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# Development of a return to work tool for primary care providers for patients with low back pain: A pilot study

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## Abstract

**Context:** Low back pain (LBP) is a common cause of disability in adults and primary care physicians (PCPs) are commonly the first medical practitioners to assess these patients. Despite this, PCPs often feel unprepared to make return to work (RTW) recommendations. **Aims:** The purpose of our project was to develop RTW guidelines for patients with LBP in the form of an accessible and adaptable electronic medical records (EMR) integrated tool. **Settings and Design:** All licensed physicians and physician extenders who see patients over the age of 18 years, presenting with acute LBP who are currently employed were eligible for participation. PCPs were randomized with and without the RTW guidelines and charts were reviewed to assess if PCPs made RTW recommendations. **Subjects and Methods:** RTW guidelines were developed using the Oswestry LBP Disability Questionnaire and the Official Disability Guidelines and integrated into the EMR. **Statistical Analysis Used:** A Chi-square analysis was used to compare physicians in the interventional and control groups. **Results:** Forty-four PCPs were randomized into the intervention group and 37 into the control group. In the intervention group, 301 patient encounters met the inclusion criteria for acute LBP. Of these, RTW recommendations were used in 7.3% encounters. Comparatively, there were 256 cases of LBP in the control group and RTW recommendations were offered in 1.6% of encounters ( $P < 0.001$ ). **Conclusion:** This study showed that PCPs with access to the RTW guidelines in an EMR-integrated tool were significantly more likely to make such recommendations.

**Keywords:** Low back pain, primary care recommendations, return to work

## Introduction

Low back pain (LBP) is a common cause of disability in American adults<sup>[1-3]</sup> and is among the most common reasons to visit a physician.<sup>[4]</sup> Most people recover from an episode of acute LBP and are able to return to work (RTW) and normal activities;<sup>[5,6]</sup> however, as many as 10–20% of working age Americans report persistent or recurrent LBP that may limit their ability to continue working.<sup>[7]</sup> Inability to work contributes to poor self-efficacy, poor quality of life and creates high economic consequences for the patients, their families and society in general. It is estimated that the combined direct and indirect costs attributed to LBP are as high as 635 billion annually in USA.<sup>[8-10]</sup>

Primary care physicians (PCPs) are commonly the first line care providers to assess a patient reporting acute LBP.<sup>[11]</sup> Accordingly, they are in a unique position to offer treatment options and RTW recommendations. Multiple studies have now demonstrated that treatment for LBP should not include bed rest<sup>[12-16]</sup> and that rapid return to normal activities of daily living is generally the best activity recommendation.<sup>[14]</sup> Specifically, Shaw and his colleagues demonstrated that pain and function improved more rapidly in workers with immediate or early RTW in those with acute LBP.<sup>[17]</sup>

Additionally, current practice guidelines from the American College of Physicians (ACP) also proposed an immediate return to normal activities including work as the initial treatment for LBP.<sup>[18]</sup> Despite these clear benefits of following, these LBP

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practice guidelines, dissemination and utilization of these guidelines are often limited.

The objective of our study was to develop an EMR-integrated tool that can be easily and effectively adopted and used by PCPs to make recommendations regarding RTW after a diagnosis of acute LBP. Specifically, physicians will be able to identify the type of work and the grade of disability due to LBP. Additionally, our aim is that these classifications will inform clinical decision making and enable physicians to make recommendations with regards to RTW.

## Subjects and Methods

### Trial design

This pilot study was designed as a non-blinded, randomized, controlled and multisite superiority trial with two parallel groups with the same endpoint of RTW recommendations. Randomization was done with a rolling enrolment into the study over a 5-month period. There was no crossover allowed.

### Participants

Subjects were recruited from the primary care offices affiliated with the study hospital system. These included physicians (MD or DO) as well as physician extenders such as residents, nurse practitioners and physician assistants. Email addresses for potential participants were obtained from the hospital's physician directory. Emails were sent out to these practitioners describing the purpose of this study and requesting participation. If they expressed interest, a meeting was set up to further explain the study details and obtain consent form. All licensed physicians and physician extenders in a primary care setting who see patients over the age of 18 years were eligible to participate. Participants were enrolled in this study on a rolling basis from November 2016 until March 2017.

