ARTICLES

Physiotherapy and Low Back Pain in the Injured Worker: An Examination of Current Practice During the Subacute Phase of Healing

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ABSTRACT

Purpose: To describe current physiotherapy practice for injured workers with subacute low back pain (SA-LBP).
Method: A chart audit of discharged workers was conducted over three episodes of care: 4–6 weeks (T1), 6–8 weeks (T2), and 8–10 weeks (T3) post-injury. The prevalence and reproducibility of parameters for common interventions were calculated as the percentage of active charts over time. Focus groups were used to validate audit results and deepen our understanding of practice.
Results: In all, 164 charts were audited. The most prevalent interventions were (1) for manual therapy, joint mobilization and traction; (2) for electrophysical agents (EPAs), heat, ultrasound, and interferential therapy; and (3) for exercise, core stabilization exercises. Transcript analyses revealed that participants viewed injured workers with SA-LBP in a positive light, emphasized the importance of physiotherapy, and discussed SA-LBP in five themes: time frame, non-specific diagnosis, mixed client outlook, change in pain presentation, and the transition from a passive to a more active treatment approach.
Conclusions: The pattern of decreasing passive and increasing active interventions is consistent with the focus-group participants' description of how they approach treatment of clients with SA-LBP. Also noted was a higher prevalence of interventions poorly supported by evidence and lower prevalence of interventions well supported by evidence.

Key Words: chart audit, electrophysical agents, exercise, focus groups, manual therapy, subacute low back pain

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RÉSUMÉ

Objectif : Décrire la pratique actuelle en physiothérapie pour les accidentés du travail atteints d'une lombalgie dans la phase subaiguë de guérison.
Méthode : On a examiné les dossiers de travailleurs ayant reçu leur congé, et ce, en fonction de 3 périodes de traitement : de 4 à 6 (T1), de 6 à 8 (T2) et de 8 à 10 semaines après la survenue de la lésion. La prévalence et la reproductibilité des paramètres inhérents aux interventions courantes ont été calculées par rapport au pourcentage des dossiers actifs au fil du temps. On a fait appel à des groupes de discussion pour valider les résultats de l'examen des dossiers et mieux comprendre la pratique.
Résultats : L'examen a porté sur 164 dossiers. Les modalités d'intervention les plus courantes ont été (1) la mobilisation articulaire et la traction en matière de thérapeutique manuelle ; (2) la chaleur, les ultrasons et l'électrothérapie à courants interférentiels pour ce qui est des agents électrophysiologiques et (3) les exercices de stabilisation des muscles du tronc pour ce qui est des exercices. L'analyse des transcriptions a révélé que les participants avaient une opinion positive des accidentés du travail souffrant de lombalgie subaiguë; ils ont souligné l'importance de la physiothérapie et ont abordé la lombalgie subaiguë en fonction de 5 thèmes : le bloc de temps, le diagnostic non spécifique, le portrait diversifié de la clientèle, le tableau changeant de la douleur et la démarche thérapeutique (transition d'un traitement passif à un traitement plus active au cours de la période du traitement).
Conclusions : La tendance voulant que l'on intervienne de plus en plus activement cadre avec la façon dont les groupes de discussion ont décrit leur démarche thérapeutique auprès des patients souffrant de lombalgie subaiguë. Il est par ailleurs à noter que la prévalence des interventions moins bien étayées était supérieure à celle des interventions recueillant un fort appui.

Mots clés: agents électrophysiologiques, examen de dossiers, exercice, groupes de discussion, lombalgie subaiguë, thérapeutique manuelle

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INTRODUCTION

Chronic pain causes suffering, has no apparent biological value,[1] and is resistant to treatment.[2] In Canada, chronic pain is estimated to cost $6 billion each year.[3] There is a high prevalence of chronic pain,[3–5] with chronic low back pain (LBP) the primary cause of absenteeism and disability in industrialized countries. Scientists and clinicians continue to search for improved therapeutic interventions to prevent chronic pain.[2,6] It has been stated that this is a major focus in research.[7] In physiotherapy, however, attention to our interventions in the subacute phase of healing is not at a level that enables us to contribute to an understanding of preventive actions.

Effective intervention at the subacute phase of healing could play a critical role in the prevention of recidivism and chronicity, particularly with LBP.[2,8] Clients in the subacute phase of healing are frequent consumers of primary-care physiotherapy. Although there are guidelines providing evidence-based interventions for the management of acute and chronic LBP,[9–17] there are no guidelines for management in the subacute phase of LBP (SA-LBP). This gap is likely due to the challenge of studying this population, particularly with respect to diagnostic terminology and variability in presentation and response to treatment.

This mixed-method investigation examined the practice patterns of physiotherapists treating injured workers with SA-LBP to understand decision making and selection of interventions. The information obtained from this study could direct focused effectiveness studies leading to the development of clinical practice guidelines. Chart audit analyses reveal the prevalence of interventions during the period between 4 and 10 weeks post-injury. Focus groups provide insights such as the participants' beliefs and attitudes about SA-LBP, a validation of the chart audit findings, and identification of some of the challenges of documenting treatment.

Literature Review

The study of SA-LBP is complicated by a lack of consensus on terminology[18–22] and by inconsistency with respect to an operational definition. Like acute and chronic phases, the subacute phase is generally defined by post-injury duration,[23] which has been variously defined as 4–12,[8,24] 6–12,[14,25] and 6–8 weeks.[26] One explanation of these differences may be that both the progression from acute to subacute and the duration of a subacute phase are influenced by access to care, re-injury, and repeated painful experiences.[23] Perhaps this is why physiotherapists rely on the client's response to tissue loading to determine the phase of healing.[27,28] For the purposes of this study, the definition we have used is 4–10 weeks post-injury. This time frame is consistent with most of the examples cited above; as well, the clients in the current study were referred to a standardized treatment programme after 10 weeks.

Another challenge in this field is the heterogeneity of diagnoses. Current guidelines for clinical practice do not include specific diagnoses; instead, the terms ''non-specific back pain'' and ''mechanical LBP'' are most common.[29] In this study, we have not considered specific diagnoses; all charts with ''low back pain'' were included in the chart audit.

Because of these inconsistencies in terminology, time frame, and diagnosis of SA-LBP, physiotherapists rely primarily on their clinical reasoning skills to evaluate the client and prescribe an appropriate intervention plan.[30–32]

Interventions

In the absence of clinical practice guidelines, an examination of the literature reveals three publications that can inform us of practice patterns for SA-LBP.[33–36] Jette and Delitto collected data on outpatients with lumbar impairment ($n = 1279$) during three episodes of care.[33] They found a decrease in most electrophysical agents (EPAs) and manual therapy and an increase in exercise across time. There was no analysis for SA-LBP, although data coding revealed a decreasing prevalence of heat and electrical stimulation with chronicity.[34] Foster et al. reported on a descriptive study of LBP management.[33] Responses to their postal survey ($n = 813$) revealed a higher prevalence of Maitland mobilization and McKenzie approaches, along with abdominal exercise, passive stretching and neural tension, and EPAs, and less use of manipulation, fitness programmes, and multidisciplinary approaches. There was no distinction between acute and chronic pain, and the lack of clarity in application of the interventions limits the usefulness of their findings. Poitras et al. reported the results of a survey of management of work-related LBP.[35,36] This report focused on objectives and interventions across three episodes of care for clients with radiating and non-radiating pain. Like Jette and Delitto, Poitras et al. found a pattern of decreasing passive interventions and increasing active interventions over time. However, there was no distinction of phases of healing, and it is unclear whether the treatment approach was the same for each client. These three studies are useful in identifying interventions likely to be used in LBP, but they lacked specificity by phase of healing.

