alternative ways of moving 61%, mobilisation 29%, avoiding pain provoking movements 77%, and general exercise 36%. More than 50% reported they would use massage in vignettes 1, 2 and 4. Very few physiotherapists reported that they would recommend bed rest (a recommendation that would have been in conflict with guidelines).

## DISCUSSION

This survey gathered data on physiotherapists' intentions to recommend or order investigations and provide interventions in response to five acute LBP presentations and to assess concordance between reported intended practice and recommendations in the Australian evidence-based acute LBP guideline [1]

### *Compliance with guideline recommendations*

Across vignettes 1 – 4, where an X-ray was not indicated, about 75% of physiotherapists reported they would not order an X-ray, and 62% would provide advice to stay active. Results from a survey of 171 final year Australian physiotherapy students responding to a vignette describing a woman with acute LBP with no red flags were similar. 62% of the students indicated they would recommend physical activity and 75% would recommend avoiding bed rest [18]. For vignette 5, where imaging was indicated for a suspected fracture, 79% of physiotherapists reported they would X-ray, and 32% reported they would refer to another practitioner. Consistent with these findings, a systematic review of adherence to

guidelines by primary care providers concluded that 72 – 79% of physicians appear to appropriately order X-rays for acute LBP, where imaging was indicated [19].

For both vignettes 2 and 3, where the patient pressured the practitioner for referral for additional investigations, X-ray guideline adherence was significantly and substantially lower than for any of the other vignettes. This is consistent with other studies conducted in doctors. When doctors were asked how they would respond when a demanding patient requests an unnecessary X-ray [20], many reported that they would oblige the request (Slovenia 32%, Sweden 36%). Doctors justified these decisions arguing the patient's right to self-determination and a wish to preserve the doctor-patient relationship. We do not know whether physiotherapist behaviours reflect similar considerations, but it is one possibility. Our data, indicating the lower compliance in vignettes when patients demand X-ray, may indicate an opportunity to further improve guideline compliance. Physiotherapists may benefit from help with explicit strategies to navigate difficult conversations and to deal with demands for inappropriate investigations or treatments.

Across vignettes 1-4, 62% of respondents indicated they would give advice to stay active, but there was considerable variation (i.e. 37% for vignette 4 and 82% for vignette 2). It is not clear why this recommendation was considered so infrequently in response to vignette 4. Perhaps physiotherapists were reluctant to advise staying active when the patient reported severe pain. Across vignettes, 78% recommended back exercises. Physiotherapists may not be making a clear distinction between advice to stay active and back exercises. It is possible that physiotherapists who encourage exercises might consider that this is encouraging the patient to stay active, and that making another explicit recommendation about staying active is unnecessary. The guidelines explicitly state that "Advice to stay active provides a small beneficial effect on pain, rate of recovery and function compared to bed rest and compared to a specific exercise regime[n] in mixed (acute/chronic) populations with low back pain." However the evidence that compares the effects of advice to stay active to exercise prescription is weak. A Cochrane review [6] identified one low quality study [21] that found that exercises appear to add no clinically important benefit in acute LBP compared to advice to stay active. More research is needed to understand whether there is

an important distinction between advice to stay active and advice to exercise. A review comparing exercise to advice to stay active for people with back pain and sciatica is underway [22]. Greater compliance with guidelines might be concluded if the differentiation between advice to exercise and advice to stay active was clarified.

While imperfect, the observed concordance in our sample with the guideline recommendations may be as good as could be expected. Guideline compliance of GPs, who treated people with back pain, with and without sciatica, has been reported to be 26.9% and 4.3% respectively [23]. Physiotherapist compliance estimates for acute ankle sprain in the Netherlands were 66% [24]. Rebbeck and colleagues [25] estimated compliance of physiotherapists, chiropractors and osteopaths with Australian whiplash guidelines to be 58%.