Acute LBP was defined as LBP that is present for up to 6 weeks. Using ICD-10 codes for LBP, charts from the participating PCPs were retrospectively analyzed and eligibility was determined based on the following criteria:

### Patient inclusion criteria

- 18 years old or older
- Presenting with acute or chronic LBP
- Currently working (assumed to be working unless stated otherwise in the chart).

### Patient exclusion criteria

- Under the age of 18 years
- Presenting with chronic LBP or other diagnoses
- Retired, disabled or not working.

### Interventions

Using the Oswestry LBP Disability Questionnaire (Oswestry)<sup>[19]</sup> and the Official Disability Guidelines,<sup>[20]</sup> a simple and practical

algorithm for RTW recommendations based on type of work and level of disability was created [Tables 1 and 2].

The Oswestry Questionnaire<sup>[19]</sup> allows physicians to determine the level of disability endured by the patient presenting with LBP. A grade is assigned based on the score obtained from the questionnaire with a brief explanation of the level of impairment the patient is expected to have based on the level of disability assigned to them.

The Official Disability Guideline<sup>[20]</sup> is an evidence-based decision support document to assist physicians in their clinical decision making. The chapter used for the purposes of this study was the Low Back – Lumbar and Thoracic (Acute and Chronic) which was last updated on 12/28/2017. These guidelines offer different pathways to RTW based on the type of work (clerical, manual and heavy manual), and grade of disability.

As grading definitions of LBP are often not applicable in a routine clinical practice, we constructed the RTW matrix by replacing the 'Grading System' with a validated Oswestry scoring system [see Tables 1 and 2]. This recommendation algorithm uses visit number (1 through 3), type of LBP (radicular vs non-radicular), grade of disability (1–5) and type of work (clerical, manual and heavy manual) to assist the physician with RTW decision making.

The intervention group was given the RTW guidelines as a SmartPhrase in the EMR and educated on its use. A SmartPhrase allows you to insert specific text by typing a short abbreviation and allows the physician to access drop-down menus to select appropriate RTW recommendations. This included information on the type of LBP (radicular or not), duration of back pain, type of employment (clerical, manual and heavy manual), the Oswestry score and the visit number. From this, RTW recommendations were provided based on these answer choices. The control group was provided education on the treatment and management of LBP, the Oswestry score and RTW guidelines separately – not built into the EMR. They too had access to a SmartPhrase as a prompt to make RTW recommendations, but it did not generate the RTW matrix.

### Electronic medical records/data collection

Participant information was entered into a secure online database called REDCap (Research Electronic Data Capture). REDCap is a secure web application for building and managing online databases and is compliant with the Health Insurance Portability and Accountability Act of 1996. REDCap database was used for the collection of information in a secure platform. Two modules were constructed; a PCP and a Patient Module. The PCP module collected information on the provider's practice location, gender, years in practice, randomization status and signed consent forms from the providers. The module also served as the 'survey-based recruitment tool' created to introduce the study specifics to the diverse primary care providers' practices. Information on the

**Table 1: Return to work guidelines for patients with acute non-radicular low back pain based on the assigned Oswestry Disability Score and the Official Disability Guidelines for patients with acute low back pain presenting to a primary care physician**