In addition to the results of these studies, consultation of current textbooks[37] and discussions with physiotherapists working with injured workers with SA-LBP revealed three categories of intervention likely be used at this

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Table 1 Details of Publications Reviewed for Evidence for the Use of Manual Therapy in SA-LBP Management

Design and Level of Evidence	*Publication*	*Population*	*Intervention*	*Outcome*	*Comments*
Level 1: Meta-analysis	Assendelft et al. (2004)[9]	LBP	S-MAN vs. sham: 2 trials S-MAN vs. ''other'' therapies: 12 trials	S-MAN vs sham: • Short-term reduction in pain (10 mm difference; 95% CI: 2, 17 mm) • Clinically relevant but non-significant improvement in function (2.8 points difference in Roland Morris Disability scale; 95% CI: 0.1, 5.6) S-MAN vs ''other'' therapies: • Short-term pain relief compared to ineffective or harmful therapies (4 mm difference; 95% CI: 1, 8 mm)	No trials specific to SA-LBP Direct contrast to previous meta-analyses that supported S-MAN as having Level 1 evidence of effectiveness
	Furlan et al. (2004)[88]		Acute: MASS vs. S-MAN: 1 trial ($n=90$) Chronic: MASS vs. sham: 1 trial ($n=25$)	Acute: MASS vs. S-MAN vs. electrical stimulation: • no significant difference in pain reduction, function, or mobility Chronic: MASS vs. sham therapy (LASER): • positive effect at 1 month on pain intensity (−0.80 difference; 95% CI: −1.37, −0.23) and function (−1.06 difference; 95% CI: −1.65, −0.47)	
Level 2: Systematic Reviews	Pengel et al. (2002)[55]	RCTs from 19 databases		S-MAN improved pain (effect size [ES] 0.5; 95% CI: 0.1,1.0) and disability (ES 1.3; 95% CI: 0.5, 2) compared to TENS. S-MAN improved disability (ES 1.5; CI: 0.8, 2.2) compared to MASS.	Three high-quality S-MAN studies SA-LBP was expanded to cover 1–24 weeks
	Bronfort et al. (2004)[89]	31 trials: 6 acute, no subacute		Moderate evidence for *superior* short-term pain relief (3 days) and 50% reduced disability with S-MAN ($n=26$) compared to S-MOB ($n=28$) Limited evidence for *superior* recovery rate (i.e., symptom-free status) with S-MAN ($n=24$) compared to a combination of diathermy, exercise, and ergonomic advice ($n=24$)	Level of evidence: moderate Outcome measures, patient characteristics, and treatment methods too dissimilar for data pooling
Level 3: Evidence-Based Clinical Guidelines	Philadelphia Panel (2001)[24]	SA-LBP 4–12 wks; 2 RCTs	Mechanical traction	No clinically important benefit was demonstrated.	
	Bekkering et al. (2003)[45]	Non-specific SA-LBP 4 RCTs	MASS	Evidence of effectiveness of MASS in SA-LBP is unclear	Methodology of 4 RCTs is weak; evidence is contradictory
	Chou et al. (2007)[90]	SA-LBP and C-LBP	MASS S-MAN	Net benefit: Moderate • Fair evidence of no effect versus placebo, sham, or no treatment Net benefit: Moderate • Good evidence of positive effect versus placebo, sham, and no treatment ($n=13$ RCTs)	Based on 4 systematic reviews (3 of high quality) Based on 29 systematic reviews (15 of high quality)
	Australian Physiotherapy Association, LBP Position	A-LBP A-LBP, SA-LBP, and C-LBP	S-MAN MASS	Sufficient evidence for S-MAN in improving clinical outcomes for A-LBP MASS not recommended for treating LBP except as an adjunct	Level of evidence: I & II (6/7 systematic reviews; 13/19 RCTs) Level of evidence: I & II (1/2 systematic reviews; 2/4 RCTs)

	Statement—August, 2002				
Level 4: Randomized Controlled Trials	Hanrahan et al. (2005)[92]	Mechanical A-LBP (<48 hrs duration) Subjects: male college athletes (mean age: 20.3 years)	S-MOB: ($n=9$) (2 reps, 30 secs at each of 3 spinal levels) Control: ($n=10$) (rest in prone)	S-MOB group: during resisted trunk extension subjects reported less pain (McGill Questionnaire) ($p<0.05$) and increased force production (dynamometer) ($p<0.001$) compared to control group.	Weaknesses: Raters not blinded; subjects were truly A-LBP; small number of subjects
	Lewis et al. (2005)[91]	C-LBP (>3 mos)	Individual treatment: MAN-T plus spinal stabilizations exercises (30 min weekly for 8 weeks) ($n=29$) Exercise class (aerobics, strengthening, ROM) plus MAN-T as required (60 min weekly for 8 weeks) ($n=33$)	Both groups had decreased disability (Quebec Disability Questionnaire) and increased spinal ROM at 12-month follow-up. Exercise class had greater exercise compliance and self-reported self-confidence. Exercise class costs were 40% less.	Strengths: Included intention-to-treat analysis; raters were blinded; long-term follow-up (6 and 12 mos) Weaknesses: No power calculation; exercise subjects also received some individual treatment
	Schenk et al., (1997)[93]	Asymptomatic subjects with limited lumbar extension ROM	MET group: 8 MET sessions in 4 wks ($n=13$) Control: No treatment ($n=13$)	MET group: greater lumbar extension ($p<0.05$) at 8-week follow-up	Strengths: Balanced design re: gender Weaknesses: Subjects did not have LBP; raters not blinded; tested within-group differences with independent *t*-tests

A-LBP = acute low back pain; SA-LBP = subacute low back pain; C-LBP = chronic low back pain; S-MAN = spinal manipulation; S-MOB = spinal mobilizations; MASS = massage; MAN-T = manual therapy (combination of any or all of S-MOB, McKenzie therapy, Mulligan mobilizations); MET = muscle energy techniques; ROM = range of motion; LASER = light amplification by stimulated emission of radiation; TENS = transcutaneous electrical nerve stimulation; RCTs = randomized controlled trials; reps = repetitions

time: manual therapy, EPAs, and exercise. Tables 1–3 contain details of publications reviewed for evidence of the effectiveness of these interventions in managing clients with SA-LBP.

Using the Canadian definition of manual therapy—''A comprehensive system of diagnosing and treating neuromusculoskeletal disorders involving specific skills, including assessment, mobilization, manipulation and education, including exercise, to restore optimal motion, function and/or reduce pain''[38(p. 3)]—as a guide, we examined charts for evidence of the following techniques: neurodynamic mobilization, muscle energy, traction, massage, spinal/pelvic joint mobilization, and spinal manipulation. Any of these would be an appropriate choice for SA-LBP.[39,40] However, there is little or no consensus regarding *which* to use, *when* to use it, or in *what combination*.[41] A review of the literature (Table 1) revealed that there are many randomized controlled trials (RCTs) investigating the effectiveness of spinal manipulation but that substantially less evidence exists on the effectiveness of other manual techniques.