Rates of compliance with guidelines are variable and there are likely to be a number of barriers and enablers to change [26]. For example, practitioner characteristics, their circumstances [27] and knowledge [19], are factors with the potential to affect guideline adherence. Furthermore, different methods for measuring behaviour (e.g. surveys of intended behaviour compared to audit of patient files) are likely to yield different estimates of compliance. It remains unknown what proportion of practitioners consider CPGs of limited relevance to usual practice, or the extent to which such practitioners are represented in our survey participants. Parr and May [28] surveyed 223 UK musculoskeletal physiotherapists and reported that participants thought the NICE back pain guidelines [29] facilitated evidence-based practice but were unrealistic, idealistic, and promoted a single treatment, passive approach. Identifying key factors that affect guideline compliance will assist with the development of effective strategies to improve guideline uptake.

In response to vignettes 1 - 3, almost all respondents reported that they would not advise bed rest for people with simple acute back pain. For these vignettes, this key guideline message appears to have been comprehensively adopted by physiotherapists. A possible explanation is the mass media campaign in Victoria in 1997 [12] that emphasised staying active and avoiding bed rest for back pain. Again vignette 4, that described a client in severe

pain, was the exception. In this case 20% of respondents proposed that they would advise bed rest, in conflict with the CPGs. Additional investigation into challenges facing practitioners who treat people in severe pain appears warranted.

#### *Study limitations*

We did not meet our target sample size of 440 participants, and our response rate was low. The former affects the precision of our estimates, while the latter may result in biased estimates. Despite not meeting the target sample size, the width of the confidence intervals surrounding the estimates were at worst  $\pm 7\%$ , which still allowed for reasonably accurate estimation of intended concordance with guideline recommendations. Our low response rate of 36% means that we cannot be confident that participant responses are representative of the larger body of primary care physiotherapists, or whether our results provide an optimistic view of likely guideline compliance. Our response rate is perhaps not unusual for studies of primary care providers e.g. 25% survey response rates have been reported for GPs [23]). Practitioners have very busy work lives, and the survey was relatively demanding. In contrast, others using similar methods to ours have achieved better response rates (72.5% [30]) and follow up is warranted to determine whether we can identify reasons for lack of response and develop strategies that improve physiotherapy engagement in research of this nature.

We also remain uncertain regarding the concordance between intended behaviour, as measured via the vignettes, and actual behaviour. In addition, clinician behaviours are likely to change across time and therefore data collected when this study commenced may not reflect responses that would be returned if the survey were repeated.

#### **Conclusion**

Most physiotherapists report intended compliance with recommendations in Australian CPGs regarding avoiding the use of X-rays and providing advice to stay active for people with simple acute low back pain, given a vignette based scenario. The majority of respondents reported that they would not advise bed rest. Possible opportunities to further enhance

compliance need to be developed and tested to reinforce the role of CPGs in informing physiotherapy practice.