LBP without radicular symptoms	Oswestry grade	1 <sup>st</sup> visit	Pain persists at 2 <sup>nd</sup> visit	Pain persists at 3 <sup>rd</sup> visit
Type of work Clerical	Time from initial visit	0 days	3-10 days	10-17 days
	Oswestry grade			
	Grade I	RTW full duty	RTW full duty	RTW full duty
	Grade II	RTW with 3 days of modified duty	RTW with 0-3 days of modified duty	RTW full duty or reassess injury severity
	Grade III	RTW with 3 days of modified duty	RTW with 3-10 days of modified duty	RTW with 3-10 days of modified duty
	Grade IV-V	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider
Manual work	Comment (GI-III)		If pain persists, refer for exercise or manual therapy	Refer to specialist. Imaging may be warranted
	Grade I	RTW with 7-10 days of modified work RTW with 3-10 days of modified duty	RTW with 7-10 days of modified work	Discretion of the provider
	Grade II	RTW with 14-17 days of modified work	RTW with 14-17 days of modified work	Discretion of the provider
	Grade III	RTW with 14-17 days of modified work	RTW with 14-17 days of modified work	Discretion of the provider
	Grade IV-V	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider	Out of work, duration at discretion of the provider
	Comment (GI-III)		If pain persists, refer for exercise, instruction or manual therapy	Refer to specialist. Imaging may be warranted
Manual work, heavy	Grade I	RTW with 14-17 days of modified duty	RTW with 14-17 days of modified duty	Discretion of the provider
	Grade II	RTW with 35 days of modified duty	RTW with 35 days of modified duty	Discretion of the provider
	Grade III	RTW with 35 days of modified duty	RTW with 35 days of modified duty	Discretion of the provider
	Grade IV-V	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider
	Comment		Refer for physical therapy and imaging (MRI or CT if MRI not available)	Hardening program

study, Oswestry LBP Questionnaire, exercise slides/pictograms and LBP-related information/education in both English and Spanish versions were provided.

The patient module in the REDCap database collected information on patient demographics, type of LBP, current employment status, disability score, RTW recommendations, follow-up/discharge plans for both the interventional and control group of providers.

Patient charts for study participants were then identified using the most commonly used ICD-10 codes for LBP. Retrospective chart reviews were then completed by study personnel using the hospital's EMR software EPIC.

## Outcomes

The main outcome measure of this pilot study was whether physicians used the EMR-integrated RTW tool in their treatment

of patients presents with acute or acute on chronic LBP. Other key information about the providers was collected which included age, gender, credentials and practice type of the subjects in both the intervention and control group. Percentages for the level of disability, type of work (clerical, manual and manual heavy), the type of LBP (acute, acute on chronic and chronic) and the ICD-10 codes for LBP were also collected.

## Sample size

To determine statistical significance between the control and interventional groups, 135 patient visits were required for both the interventional and control group.

## Randomization

Once participants provided informed consent, they were randomized to either the interventional group or the control group. This assignment was done by a computer algorithm and

**Table 2: Return to work guidelines for patients with acute low back pain with radicular symptoms based on the assigned Oswestry Disability Score and the Official Disability Guidelines for patients with acute low back pain presenting to a primary care physician**

Low back pain with radiculopathy	Oswestry grade	1 <sup>st</sup> visit	2 <sup>nd</sup> visit	3 <sup>rd</sup> visit
Type of work	Time from initial visit	0 days	3-10 days	10-17 days
Clerical	Oswestry grade			
	Grade I	RTW full duty	RTW full duty	RTW full duty
	Grade II	RTW 3 days of modified duty	RTW 3 days of modified duty	RTW 3-10 days of modified duty
	Grade III	RTW with 3 days modified work	RTW with 3-10 days of modified duty	RTW with 3-10 days of modified
	Grade IV-V	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider
Manual work	Comment (GI-III)		Refer for exercise/instruction/manual therapy	Refer to specialist, imaging
	Grade I	RTW with 3-10 days of modified duty	RTW with 3-10 days of modified duty	Discretion of the provider
	Grade II	RTW with 14-17 days of modified work	RTW with 14-17 days of modified work	Discretion of the provider
	Grade III	RTW with 14-17 days of modified work	RTW with 14-17 days of modified work	Discretion of the provider
	Grade IV-V	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider
Manual work, heavy	Comment		Refer to specialist and physical therapy	Functional restoration?
	Grade I	RTW with 14-17 days of modified duty	RTW with 14-17 days of modified duty	Discretion of the provider
	Grade II	RTW with 35 days of modified duty	RTW with 35 days of modified duty	Discretion of the provider
	Grade III	RTW with 35 days of modified duty	RTW with 35 days of modified duty	Discretion of the provider
	Grade IV-V	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider	Out of work, duration at discretion of provider
	Comment (GI-III)		Refer to specialist and physical therapy	Functional restoration

left up to random chance. Once randomization had occurred, both the study participant and the study personnel were informed of the grouping. Regardless of randomization, all participants were provided with information on the diagnosis and treatment of LBP as well as the new practice guidelines put forth by the ACP.<sup>[18]</sup>