EPAs such as transcutaneous electrical nerve stimulation (TENS), neuromuscular electrical nerve stimulation (NMES), interferential therapy (IFT, also known as interferential current, IFC), high-voltage pulsed current (HVPC), ultrasound (US), low-level laser therapy (LLLT), and acupuncture are typically used in the management of pain and inflammation and in muscle strengthening, and thus may be used in treating clients with SA-LBP.

Research specifically examining the effectiveness of these agents for SA-LBP is limited (see Table 2).[42,43] Furthermore, current evidence-based clinical practice guidelines (EBCPGs) are of little assistance, as issues related to parameters (e.g., treatment with different dosages) are not addressed.[24,44,45]

In recent reviews of exercise and LBP (see Table 3), the importance of activity and exercise is highlighted. However, the existing research is limited and of poor quality, owing to inadequate descriptions of how activity and exercise are prescribed, inconsistencies in operational definitions and outcome measures used, poor control over important study factors, and, consequently, low reproducibility.[8] Clinical practice guidelines (CPG) for acute LBP are inadequate, as the recommendations to keep active and to add ''exercise'' during the subacute phase of healing are too vague.[24] A recent CPG indicated that although exercise is recommended, there is no strong evidence to direct when exercise should begin and there is moderate support for intense, interdisciplinary rehabilitation (including exercise) and functional restoration.[46] One exercise approach not represented in these reviews is the widely used trunk/core stabilization.[21,47] Evidence supporting the effectiveness of core stabilization exercises for LBP is limited, and, to date, this approach has not been studied in SA-LBP.[48–50]

Table 2 Details of Publications Reviewed for Evidence for the Use of Electrophysical Agents in SA-LBP management

Design and Level of Evidence	*Publication*	*Population*	*Intervention*	*Outcome*	*Comments*
Level 1: Meta-analysis	Enwemeka et al. (2004)[94]	34 peer-reviewed papers on tissue repair 9 peer-reviewed papers on pain control (Trials not specific to LBP)	Calculated effect sizes for 55 outcomes of laser treatment	Positive effect of various wavelengths on tissue repair ($d = \pm 1.81$; $n = 46$): 632.8 nm = highest treatment effect ($d = +2.44$); 780 nm = lowest treatment effect ($d = 0.60$) Positive overall treatment effect for pain control ($d = \pm 1.11$) Fail-safe $n = 370$ for tissue repair, $n = 41$ for pain control.	The most impressive finding is the fail-safe numbers—the number of studies in which LLLT would have to have negative or no effect in order to nullify the outcome (i.e., there would need to be 41 studies with no effect or a negative effect on pain control in order to nullify the findings of this meta-analysis). Heterogeneous collection of study populations
Level 2: Systematic Reviews	Pengel et al. (2002)[55]	13 RCTs from 19 databases	Calculated effect sizes and 95% CIs for pain and disability; risk ratios for RTW	If SA-LBP defined as 6 wks—3 mos, no evidence of high internal validity for any intervention If subacute LBP defined as 7 days–6 mos, TENS may be effective	If definition of SA-LBP is broadened to include earlier and later time periods, the effectiveness of TENS is better supported.
Level 3: Evidence-Based Clinical Guidelines	Philadelphia Panel (2001)[24]	SA-LBP defined as 4–12 wks		For TENS in SA-LBP there were insufficient or no data to draw conclusions. For electrical stimulation in SA-LBP there were insufficient or no data to draw conclusions. There are no data for effectiveness of US in LBP.	
	Bekkering et al. (2003)[45]	188 papers SA-LBP defined as 7–12 wks	Summarized effectiveness of modalities by grouping findings into the following categories: strong evidence of effectiveness, limited/moderate evidence of effectiveness, effectiveness unclear, moderate evidence of ineffectiveness, strong evidence of ineffectiveness	Effectiveness of electrotherapy and TENS unclear for SA-LBP Effectiveness of LLLT unclear for SA-LBP Effectiveness of US unclear for SA-LBP	Included papers on the use of electrical stimulation in non-LBP and did not identify papers specific to LBP
	Ashton et al. (2004)[44]	A-LBP defined as < 3 months	Assessed level of evidence using the SIGN (Scottish Intercollegiate Guidelines Network) classification system	Grade A (i.e., meta-analysis, systematic review, RCT, or body of evidence, with very low risk of bias) evidence that there was no improvement with TENS Insufficient evidence for physical agents and passive modalities Insufficient evidence for efficacy of US	No clarification provided as to which modalities were included in the category of ''physical agents and passive modalities''
	Australian Physiotherapy Association LBP Position Statement			Did not include a statement on electrical stimulation, LLLT, or US for A-LBP or SA-LBP	
Level 4: Randomized Controlled Trials	Hurley (2001)[43]	LBP $\leq$ 3 mos $n = 60$ 19–62 yrs	3 groups: (1) IFT at painful area plus Back Book, (2) IFT at spinal nerve plus Back Book, (3) control + Back Book only	At 3 months, the group who received the IFT at the spinal nerve and the Back Book had more significant improvement in Roland Morris scores than the other groups ($p = 0.030$).	Weaknesses: No calculation of power (providing data for power calculation for subsequent study); single blinded Strengths: Particularly strong finding in favour of electrical stimulation, as the IFT at the spinal

		IFT = 3.8 KHz; 140 Hz constant; 130 ms pulse width, 30 min		nerve group actually had the highest risk of LBP chronicity on entry to the study
Hurley et al. (2004)[95]	LBP < 12 wks (4–12 wks) $n = 240$ 18–65 yrs	3 groups: (1) MT, (2) IFT, (3) combined therapy (CT) = MT and IFT IFT: 3.85 KHz; 140 Hz; 130 ms, 30 min; spinal nerve placement	All 3 interventions reduced functional disability and pain and increased quality of life to approximately the same degree. There was no significant difference between groups for recurrence, work absenteeism, medication consumption, exercise participation, or health care use at 12 months.	Weaknesses: Single blinded Strengths: Ensured baseline comparability; concealed allocation; power analysis; data from dropouts (15%) included in analysis as intention to treat
Herman et al. (1994)[96]	A-LBP defined as 3–10 wks 58 industrial workers	2 groups: (1) Electrical stimulation (200 Hz × 15 min at ''tingling'' intensity then 4 Hz for 15 min to ''twitch'' intensity) and exercise; (2) placebo electrical stimulation and exercise	No significant difference between groups on any of the outcome measures	Weaknesses: No control group, single blinded, and dosage parameters not individually adjusted; disproportionate dropout rate, especially from electrical stimulation group (49.3% of TENS group vs. 11.3% of placebo group) Strengths: Inclusion of data from dropouts in data analysis
Glaser et al. (2001)[97]	LBP > 6 wks duration 18–80 yrs ± radicular pain $n = 80$	2 groups: (1) Exercise and electrical stimulation; (2) exercise and placebo electrical stimulation	Electrical stimulation at an intensity of motor stimulation had lasting therapeutic effects at 6 months even though stopped at 2 months.	Weaknesses: Significant number of dropouts Strengths: Original power calculation assumed normalcy of data, and changing to non-parametric statistical calculations improved the statistical power. (Placebo group had intensity of electrical stimulation to sensory level rather than no stimulation.)
Werners et al. (1999)[98]	$n = 152$ 20–60 yrs No radiation of pain	6 sessions over 2–3 wks IFT = 30–60 Hz paravertebrally × 10 min	Reduction in ODI and VAS for pain with IFT or traction and massage but no significant difference between groups	Weaknesses: No control group; no placebo; no report of blinding Strengths: Power analysis
Pope et al. (1994)[99]	LBP 3–6 mos 18–55 yrs No radicular signs	MT: 3×/wk × 3 wks MASS: soft-tissue effleurage 15 min 3×/wk × 3 wks Electrical stimulation (TMS): 37 pps; biphasic; 2 sec ramp up, 6 sec on; 2 sec ramp down; off 6 sec; 225 ms; electrode placement—either side of spine; amplitude strong but comfortable; at least 8 hrs/day, minimum of 1 hr at a time Corset: only off 10 min for no more than 3×/day	No significant difference between treatment methods	The selected parameters for electrical stimulation were inappropriate for strengthening muscle.
Hseih et al. (1992)[100]	LBP 3 wks–6 mos $n = 85$ 18–55 yrs	Corset: fitting, 8 hrs/day + weekly follow-up for 3 wks MASS: hot pack for 10 min; massage 3×/wk × 3 wks Manipulation; hot pack + ''diversified'' manipulation of LSp and SIJ 3×/wk × 3 wks Electrical stimulation (TMS): 4 electrodes around pain; 225 ms; 37 Hz, 2 sec ramp up, 6 sec off for 8 hrs	Both ODI and Roland-Morris showed significant differences between manipulation and massage ($p = 0.05$). Roland Morris: significant difference between manipulation and TMS and between corset and MASS.	Weaknesses: Only 63/85 subjects finished study, and there was no inclusion of data of dropouts in the analysis; thus, internal validity is jeopardized. As per Pope et al. study (1994),[99] the location and parameters for electrical stimulation were inappropriate for effective muscle stimulation.