ACCEPTED MANUSCRIPT



**REFERENCES**

1. Australian Acute Musculoskeletal Pain Guidelines Group (AAMPGG). Evidence-based management of acute musculoskeletal pain. Brisbane: Australian Academic Press; 2003.
2. Bekkering GE, Hendriks HJ, van Tulder MW, Knol DL, Hoeijenbos M, Oostendorp RA, et al. Effect on the process of care of an active strategy to implement clinical guidelines on physiotherapy for low back pain: a cluster randomised controlled trial. *Qual Saf Health Care*. 2005;14:107-12.
3. McKenzie JE, O'Connor DA, Page MJ, Mortimer DS, French SD, Walker BF, et al. Improving the care for people with acute low-back pain by allied health professionals (the ALIGN trial): A cluster randomised trial protocol. *Implement Sci*. 2010;5:86.
4. Chou R, Fu R, Carrino JA, Deyo RA. Imaging strategies for low-back pain: systematic review and meta-analysis. *Lancet*. 2009;373:463-72.
5. Dagenais S, Tricco AC, Haldeman S. Synthesis of recommendations for the assessment and management of low back pain from recent clinical practice guidelines. *Spine J*. 2010;10:514-29.
6. Dahm KT, Brurberg KG, Jamtvedt G, Hagen KB. Advice to rest in bed versus advice to stay active for acute low-back pain and sciatica. *Cochrane Database Syst Rev*. 2010.
7. Koes BW, van Tulder M, Lin CW, Macedo LG, McAuley J, Maher C. An updated overview of clinical guidelines for the management of non-specific low back pain in primary care. *Eur Spine J*. 2010;19:2075-94.
8. Little SD, Gracey JH, Baxter GD. Advice for the management of low back pain: a systematic review of randomised controlled trials. *Man Ther*. 2007;12:310-27.
9. Walker BF, French SD, Page MJ, O'Connor DA, McKenzie JE, Beringer K, et al. Management of people with acute low-back pain: a survey of Australian chiropractors. *Chiropr Man Therap*. 2011;19:29.
10. O'Connor D, Green S, French S, King S, Francis J, Grimshaw J, et al. Identifying general practitioner beliefs, intentions and behaviour toward uptake of an evidence-based guideline for acute low back pain using the theory of planned behaviour. *International Forum IX: Primary Care Research on Low Back Pain*; 2007; Palma de Mallorca, Spain; 2007.
11. French SD, McKenzie JE, O'Connor DA, Grimshaw JM, Mortimer D, Francis JJ, et al. Evaluation of a theory-informed implementation intervention for the management of acute low back pain in general medical practice: the IMPLEMENT cluster randomised trial. *PLoS ONE [Electronic Resource]*. 2013;8:e65471.
12. Buchbinder R, Jolley D, Wyatt M. 2001 Volvo Award Winner in Clinical Studies: Effects of a media campaign on back pain beliefs and its potential influence on management of low back pain in general practice. *Spine (Phila Pa 1976)*. 2001;26:2535-42.
13. Bonetti D, Eccles M, Johnston M, Steen N, Grimshaw J, Baker R, et al. Guiding the design and selection of interventions to influence the implementation of evidence-based practice: an experimental simulation of a complex intervention trial. *Soc Sci Med*. 2005;60:2135-47.
14. Eccles MP, Hrisos S, Francis J, Kaner EF, Dickinson HO, Beyer F, et al. Do self-reported intentions predict clinicians' behaviour: a systematic review. *Implement Sci*. 2006;1:28.
15. Dillman DA, Smyth JD. Design effects in the transition to web-based surveys. *Am J Prev Med*. 2007;32:90-6.

16. Clopper C, Pearson E. The use of confidence or fiducial limits illustrated in the case of the binomial. *Biometrika*. 1934;26:404-13.
17. Wolter KM. *Introduction to Variance Estimation*. 2nd ed. New York Springer; 2007.
18. Briggs AM, Slater H, Smith AJ, Parkin-Smith GF, Watkins K, Chua J. Low back pain-related beliefs and likely practice behaviours among final-year cross-discipline health students. *Eur J Pain*. 2013;17:766-75.
19. Scott N. A, Moga C, C. H. Managing low back pain in the primary care setting: the know-do gap. *Pain Res Manag*. 2010;15:392-400.
20. Bremberg S, Nilstun T, Kovac V, Zwitter M. GPs facing reluctant and demanding patients: analysing ethical justifications. *Fam Pract*. 2003;20:254-61.
21. Malmivaara A, Hakkinen U, Aro T, Heinrichs ML, Koskeniemi L, Kuosma E ea. The treatment of acute low back pain - bed rest, exercises, or ordinary activity? *N Engl J Med*. 1995;332:351- 5.
22. Fernandez M, Hartvigsen J, Ferreira M, Refshauge K, Machado A, Lemes I, et al. Advice to stay active or structured exercise in the management of sciatica: a systematic review and meta-analysis. PROSPERO 2014 2014:CRD42014013450 Available from [http://www.crd.york.ac.uk/PROSPERO/display\\_record.asp?ID=CRD42014013450](http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42014013450).
23. Webster BS, Courtney TK, Huang YH, Matz S, Christiani DC. Physicians' initial management of acute low back pain versus evidence-based guidelines. Influence of sciatica. *J Gen Intern Med*. 2005;20:1132-5.
24. Leemrijse CJ, Plas GM, Hofhuis H, van den Ende CH. Compliance with the guidelines for acute ankle sprain for physiotherapists is moderate in the Netherlands: an observational study. *Aust J Physiother*. 2006;52:293-9.
25. Rebbeck T, Macedo LG, Maher CG. Compliance with clinical guidelines for whiplash improved with a targeted implementation strategy: a prospective cohort study. *BMC Health Serv Res*. 2013;13:213.
26. Michie S, Johnston M, Abraham C, Lawton R, Parker D, Walker A, et al. Making psychological theory useful for implementing evidence based practice: a consensus approach. *Qual Saf Health Care*. 2005;14:26-33.
27. Hinchey SA, Jackson JL. A cohort study assessing difficult patient encounters in a walk-in primary care clinic, predictors and outcomes. *J Gen Intern Med*. 2011;26:588-94.
28. Parr S, May S. Do musculoskeletal physiotherapists believe the NICE guidelines for the management of non-specific LBP are practical and relevant to their practice? A cross sectional survey. *Physiotherapy*. 2014;100:235-41.
29. NICE. *Low Back Pain: Early Management of Persistent Non-specific Low Back Pain*. London: Royal College of General Practitioners; 2009.
30. Li LC, Bombardier C. Physical therapy management of low back pain: an exploratory survey of therapist approaches. *Phys Ther*. 2001;81:1018-28.
31. Australian Institute of Health and Welfare. *Rural, regional and remote health: a guide to remoteness classifications*. Canberra: AIHW; 2004.
32. Clopper C J, Pearson E S. The use of confidence or fiducial limits illustrated in the case of the binomial. *Biometrika*. 1934:404 - 13.