## Statistical methods

A Chi-square analysis was used to compare physicians with access to the RTW guidelines tool compared to those without access but access to Education/Oswestry scale/RTW guideline separately.

## Ethics

This study was approved by the Internal Review Board of our institution.

## Results

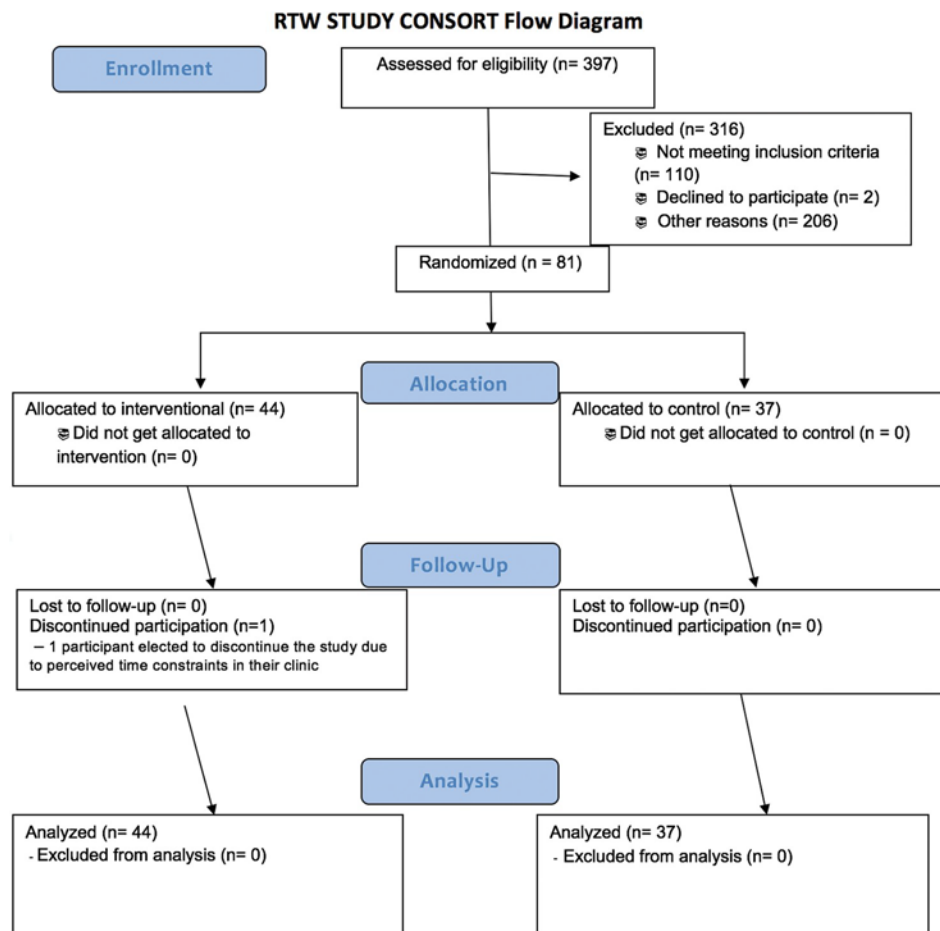
About 397 PCPs were identified as potential participants in our study, of those, 81 participants were enrolled [see Figure 1]. Forty-four were randomized into the intervention group and 37 into the control group. One participant from the interventional group withdrew from the study for personal reasons.

Characteristics of the participants including title, gender, ethnicity and clinical site are described in Table 3.