(Continued)

Table 2 Details of Publications Reviewed for Evidence for the Use of Electrophysical Agents in SA-LBP management

Design and Level of Evidence	*Publication*	*Population*	*Intervention*	*Outcome*	*Comments*
	Tsukayama et al. (2002)[101]	LBP > 2 wks No sciatica $n = 20$ > 20 yrs	2×/wk × 2 wks 2 groups: (1) Electro-acupuncture: 1 Hz × 15 min at 4 points bilaterally with intensity to muscle stimulation; (2) TENS: 8 electrodes; no skin prep; intensity to max comfortable without muscle action; 1 Hz unknown pulse width	Mean VAS of electroacupuncture significantly less than that of TENS ($p < 0.01$, 95% CI: 4.126, 37.953) JOA in electro-acupuncture improved significantly; that for TENS did not change significantly.	Weaknesses: Small sample size with no power calculation, yielding high probability of Type II error; very wide confidence intervals; included acute, subacute, and chronic LBP patients Strengths: Randomization; concealed allocation; 1 dropout and data included in analysis
	Basford et al. (1999)[102]	LBP > 30 days No radiation of pain $n = 63$ 18–70 yrs	IR LASER (542 mW/cm^2) on 8 points for 90 sec each 3×/wk × 4 wks	LLLT increased function and decreased pain modestly. This effect lessened with time.	Weaknesses: Heterogenous population of subacute and chronic LBP Strengths: Power calculation, randomized, double blinded; dropouts reported
	Ansari et al. (2006)[42]	Nonspecific LBP > 3 mos Non-radiating $n = 10$ 18–65 yrs	US or sham US for 10 sessions, 3×/wk, every other day	US group had significantly better Functional Rating Index and ROM but not significantly different EMG.	Weaknesses: Heterogenous population of subacute and chronic LBP; no exercise programme; no power calculation; $n = 10$ and a 25% dropout rate, thus the internal validity of the study is suspect

LBP = low back pain; A-LBP = acute low back pain; SA-LBP = subacute low back pain; TENS = transcutaneous electrical nerve stimulation; US = ultrasound; IFT = interferential therapy; MT = manipulative therapy; MASS = massage; TMS = transcutaneous muscular stimulation; ODI = Oswestry Disability Index; VAS = visual analogue scale; JOA = Japanese Orthopaedic Association Score; RCTs = randomized controlled trials; LLLT = low-level laser therapy; IR LASER = infrared light amplification by stimulated emission of radiation; RTW = return to work; EMG = electromyography; ROM = range of motion; LSp = lumbar spine; SIJ = sacroiliac joint; ms = microseconds; Hz = hertz; KHz = kilohertz; nm = nanometre; pps = pulses per second; mW = milliwatt

Clients with SA-LBP represent a large sector of primary-care physiotherapy, but there are no specific descriptive studies in this practice area. Inconsistent terminology, variable time frames, and diagnostic inconsistencies confound investigation, and management guidelines do not exist. With the intent to contribute constructively to this important research area, this mixed-method study examined practice in a group of primary-practice physiotherapy clinics that treat a large number of clients with LBP per year.

METHODS

Chart Audit Methods

All aspects of this study were reviewed and approved by ethics committees at Dalhousie University and the University of British Columbia and by the Medical Review Committee of the Workplace Health, Safety and Compensation Commission of New Brunswick (WHSCC-NB).

This study used the charts of injured workers treated in WHSCC-NB approved clinics. These are private clinics, treating primarily clients with musculoskeletal complaints, with and without insurance coverage. From all LBP claims ($N = 2{,}400$) between October 2004 and October 2005, charts of all workers who received physiotherapy services within 4 weeks of the onset of their injury and had been discharged ($n = 240$) formed the primary data set for this study. Charts were collected from approximately 60 clinics. Copies of blinded charts were sent to the researchers; the order in which the charts were to be reviewed was randomized prior to auditing.

An interrater agreement study for audit teams was conducted. Percent agreement measured interrater agreement of both ordinal and nominal categorical data.[51] A reported intervention was referred to as an ''occurrence''; interventions not reported were referred to as non-occurrences. Occurrence and non-occurrence agreement was used to determine percent agreement by calculating the number of times the auditors agreed that an intervention was or was not reported.[51] The number of agreed occurrences and non-occurrences were used to calculate percent agreement and to compare results between auditing pairs.

Two teams, each of two raters, audited charts for entries at three treatment episodes: T1 (4–6 weeks post-injury), T2 (6–8 weeks post-injury), and T3 (8–10 weeks post-injury). The charts were examined for documentation of (1) manual therapy, (2) EPAs, and (3) exercise prescription. In addition to the occurrence of the above items, the auditors examined parameters for each intervention to determine whether a treatment was reproducible by another physiotherapist. Key parameters were chosen for each intervention (e.g., electrode placement, number of repetitions).

Table 3 Details of Publications Reviewed for Evidence for the Use of Exercise in SA-LBP management.