Table 1. Demographic details of physiotherapist respondents

Variable	Category	Physiotherapists (N=203 unless indicated otherwise)
Sex (n, %)	Female	124 (61)
Age (Mean, SD)		39 (12) <sup>†</sup>
Practice location <sup>##</sup> (n, %)	Urban	156 (77)
	Rural	39 (19)
	Remote	8 (4)
Practice type (n, %)	Group	163 (81) <sup>*</sup>
	Solo	39 (19)
Years in clinical practice (Mean, SD)		15 (11)
	(Median, IQR)	12 (6,25)
Hours practicing/week (Mean, SD)		33 (12) <sup>‡</sup>
	(Median, IQR)	36 (24,40)
Total patients/week (Mean, SD)		50 (27) <sup>†</sup>
	(Median, IQR)	50 (30,65)
Acute LBP patients/week (Mean, SD)		12 (10) <sup>‡</sup>
	(Median, IQR)	10 (4,20)
Involvement in teaching (n, %)	Yes	31 (15)
Formal postgraduate training relevant to LBP (N, %)	Yes	74 (36) <sup>‡</sup>
	No	
Access to bulk-billing radiology service (n, %)	Yes	116 (57)

SD=standard deviation; IQR=interquartile range; LBP=low back pain

<sup>†</sup>N = 194; <sup>‡</sup>N = 198; <sup>†</sup>N = 200; <sup>\*</sup>N = 201; <sup>‡</sup>N = 202

<sup>##</sup> Practice location defined from the Rural, Remote and Metropolitan Areas classification system [31]

Table 2. Percentage (95% confidence interval) of physiotherapy respondents ordering, undertaking, or recommending investigations

Investigation	Vignette 1	Vignette 2	Vignette 3	Vignette 4	Vignette 5*
N = 203					
Lumbosacral plain X-ray	11 (7, 16)	36 (29, 43)	35 (29, 42)	14 (10, 20)	69 (63, 76)
Lumbosacral CT scan	2 (1, 6)	2 (1, 5)	30 (24, 37)	12 (8, 17)	4 (2, 8)
Lumbosacral MRI	1 (0, 4) <sup>†</sup>	0 (0, 3) <sup>†</sup>	10 (7, 15)	6 (3, 10)	1 (0, 4) <sup>†</sup>
Full spine plain X-ray	0 (0, 3) <sup>†</sup>	1 (0, 4) <sup>†</sup>	1 (0, 4) <sup>†</sup>	2 (1, 5)	10 (7, 15)
None	87 (81, 91)	61 (54, 67)	34 (28, 41)	74 (67, 80)	18 (13, 24)
Overall X-ray guideline adherence	89 (84, 93) <sup>‡</sup>	63 (56, 70) <sup>‡</sup>	63 (56, 70) <sup>‡</sup>	84 (78, 89) <sup>‡</sup>	79 (73, 85) <sup>‡</sup>

\* Only vignette where guideline recommends plain X-ray and not advice to stay active

Note: For Vignettes 1-4, overall X-ray guideline adherence is defined as the number of participants not ordering any type of X-ray (e.g., lumbosacral, full spine, AP lateral, pelvic)

Note: For Vignette 5, overall X-ray guideline adherence is defined as the number of participants ordering some type of X-ray (e.g., lumbosacral, full spine, AP lateral, pelvic)

<sup>†</sup> Exact binomial confidence calculated [32]

<sup>‡</sup> Based on 197 participants.