A total of 24,654 patient visits were identified from the participating PCPs during the 6 months of this study for both the interventional and control group. Charts were removed if the patient did not meet the inclusion criteria listed above or if there were duplicate charts. Only patient's first visit was included in the analysis ( $n = 2381$ ). Of the identified visit in the interventional group, 301 met the inclusion criteria for this study, whereas 256 patient visits met inclusion criteria in the control group [see Figure 2].

In the intervention group, 301 charts of patients with LBP met inclusion criteria. Of these, the interventional SmartPhrase was used in 7.3% of those encounters ( $n = 22$ ). In eight cases, all criteria were met for type of work, level of disability and RTW recommendations. Type of occupation and level of disability were recorded [see Table 4].

In the control group, 256 patient visits were determined to be true cases meeting the inclusion criteria of this study. Of these, the interventional SmartPhrase was used in 1.6% of those encounters ( $n = 4$ ). In 0 cases, all criteria were met for type of



**Figure 1:** Consort flow diagram for primary care physicians recruited, assessed for eligibility, signed informed consent and completed the study

work, level of disability and RTW recommendations. Type of occupation and the level of disability were recorded [see Table 4].

The SmartPhrase was used in 7.3% of cases in the intervention group as compared to 1.6% of the time in the control group ( $P \leq 0.001$ ). This was a statistically significant difference [Table 5].

## Discussion

The high volume of LBP patients presenting to primary care offices was reflected in our study. In a 6-month period, there were over 4000 encounters for individuals with the chief complaint of LBP among our 81 providers.

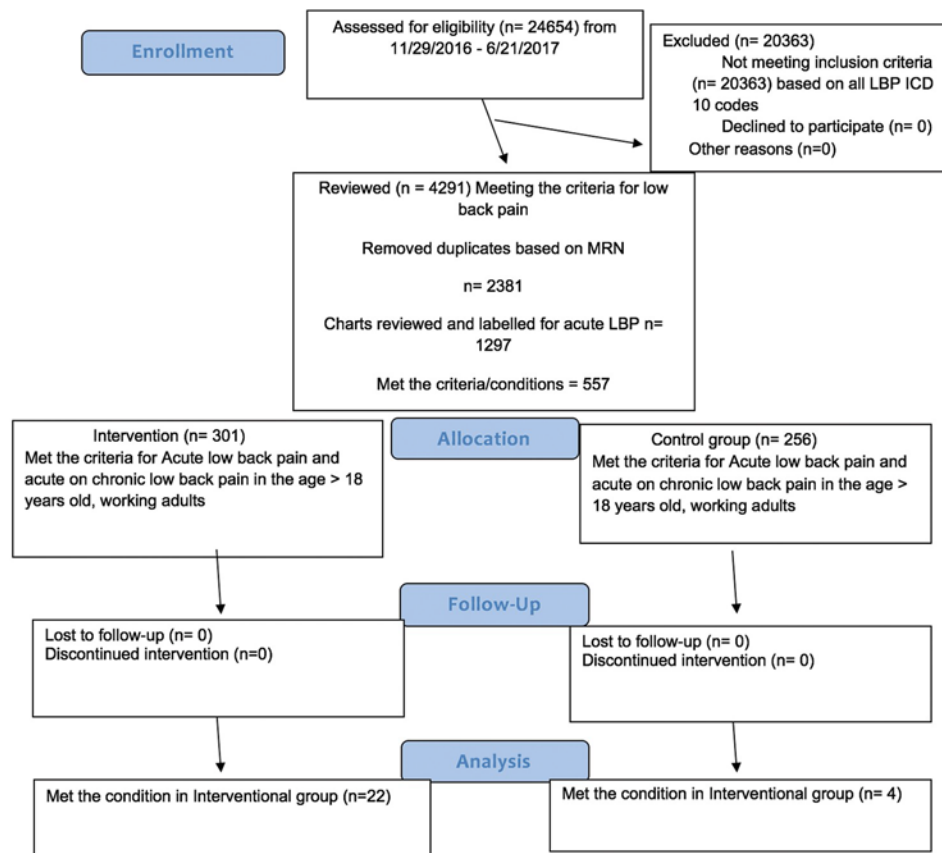
Our results show that PCPs frequently encounter patients with LBP, yet they rarely inquire about occupation, level of disability or offer RTW recommendations. Of the 557 patients seen with acute LBP in our dataset, only 26 patients were provided with RTW recommendations by 10 different PCPs. This is <5% of those presenting to our primary care clinics with this chief complaint.