Design and Level of Evidence	*Publication*	*Population*	*Intervention*	*Outcome*	*Comments*
Level 1: Meta-analysis	Hayden et al. (2005)[14]	Six RCTs for SA-LBP (12 wks)	Graded-activity exercise programmes in the occupational setting	Some evidence for graded activity; for other types of exercise, evidence is unclear	
	Kool et al. (2004)[103]	14 RCTs for non-specific non-acute LBP	Exercise (work hardening, stretching and training, back school, graded activity, Mensendieck exercise, multidisciplinary exercise, medical exercise, individually tailored exercise, progressive exercise) vs. usual care by physician (rest, advice, medication, sick listing, and physical therapy)	Strong evidence that exercise reduces sick days during the first year after treatment (ES -0.24; 95% CI: -0.36, -0.11), especially in clients with a higher degree of disability	A mix of exercises, unclear which has an effect
Level 2: Systematic Reviews	Pengel et al. (2002)[55]	RCTs from 19 databases	Exercise class with stretching, aerobic, and strengthening aspects 2×/wk × 4 wks	When SA-LBP definition was extended to 6 months' duration, high-quality evidence was found for an exercise programme on disability.	Inconsistent definition of SA-LBP
	Clare et al. (2004)[104]	3 RCTs studied short-term spinal pain < 3 mos	McKenzie therapy, education, strength training, spinal mobilization	Short term follow-up favoured McKenzie therapy (pooled ES: -8.6; CI: -13.7, -3.5)	Large variance in presentation of LBP in studies
Level 3: Evidence-Based Clinical Guidelines	Philadelphia Panel (2001)[24]	SA-LBP 4–12 wks 3 RCTs for exercise	Therapeutic exercise: McKenzie, Kendall, and strengthening, 2×/wk × 4 wks	Therapeutic exercise provided more pain relief than control by 10% for strengthening, 11% Kendall, 50–57% for McKenzie.	
	Abenhaim et al. (2005)[8]	SA-LBP (4–12 wks) Group 1: LBP with no radiation Group 2: LBP radiating no further than the knee Group 3: LBP radiating beyond the knee with no neurological signs Group 4: LBP radiating to a precise and entire leg dermatome, with or without neurological signs	Recreational and sports-related activities, occupational activity	Recommendations for SA-LBP, no bed rest for any group. Groups 1 and 2: A and E are recommended (supported by scientific evidence); W as tolerated with ergonomic and occupational medicine evaluation after 4 weeks as required is recommended and is consistent with scientific evidence. Group 3: A is recommended with scientific evidence, E is recommended on task force consensus, and W is recommended consistent with scientific evidence. Group 4: A and E are authorized on task force consensus; W is authorized consistent with scientific evidence.	
	Chou et al. (2007)[46]	SA-LBP (4–8 wks)	Intense interdisciplinary rehabilitation (physician consult coordinated; psychological, physical therapy, social, or vocational intervention) and functional restoration with a cognitive-behavioural component	Moderately effective	
Level 4: Randomized Controlled Trials	Moffett et al. (1999)[87]	187 patients with mechanical LBP 4 wks–6 mos	6 wks of group exercise including strengthening, stretching, relaxation, and education	At 6 months and 1 year, intervention group showed significantly greater improvement on disability questionnaire (mean difference in changes 1.35, 95% CI: 0.13, 2.57). At 1 year, intervention group was significantly better on Aberdeen scale (4.44, 95% CI: 1.01, 7.87) and reported only 378 days off work compared to 607 for control group.	

(Continued)

Table 3 Details of Publications Reviewed for Evidence for the Use of Exercise in SA-LBP management.

Design and Level of Evidence	*Publication*	*Population*	*Intervention*	*Outcome*	*Comments*
	Staal et al. (2004)[86]	Injured workers with LBP	Graded activity—a physical exercise programme based on operant-conditioning principles	Graded group more effective in significantly improving RTW considering 50 days after randomization. Hazard ratio was 1.9 (95% CI: 1.2, 3.2; $p=0.009$)	LBP duration (4–14 wks) covered subacute and chronic phases.
	Ostelo et al. (2003)[85]	First-time lumbar disc surgery	Graded activity programme vs. ''usual care'' in physiotherapy	The groups were not significantly different on any outcome measure except Global Perceived Effect (where the usual care performed better: 19.3% difference, 95% CI: 0.1, 38.5).	
Level 4: Randomized Controlled Trials	Lindström et al. (1992)[84]	Sick-listed workers with subacute, non-specific, mechanical LBP	Graded activity (measurements of functional activity, a workplace visit, back school education, and an individual submaximal, gradually increased exercise programme) vs. control (traditional medical care)	Graded activity RTW significantly earlier than controls	Traditional care could include rest, analgesics, available physical therapy ''and so forth''; evaluators were not blinded
	Schenk et al. (2003)[82]	Classified with derangement	Joint mobilization or therapeutic exercises according to McKenzie method; all had postural correction	Exercise group showed significantly greater decreases in pain ($p<0.01$) and greater improvement in function ($p<0.03$) vs. mobilization group.	
	Koumantakis et al. (2005)[50]	Recurrent LBP	Compared general exercise to specific core stabilization exercises	No between-group differences in paraspinal muscle strength and electromyographic fatigue of erector spinae and multifidus muscles after 8 wks	
	Soukup (2001)[105]	77 women and men post-discharge from LBP episode	20 group Mensendieck exercise and ergonomics sessions over 13 wks	At 3-year follow-up, exercise group was significantly better on recurrence only.	
	Cairns et al. (2006)[29]	97 patients with recurrent LBP	Group 1: SPT individualized general active exercises and manual therapy Group 2: SPT plus spinal stabilization exercises Up to 12 treatments over 12 wks	At 12 months, both groups showed improved physical functioning: Roland Morris Disability increased by -5.4 (95% CI: -6.5, -4.2) for group 1 and -5.1 (95% CI: -6.3, -3.9) for group 2; also reduced pain intensity and improved quality of life. No statistically significant differences were found on any measure.	

LBP = low back pain; SA-LBP = subacute low back pain; RCTs = randomized controlled trials; RTW = return to work; A = activity; E = exercise; W = work; ES = effect size

Data from each chart were entered in a spreadsheet file (Microsoft Excel, Redmond, WA) and saved with a filename linking the file to the original chart. These files contained cells to enter occurrence of expected interventions and their documentation. As data were entered, the integrity of numerical data was verified to ensure that the values were within the range of acceptable values for each data point in question. A macro-enabled Excel workbook was then used to read the data from each chart's file. The macros, developed in-house, then performed the analytical calculations to sum up the entries for each file and entered the ensemble results into a worksheet.

Chart Audit Analyses

There was > 90% agreement of the occurrence or non-occurrence of data points between raters. During data collection, periodic checks were made to ensure the maintenance of > 90% interrater agreement. Data were compiled according to frequency of occurrence at each of the three time periods and calculated as either a percentage of all active charts or, when examining a specific aspect of a group of interventions, the percentage of the subset of charts with that group of interventions (e.g., of the charts indicating exercises, % of charts with exercises that indicated core stabilization exercises).

Focus-Group Methods

Focus groups of physiotherapists were added to test the accuracy of the audit results and deepen our understanding where charts did not adequately reflect practice. The insights that clinicians offered into the above-mentioned challenges of terminology, time frame, and operational definition were explored.

Eight focus-group interviews were conducted. The variety of views in focus groups provides immediate verification of data as a consequence of the probing of responses and dialogue among participants.[52] The focus-group interviews were held in conjunction with WHSCC-NB-sponsored continuing-education events. Invitations to the 2-hour focus groups and a lecture to follow on SA-LBP were sent to WHSCC-NB-approved clinics. Eight interviews with a total of 64 physiotherapists were conducted over 1 month in geographically dispersed areas of the province.

Informed consent was provided by participants at the beginning of the audiotaped interviews. The three lead investigators (KH, AF, AH) conducted the focus groups using standardized structured questions based on the results of the chart audit. To initiate the discussion, participants were asked to ''reflect for a moment on the diagnosis of injured worker with SA-LBP—please share with us your clinical thoughts.'' Then, as a validation of the study, participants were asked to consider the audit results as compared to their practice. When the results did not reflect the participants' practice, further exploration of the topic followed.