Table 3. Number (%) of physiotherapist respondents intending to undertake or recommend interventions

Response options	Vignette 1	Vignette 2	Vignette 3	Vignette 4	Vignette 5
Bed rest*	1 (0)	1 (0)	3 (1)	41 (20)	13 (6)
Bed rest outside guideline recommendations†	0 (0)‡	1 (0)	1 (1)‡	6 (3)≠	NA
Paracetamol	61 (30)	52 (26)	40 (20)	95 (47)	130 (64)
NSAIDs	78 (38)	44 (22)	79 (39)	144 (71)	79 (39)
Back exercises	173 (85)	174 (86)	145 (71)	144 (71)	68 (34)
General exercise	107 (53)	179 (88)	96 (47)	63 (31)	74 (36)
Advice to stay active	142 (70)	166 (82)	118 (58)	76 (37)	78 (38)
Advice regarding alternate ways of moving	150 (74)	158 (78)	116 (57)	156 (77)	124 (61)
Advice to avoid pain provoking movements	142 (70)	125 (62)	97 (48)	157 (77)	156 (77)
Work modification	77 (38)	101 (50)	81(40)	103 (51)	22 (11)
Spinal manipulation/ adjustment	25 (12)	8 (4)	15 (7)	7 (3)	6 (3)
Mobilisation	176 (87)	161 (79)	113 (56)	123 (61)	58 (29)
Massage	126 (62)	132 (65)	72 (35)	110 (54)	79 (39)
Lumbar supports	14 (7)	23 (11)	22 (11)	51 (25)	28 (14)
Spinal traction	3 (1)	2 (1)	15 (7)	15 (7)	1 (0)
Acupuncture	28 (14)	18 (9)	33 (16)	25 (12)	14 (7)
Electrotherapy	40 (20)	40 (20)	34 (17)	70 (34)	58 (29)
Thermal modalities	93 (46)	81 (40)	46 (23)	94 (46)	101 (50)
Printed information	50 (25)	44 (22)	22 (11)	32 (16)	16 (8)
Referral to another health care provider	4 (2)	37 (18)	90 (44)	48 (24)	64 (32)

N = 203 physiotherapists unless otherwise specified.

\* Advising bed rest (irrespective of the number of days).

† Advising bed rest for > 2 days.

‡ N = 202; ≠N = 199

**Figure 1. Patient vignettes***Introduction of survey to physiotherapists and the five vignettes*

This section contains five hypothetical scenarios about patients who present to you with acute low-back pain. In the vignettes we have varied a range of features that might influence your management decisions (in regards to investigations you might order and interventions you might recommend or undertake). At the end of each vignette we ask you to indicate what investigation(s) you would order for the patient described in the vignette, and what intervention(s) you would recommend or undertake for this patient. We are aware that the scenario format means that skills you may normally draw on, such as evaluating non-verbal cues from the patient and performing a physical examination, cannot be a factor in your assessment. Nevertheless, given this understanding, we hope that you address each vignette and answer the questions as best as you can with the information provided. We have left space for you to comment on your decisions, if you wish.

**Vignette 1**

A 48 year old office worker attends your clinic. He is usually very active, playing lots of sport and doing regular exercise (e.g. jogging, gym). He has low-back pain, rated 5 out of 10. The pain started two weeks ago and is located in the low-back region, right sided, no radiation. The pain is relieved by stretching his low-back and using a heated wheat bag. The pain is worse after playing sport, to the point where in the last week he had to stop mid-game during basketball. He has no previous history of low-back pain. The patient thinks that an X-ray is required to “find out what is wrong”, and he is fearful that movement and activity might make the pain worse.