To address LBP as a growing public health concern, the ACP has developed evidence-based practice guidelines to inform the treatment and management of LBP.<sup>[18]</sup> Among the

recommendations was the idea that ‘clinicians should also provide patients with evidence-based information with regard to the expected course, advise them to remain active as tolerated.’<sup>[18]</sup>

Those that create guidelines often lack the resources to either incorporate implementation advice or tailor guidelines to meet the unique needs of the frontline providers.<sup>[21]</sup> This hardship of translating guidelines into practice was evident in our study. The lack of application of the SmartPhrase, despite its accessibility, demonstrates that modifying physician behaviour to include RTW recommendations as part of their standard of care needs to be tailored to the individual practice group to ensure compliance. Our results suggest that interventions aimed at changing provider practice are possible when easily accessible learning tools are used, such as our EMR-integrated decision making tool.

Although this study utilized a randomization methodology, neither participants nor study personnel were blinded. This could have led to utilization bias of the SmartPhrase. This, however, was unavoidable as providers needed to be aware of what group they were in based on the EMR-integrated tool they were given. Another potential limitation is that rolling enrolment was used, therefore, some participants were included for the entire 6-month period while others for only part of this time. Interestingly, the providers enrolled later in the study



**Figure 2:** Consort flow diagram of patient charts assessed for inclusion in this study

**Table 3: Descriptive demographics of primary care physicians recruited into this study including their job title, gender, ethnicity and the clinical site at which they practice**

	Intervention (n=44) (%)	Control (n=37) (%)	Overall (n=81) (%)
<b>Title</b>			
Assistant professor	25 (56.8)	23 (62.16)	48 (59.26)
Associate professor	3 (6.8)	2 (5.4)	5 (6.2)
Director	2 (4.5)	2 (5.4)	4 (4.9)
Nurse practitioner	5 (11.4)	2 (5.4)	7 (8.6)
Residents	9 (20.5)	7 (18.9)	16 (19.8)
Professor	0 (0)	1 (2.7)	1 (1.2)
<b>Gender</b>			
Female	32 (72.7)	24 (64.9)	56 (69.1)
Male	12 (27.3)	13 (35.1)	25 (30.9)
<b>Ethnicity</b>			
Asian	6 (13.6)	9 (24.3)	15 (18.5)
Black/African American	3 (6.8)	0 (0)	3 (4.1)
More than one race	2 (4.5)	2 (5.4)	4 (4.9)
No data	2 (4.5)	4 (10.8)	6 (8.2)
White	31 (70.5)	22 (59.5)	53 (65.4)
<b>Clinic site</b>			
MSBI	11 (25.0)	5 (13.5)	16 (19.8)
MS-Q	2 (4.5)	3 (8.1)	5 (6.2)
MS-SL	2 (4.5)	1 (2.7)	3 (4.1)
MSH	29 (65.9)	28 (75.6)	57 (70.3)

saw as many or more patients with LBP as those enrolled early in the study. Lastly, the sample size could be considered small as only 81 participants were enrolled. This study served only as a pilot study and regardless of the limited number of study participants, this randomized control trial reached statistical significance.