Focus-Group Analyses

Of the eight audiotaped interviews, six (44 participants) were of sufficient quality for analysis and were imported into the qualitative software, ATLAS/ti^{TM} (element 5, Annapolis Junction, MD). In an inductive process, themes that described, organized, and interpreted the participants' responses were identified by examining their words and phrases. In an iterative process, a code to assign meaning was applied to selected text and codes were clustered, compared, and sorted into distinct and comprehensive themes.

RESULTS

The presentation of the results begins with focus-group participants' descriptions of SA-LBP; this is followed by the chart-audit findings, integrated with additional focus-group findings.

Analyses of the transcripts revealed that participants viewed an injured worker with SA-LBP in a positive light. Their descriptions illustrated the importance of physiotherapy in the presence of uncertainty from both the physiotherapist and client perspectives. These ideas are represented by the following five themes:

Time frame: It was consistently noted that this is an optimal time to intervene. Participants interpreted ''subacute'' as meaning that the client's pain was not yet chronic, and they considered that there was potential for a positive outcome:

> When I hear ''subacute,'' my first thought is time, a time frame ... time to jump in.

Non-specific diagnosis: In the subacute phase, clinicians require more information to determine the underlying cause(s) prior to establishing a treatment plan:

> ... it's very general, as opposed to kind of having [a specific diagnosis] ... you like to have an idea of what tissue is involved.

Mixed client outlook: Clients with SA-LBP express both positive and negative attitudes toward recovery. For example, a client who is showing improvement is likely to be positive:

> I am relieved when it is subacute because along with subacute comes a more positive attitude, in my experience. And I find that those people will buy into physiotherapy and be proactive more so than somebody who comes in with a chronic diagnosis.

The focus-group participants also made comments reflecting the influence of fear and anxiety at this time.

> Sometimes as well, I think they are facing a little bit of anxiety . . . it's the concept that, ''Well, I've hurt my back before but it has always gotten better. It is not getting better this time'' . . .

Change in pain presentation: This change provides important information for physiotherapists about the progress of healing. Participants noted that at this time, pain is becoming intermittent instead of constant, with inflammation decreasing, allowing for a more accurate, objective assessment:

> You are getting to the stage where everything doesn't hurt. Sometimes early on, everything hurts and that makes it difficult to assess. So you are getting to the stage where at least they can drive to physiotherapy . . .

From a passive to a more active treatment approach: Participants reported using fewer hands-on interventions and more active, exercise-based approaches. Many remarked that this is an important time to educate their clients about the need to be active to facilitate proper healing through movement:

> I might get more active in my approach and less passive, less hands-on treatment as I would go towards more the 10 week than towards the 6 weeks. They would get less manual therapy . . . as they would get more functional.

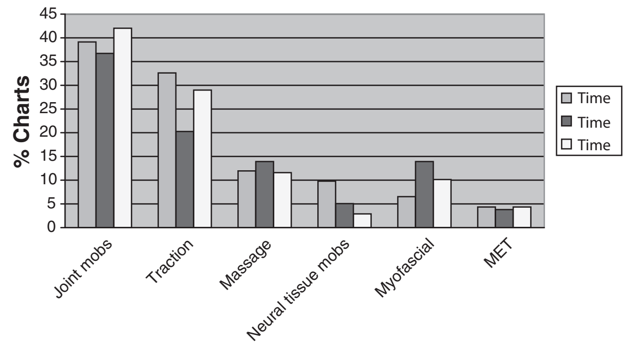

Figure 1 Percentage of active charts over time that included manual therapy interventions, according to specific technique; note that some charts recorded more than one manual therapy technique (MET = muscle energy technique).

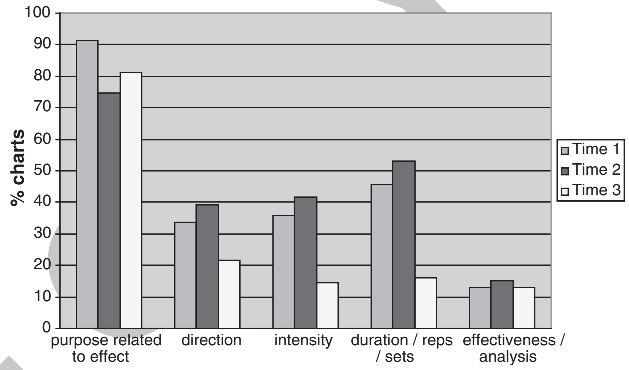

Figure 2 Percentage of active charts that included manual therapy as an intervention that had documented parameters adequate for reproduction (number of active charts: $n = 92$ at T1; $n = 79$ at T2; $n = 69$ at T3).

Chart-Audit Findings

The data set began with 240 charts; at the end of the auditing process, that number was reduced to 164. The other 76 charts were set aside for the following reasons: 26 for interrater agreement testing, 32 for illegibility or incorrect diagnosis, and 18 unstudied because the auditors were no longer available. Each chart took 45 minutes to audit. Clients discharges across the study period resulted in a different number of charts at each time point: $n = 164$ at T1, $n = 161$ at T2, $n = 145$ at T3.

Manual Therapy

The number of charts documenting manual therapy was 92 at T1, 79 at T2, and 69 at T3. On the charts documenting manual therapy, the two techniques most frequently charted were joint mobilization (39.1% at T1, 36.7% at T2, 42.0% at T3) and traction (32.6% at T1, 20.3% at T2, 29.0% at T3, including both mechanical and manual traction; see Figure 1). The soft-tissue techniques—massage, neural tissue mobilization, myofascial release, and muscle energy techniques (MET)—were less frequently noted (varying from 4–14% of charts with manual therapy, T1–T3). An examination for charting quality revealed that less than half the charts gave intervention details adequate to reproduce the technique (see Figure 2). Participants agreed that the results reflected their practice. Regarding documentation, one said,

> I do manual therapy a lot but I never document it. It is all in my head.

Another participant, with whom others agreed, said,

> There really is no need if you are mobilizing . . . I will feel how it is . . . you know, you feel it, and you know when to stop that day . . . you remember from day to day once you are at that joint again . . . if there is someone that you are really struggling with, and your manual therapy techniques aren't working, you are going to write exactly . . . be more specific with your grades so that you can say, ''Okay, you tolerated that. Let's try a little bit more.'' Or, ''let's change my intervention.''

Changes in dosage might not be charted; a change to another intervention is more likely to be charted.

Another participant provided a rationale as to why change in parameters is seldom charted:

> It's just the demand . . . you feel that if you ever did a change, you would continually be doing paperwork. You see your patient and how they are presenting that day, knowing how you treated them last time, and then on the spot you just change. But that is not enough to make you go do the paperwork because that may take you longer than it did to do the technique. So it ends up bogging you down.

Electrophysical Agents

With respect to the use of EPAs, the three most frequently documented agents were heat (56.7% at T1, 44.1% at T2, 46.2% at T3), ultrasound (US; 51.2% at T1, 36.0% at T2, 32.4% at T3), and interferential therapy (IFT; 47.0% at T1, 29.8% at T2, 35.9% at T3; see Figure 3). As the percentages indicate, the use of all three agents decreased from T1 to T3.