**Vignette 2**

A 57 year old office worker sees you for low-back pain. She says her pain began 8 weeks ago. There was no specific incident that caused the pain. The pain is located in the lower back region, with no radiation. The pain is a dull ache (3 out of 10), with occasional sharp “twinges” with certain movements. The pain is relieved by heat and a massage from her spouse. She has no history of low-back pain. The patient is overweight (BMI 30), has mild hypertension, and a family history of type 2 diabetes. The patient rarely does any exercise. During the consultation she indicates to you that she is anxious that she may have a serious disease. The patient says “a friend had low-back pain like this and they had an X-ray and it showed that they really had something major wrong with them”. She repeatedly requests an X-ray during the consultation.

**Vignette 3**

A 36 year old real estate agent consults you for his low-back pain. He comes in on a very busy day at the practice and there are many patients already in the waiting room wanting to see you. The pain has been present for six weeks, starting two days after moving heavy furniture at home. The pain is described as an ache

(4 to 5 out of 10). There is no radiation. He has had previous, similar episodes of low-back pain that have lasted one to two weeks. The patient has no other health concerns. The patient has seen you weekly over the last four weeks for his low-back pain and complains that it is not improving. He is frustrated with his lack of improvement and thinks something different needs to be done. He is dissatisfied that he has not already been referred for further investigation, and insists that you refer him now.

#### **Vignette 4**

A 28 year old woman has suffered from low-back pain for a week. She has been unable to do her job managing a hospital cafeteria for this time. She walks slowly into your consultation room, holding her back and grimacing. You notice her abnormal posture. She sits with a loud groan. She says she has severe low-back pain, describing it as 9 out of 10. While anxious to return to work, she feels immobilised by the pain. There is no history of trauma. The pain is in the low-back area, without radiation. On physical examination there is marked limitation of anterior flexion and tenderness in the left paraspinal region. The neurological examination is normal with straight leg raising to 90 degrees. She has had numerous episodes of back pain in the past but thinks this is the worst episode she has ever had and is very worried that whatever is causing her problem is getting worse.

#### **Vignette 5**

A 67-year-old woman attends your clinic. She has low-back pain that started immediately after she fell off a chair at home 4 days ago while reaching for her glasses. The pain has been constant since then, although she gets some slight relief from paracetamol.

**Figure 2. Investigations and intervention options for the five patient vignettes**

1. Which investigations would you order, undertake or recommend for this patient at this visit? *Please tick all that apply:*

- Lumbosacral plain X-ray
- Lumbar CT scan
- Lumbar MRI
- Full spine plain X-ray
- Other 1 (*please specify*) \_\_\_\_\_
- Other 2 (*please specify*) \_\_\_\_\_
- Other 3 (*please specify*) \_\_\_\_\_
- None

2. Which interventions would you recommend or undertake for this patient at this visit? *Please tick all that apply:*

- Bed rest for \_\_\_\_ days (*please specify number of days*)
- Paracetamol
- Non-steroidal anti-inflammatory drugs (NSAIDs)
- Back exercises
- General exercise (e.g. walking)
- Advice to stay active
- Advice regarding alternate ways of moving or performing activities
- Advice to avoid pain provoking movements
- Work modification
- Spinal manipulation/adjustment
- Mobilisation
- Massage
- Lumbar supports
- Spinal traction
- Acupuncture
- Electrotherapy (e.g. TENS, interferential, ultrasound)
- Thermal modalities (e.g. heat, ice)
- Printed information (*please specify*) \_\_\_\_\_
- Other 1 (*please specify*) \_\_\_\_\_



Other 2 (*please specify*) \_\_\_\_\_

Other 3 (*please specify*) \_\_\_\_\_

Referral to another health care provider (e.g. another chiropractor, general practitioner, pain clinic, specialist).

*If yes, please specify* \_\_\_\_\_

If you wish to comment on your management decisions, please do so here:

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**Competing interests:** Sally Green is a practicing physiotherapist in part-time private physiotherapy practice (self-employed), and as such receives remuneration for the delivery of physiotherapy interventions. Jenny Keating is a physiotherapist in full-time university employment.

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**Highlights**

- Vignettes provided a strategy for estimating likely compliance with CPGs.
- We examined compliance with Australian CPGs for simple acute low back pain.
- Most physiotherapists would not advise bed rest.
- Most would avoid X-rays and provide advice to stay active.
- Strategies to further enhance compliance need to be developed and tested