The study demonstrated the magnitude of the problem in converting practice guidelines into clinical practice. This finding is echoed in a review article by Vander Schaaf and colleagues that outlined the barriers to implementing practice guidelines and the adoption of clinical practice guidelines in practice.<sup>[22]</sup> They found that practices often struggle to implement guidelines due to clinician hesitancy to change, difficulty navigating numerous recommendations<sup>[23]</sup> and resistance by patients. Specifically, some doctors prefer personalized care based on their existing knowledge and specific patient context.<sup>[22]</sup>

This underscores the importance of tailoring interventions to individual practice groups so that they are more easily adoptable. Similarly, constant re-education and support are needed in order for a new standard of care to be embraced. The literature suggests that interventions to translate practice guidelines into clinical practice are strongest when they utilize reminder systems, academic detailing and multiple individualized interventions.<sup>[23]</sup> Additionally, 'aligning incentives and providing education in various ways including educational outreach by

**Table 4: Recorded level of disability and type of work by practitioners in the interventional and control groups for patients presenting with acute and acute on chronic low back pain**

	Intervention <i>n</i> =301 (%)	Control <i>n</i> =256 (%)	Overall <i>n</i> =557 (%)
Oswestry score			
Grade 1 (0-20%) · min disability	7 (2.3)	0 (0)	7 (1.26)
Grade 2 (21-40%) · mod disability	11 (3.65)	0 (0)	11 (1.97)
Grade 3 (41-60%) · sev disability	2 (0.66)	0 (0)	2 (0.36)
Grade 4 (61-80%) · crippled	1 (0.33)	0 (0)	1 (0.18)
Grade 5 (81-100%) · complete disability	1 (0.33)	0 (0)	1 (0.18)
Missing	2 (0.66)	13 (5.08)	15 (2.69)
Not mentioned	277 (92.03)	243 (94.92)	520 (93.36)
Type of work			
Clerical work	50 (16.61)	26 (10.16)	76 (13.64)
Manual work	32 (10.63)	15 (5.86)	47 (8.44)
Heavy manual work	5 (1.66)	5 (1.95)	10 (1.80)
Not mentioned	69 (22.92)	126 (49.22)	195 (35.01)
Other	145 (48.17)	84 (32.81)	229 (41.11)

**Table 5: SmartPhrase use the interventional vs the control group**

	Intervention <i>n</i> =301 (%)	Control <i>n</i> =256 (%)	Overall <i>n</i> =557 (%)	<i>P</i>
Use of SmartPhrase				
Yes	22 (7.3)	4 (1.6)	26 (4.7)	
No	279 (92.7)	252 (98.4)	531 (95.3)	<0.001

respected clinicians, targeting early adopters and their social networks soon after new guidelines are released, and integrating guidelines into EMRs and other health information technology systems', will facilitate clinicians effectively and efficiently make sound clinical decisions.<sup>[22]</sup>

As such, to improve the response rate of study participants offering RTW recommendations, additional reminders and more individualized interventions may have been beneficial.

## Conclusion

Early intervention in patients with acute LBP is imperative to reduce the consequential burden of this chronic disease and mitigate the potential often devastating physical and economic burden it can create. PCPs need to be properly equipped to manage and treat these patients appropriately. This study reinforces the fact that the mere availability of evidence-based guidelines does not ensure their implementation and use in clinical practice or policy making. As such, a more tailored approach is necessary to ensure uptake and compliance.

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## Conflicts of interest

There are no conflicts of interest.

## References

- Centers for Disease Control and Prevention (CDC). Prevalence and most common causes of disability among adults—United States, 2005. *MMWR Morb Mortal Wkly Rep* 2009;58:421-6.
- Manchikanti L, Singh V, Falco FJE, Benyamin RM, Hirsch JA. Epidemiology of low back pain in adults. *Neuromodulation* 2014;17(Suppl 2):3-10.
- Yang H, Haldeman S, Lu ML, Baker D. Low back pain prevalence and related workplace psychosocial risk factors: A study using data from the 2010 national health interview survey. *J Manipulative Physiol Ther* 2016;39:459-72.
- Ma VY, Chan L, Carruthers KJ. Incidence, prevalence, costs, and impact on disability of common conditions requiring rehabilitation in the United States: Stroke, spinal cord injury, traumatic brain injury, multiple sclerosis, osteoarthritis, rheumatoid arthritis, limb loss, and back pain. *Arch Phys Med Rehabil* 2014;95:986-95.
- Pengel LH, Herbert RD, Maher CG, Refshauge KM. Acute low back pain: Systematic review of its prognosis. *BMJ* 2003;327:323-7.
- Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, *et al.* A systematic review of the global prevalence of low back pain. *Arthritis Rheum* 2012;64:2028-37.
- Ricci JA, Stewart WF, Chee E, Leotta C, Foley K, Hochberg MC. Back pain exacerbations and lost productive time costs in United States workers. *Spine* 2006;31:3052-60.
- Smith M, Davis MA, Stano M, Whedon JM. Aging baby boomers and the rising cost of chronic back pain: Secular trend analysis of longitudinal Medical Expenditures Panel Survey data for years 2000 to 2007. *J Manipulative Physiol Ther* 2013;36:2-11.
- Institute of Medicine (US) Committee on Advancing Pain Research C, and Education. *Relieving pain in America*:

- A blueprint for transforming prevention. Care, Education, and Research. Washington (DC): The National Academies Press; 2011.
10. National Institute of Neurological Disorders and Stroke. Low Back Pain Fact Sheet. 2013. NIH Publication No. 15-5161. Available from: [http://www.ninds.nih.gov/disorders/backpain/detail\\_backpain.htm](http://www.ninds.nih.gov/disorders/backpain/detail_backpain.htm). [Last accessed on 2018 Sep 22].
  11. Fritz JM, Kim J, Dorius J. Importance of the type of provider seen to begin health care for a new episode low back pain: Associations with future utilization and costs. *J Eval Clin Pract* 2016;22:247-52.
  12. 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. doi: 10.1002/14651858.CD007612.pub2.
  13. Di Mattia F, Tejani S, Hall T. Bed rest for sciatica: A closer look at the evidence. *J Orthop Sports Phys Ther* 2018;48:436-8.
  14. Oliveira CB, Maher CG, Pinto RZ, AC Traeger, Lin CWC, Chenot JF, *et al.* Clinical practice guidelines for the management of non-specific low back pain in primary care: An updated overview. *Eur Spine J* 2018. doi: 10.1007/s00586-018-5673-2.
  15. Ho f s t e e DJ 1, G i j t e n b e e k JM, H o o g l a n d PH, van Houwelingen HC, Kloet A, Lötters F, *et al.* Westeinde sciatica trial: Randomized controlled study of bed rest and physiotherapy for acute sciatica. *J Neurosurg* 2002;96 (1 Suppl):45-9.
  16. Rozenberg S, Delval C, Rezvani Y, Olivieri-Apicella N, Kuntz JL, Legrand E, *et al.* Bed rest or normal activity for patients with acute low back pain: A randomized controlled trial. *Spine* 2002;27:1487-93.
  17. Shaw WS, Nelson CC, Woiszwilllo MJ, Gaines B, Peters SE. Early return to work has benefits for relief of back pain and functional recovery after controlling for multiple confounds. *J Occup Environ Med* 2018. doi: 10.1097/JOM.0000000000001380.
  18. Qaseem A, Wilt TJ, McLean RM, Forciea MA, for the Clinical Guidelines Committee of the American College of Physicians. Noninvasive treatments for acute, subacute, and chronic low back pain: A clinical practice guideline from the American College of Physicians. *Ann Intern Med* 2017;166:514-30.
  19. Davidson M, Keating J. A comparison of five low back disability questionnaires: Reliability and responsiveness. *Phys Ther* 2002;82:8-24.
  20. Work Loss Data Institute. Low back -- lumbar & thoracic (acute & chronic). Encinitas (CA): Work Loss Data Institute; 2013 Dec 4. Available from: <http://www.guideline.gov/content.aspx?id=47586>. [Last accessed on 2016 Oct 10].
  21. Gagliardi AR, Brouwers MC. Do guidelines offer implementation advice to target users? A systematic review of guideline applicability. *BMJ Open* 2015;5:1-7.
  22. 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;76:230-4.
  23. Davis DA, Taylor-Vaisey A. Translating guidelines into practice: A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *CMAJ* 1997;157:408-16.