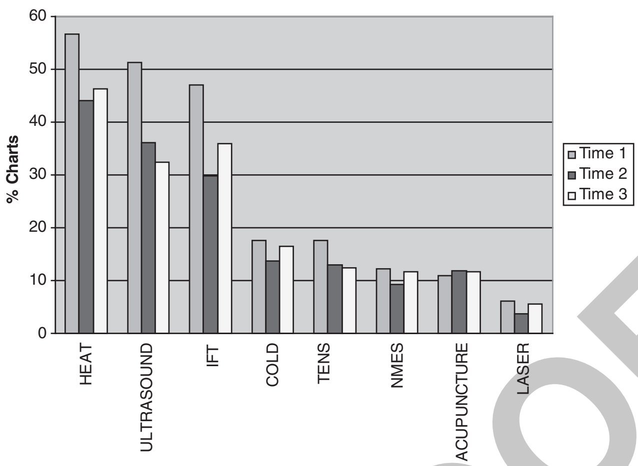

Figure 3 Percentage of active charts that included electrophysical agents over time (IFT = interferential therapy; NMES = neuromuscular electrical stimulation).

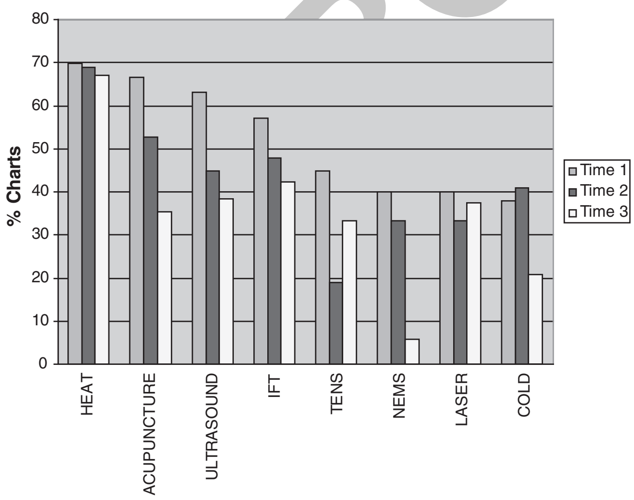

Figure 4 Of charts that included electrophysical agents, percentage with documented parameters adequate for reproduction (IFT = interferential therapy; TENS = transcutaneous electrical nerve stimulation; NMES = neuromuscular electrical nerve stimulation).

Less than 18% of charts indicated the use of other EPAs (cold, TENS, NMES, acupuncture, LLLT). On the charts documenting EPA use, adequately documented parameters (e.g., intensity, frequency, electrode location) for heat, US, and IFT decreased across time from 70% to 35% of charts (see Figure 4).

With respect to decision making, focus-group participants said that they change the type and parameters of the EPA according to a client's response. Participants reported that the prevalence figures for EPA use did not accurately reflect their practice. While agreeing that heat, US, and IFT were used most often, some participants stated that they use cold and acupuncture more often than the graphs suggested. Reflecting on the differences between their practice and the results of the chart audit, some focus-group participants compared their charting of manual and EPA techniques:

> I am probably less specific in charting manual therapy techniques knowing that if someone else is going to take over from me, there would be a verbal conversation or something because there is less reliability between therapists [if they read the chart only], whereas with some of the electrophysical agents, yes, someone should be able to look at the settings in the chart and do exactly as you did.

This distinction corresponds to the chart audit results. More reliability was conferred upon the charting of EPA treatment when compared to a manual therapy technique. Manual therapy techniques are adjusted according to tissue or client response, and one treatment can have an effect, whereas EPA parameters are applied in the same way each time they are used and require multiple doses to have clinically significant effects. Despite this approach to reasoning, discussion revealed that the therapeutic effect of an EPA may not always be the reason for its continued use. Participants admitted to using an EPA to motivate, reassure, or encourage a client:

> I have a client who comes in, goes to the gym for an hour, says ''I'm sore, I'd like that IFC.'' It might not be indicated but there is no harm to it. He wants IFC because it makes him feel good after exercise. It is a motivator to encourage exercise. It doesn't mean we are using IFC to solve any problem. It is a tool to help the client go from today to the next day.

Exercise

The results for exercise revealed that between 66% and 74% of all active charts included exercise prescription. Of

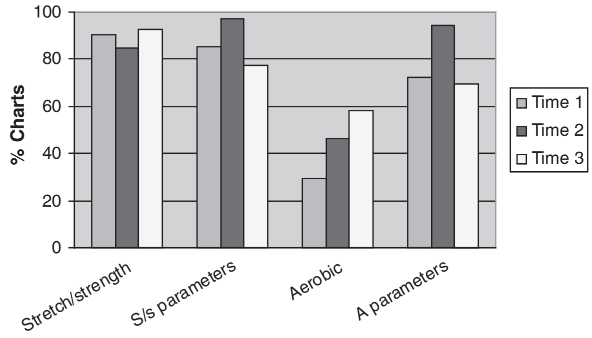

Figure 5 Percentage of active charts with documentation of exercise prescription (number of active charts: $n=122$ at T1, $n=118$ at T2, $n=96$ at T3).

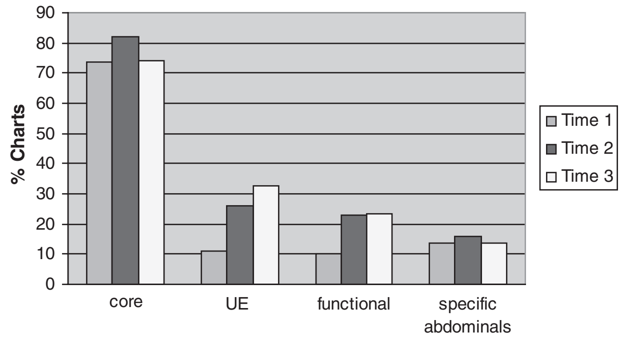

Figure 6 Specific strengthening exercises as a percentage of active charts that included strengthening and functional exercise (core = core stabilization exercises; UE = upper extremity).

the charts including exercise, strengthening or stretching was present in 90.2% of charts at T1, 84.7% at T2, and 92.7% at T3, with documentation adequate to ensure replication of technique in >75% of charts. Of those charts containing exercise prescription, aerobic exercises were prescribed in 29.5% at T1, 46.6% at T2, and 58.3% at T3, with adequate documentation in >60% of charts (see Figure 5). Of the charts documenting strengthening exercises, 73.6% at T1, 82.0% at T2, and 74.2% at T3 identified core stabilization exercises, whereas between 10% and 32% noted upper-extremity, functional activity, or specific abdominal exercises (see Figure 6). The dominant core stabilization exercise was outer unit progressions (maintaining the stiffness of the spine through muscular contraction while performing gross movements that require more superficial muscle activation[53]).

In the charts that included stretching, exercises focused primarily on the lumbar spine (29.5% at T1, 26.7% at T2, 24.7% at T3). Among the specific stretches identified, knees to chest was reported in 16.7% of charts at T1, 10.5% at T2, and 10.6% at T3. The self-mobilization exercise of lumbar extension was noted in 26.9% of charts at T1, 20.9% at T2, and 16.5% at T3. Lumbar flexion, pelvic tilt, and trunk list (lateral shift) correction were noted in less than 10% of charts that reported stretching.

As with the other interventions, focus-group participants were asked whether the chart-audit figures corresponded to their practice. In this case the figures did reflect their exercise prescription; participants explained that ''my charting of exercises declines'' over time, and some noted that exercise is such a ''taken-for-granted'' part of their job that they just don't think to chart it:

> I think it is so inbred in us as physiotherapists, it's [exercise prescription] just a natural thing to do. But a lot of people are not charting it.

Another participant said,

> It is just such a regular routine of what we do that when we change then we don't necessarily see it as something that needs to be charted.

The chart audit revealed that exercise appeared to be the most thoroughly documented intervention, and a few participants stated that they chart exercise well:

> It probably is the most detailed of my charting, the exercise and the changes and the parameters.

As compared to exercise, there was no evidence in charts that activity (e.g., walking) was prescribed to clients. This finding was not consistent with practice: the majority of focus-group participants said, ''It is just such a 'given' it doesn't get documented.'' Many participants said that they consistently prescribe activity for clients with SA-LBP, because clients often think they should be sedentary:

> The majority of subacute clients are under the impression that they are not to move or they would hurt themselves by doing so. So I make it clear to them, ''No, you are not going to damage anything, you should get out and walk and move.''

DISCUSSION

There is a growing recognition of the importance of physiotherapy management of SA-LBP.[8,14,24,25,36,44,54–56] This mixed-method study provides a unique set of results that describes physiotherapy practice across three time points during the subacute phase of healing in injured workers with LBP, combined with insights drawn from focus groups of physiotherapists who treat these clients. The data were collected from 164 charts of clients treated for SA-LBP over an entire year. Reported here are the results of a comprehensive, open-ended process that sampled charts from up to 60 physiotherapy clinics distributed throughout a province.

One challenge in using research results to design the best LBP treatment intervention has been diagnostic variability. Our focus-groups participants described the changing nature of the clinical presentation, as well as the emotional and psychological flux that clients are in, at this stage of healing. In our audit, we did not group charts by diagnosis but examined all charts with SA-LBP, and we can report here that, despite diagnostic variability, there is a predominant pattern of treatment offered. Our findings revealed that physiotherapists understand the importance of the subacute phase to engage the client in activity while attending to the changing presentation of the LBP. Their decision making about interventions is responsive to the client, and this dynamic practice is not necessarily captured in their charts.

Chart auditing is frequently performed to answer questions about competence and quality. Auditing applies standards to a set of charts, measuring compliance in content, style, format, and so on,[57] and has the advantage of collecting data in a short period while sampling from a broad geographic area for a specific condition. It is superior to survey-based research in that it is less limited in scope and is based on actual practice, as opposed to recollections or intentions.[58] Charts should be an excellent source of information about practice patterns, because of the high professional standards of practice in Canada.[59] Although charts do document interventions that have been provided, in a busy environment not everything that occurs is necessarily recorded.[60] Our focus groups revealed that the documentation does not always adequately reflect important aspects of practice, including activity prescription, clinical reasoning, and decision making. In addition, chart illegibility and incompleteness can interfere with accurate collection and interpretation of data.[57,58] Despite these limitations, from the charts examined we were able to extract the predominant interventions being used in SA-LBP and, therefore, to benefit from the charting efforts of the physiotherapists involved.

It is interesting to consider the focus-group results with respect to manual therapy interventions, in which participants describe their decision-making as to when and what details to chart. This selective charting is more evident with manual therapy treatments than with EPA or exercise treatments, reflecting the challenge of measurement and the exactitude of the intervention. ''I do manual therapy a lot, but I never document it. It is all in my head''—this tacit understanding of what one's hands sense and do with the tissues of another is part of the mystery of manual therapy.

Despite the heterogeneity of the data set (e.g., no classification by diagnosis), the study demonstrates a predominant practice pattern for this population. The treatment of injured workers with SA-LBP follows a pattern of continuous joint mobility treatment (mobilization, traction, or trunk extension exercises); pain-related EPA (heat, US, or IFT) that declines over time; and continuous core strengthening exercises, with the addition of aerobic and more general exercises over time. Other studies that examined interventions for LBP had similar findings,[33–36] but these studies did not restrict the population to SA-LBP. These repeated findings, in the presence of challenges and inconsistencies in diagnostic classification, operational definitions, and terminology, provide a good starting point for examining elements of a clinical practice guideline for SA-LBP. Chronic LBP remains a difficult health care issue, and the majority of those clients start with SA-LBP; therefore, we need to understand the long-term effectiveness of the treatment pattern identified here. The need for more emphasis on effectiveness studies is underscored by physiotherapists' perspective that the subacute phase is a challenging period because of the non-specific diagnosis, mixed client outlook, and changing presentation of pain.

Manual Therapy

The importance attributed to manual therapy as an intervention is evident in the percentage of charts that included this treatment approach (57–65% over the three time periods). In the charts studied, once manual therapy was initiated, it generally continued until discharge. The prevalence of techniques directed at articular structures (joint mobilization and traction), as opposed to soft tissue, illustrates the dominance of this approach in primary care.[61,62] However, there is limited evidence to support the use of joint mobilization for LBP (none specific to SA-LBP), and there is limited research on the preferential use of joint mobilization over any other form of physiotherapy intervention.[41] Notably, the use of spinal manipulation was absent in the charts audited. Indication for spinal manipulation in the acute phase was recently refuted,[9] and there is no support for its use in SA-LBP.

In a recent Canadian survey-based study, spinal mobilization, soft-tissue mobilization, massage, and manual traction were found to be the most common manual therapy interventions in acute LBP and SA-LBP.[35] We found a relatively low prevalence of soft-tissue techniques (4–14% of charts), yet one RCT found significant improvement in Oswestry Disability Index scores when soft-tissue techniques were combined with resisted exercises.[63] Muscle energy techniques were documented in between 3.8% and 4.3% of charts. Given our findings with respect to charting, this low prevalence might be explained by the fact that joint mobilization and muscle energy are often performed together in a treatment and may not have been documented separately. There is also some support for the use of another soft-tissue technique: a recent best practice review reported that massage for SA-LBP is safe and effective, improving pain, sleep, and function scores.[64] A Cochrane review also concluded that massage can benefit clients with SA-LBP.[65] The fact that massage therapy is not approved as a stand-alone treatment by WHSCC may have influenced its selection as an intervention.

Manual therapy techniques are central to physiotherapy; the results of our study illustrate a significant gap between evidence of effectiveness and actual practice. Given the prevalence of the use of joint mobilization and traction, these interventions should be examined for effectiveness.

Electrophysical Agents

EPAs are commonly used in primary physiotherapy practice. There is considerable overlap in the therapeutic use of different devices, which makes it a challenge to determine the most appropriate EPA and its optimal parameters (e.g., dosage, frequency, duration) for the clinical situation presented.

In this study the three most frequently used agents were heat, US, and IFT, a finding similar to those of a recent study.[35] The finding of ~40–50% charts reporting heat use is quite different from other reports (e.g., 81–88%[34,66] and 10%[66]). Moreover, the frequency is quite high considering the paucity of evidence to support the use of heat in SA-LBP (based on searches of EMBASE, EBM Reviews, PubMed, CINAHL, and MEDLINE and the conclusions of one systematic review and one EBCPG).[23,24]

The second most commonly documented EPA was US. US may have a positive effect on the inflammatory response,[67] and in the case of injured muscle, it stimulates the production of new muscle fibres rather than scar tissue.[68] Of three EBCPGs for LBP, two reported that the evidence for use of US is insufficient or unclear,[44,45] while a third made no recommendations on the use of US for the management of SA-LBP (defined as LBP of 4–12 weeks' duration) because of insufficient data.[24] Thus, there is insufficient evidence to either support or refute the use of US in SA-LBP.

The third most frequently documented EPA was IFT. There are no meta-analyses specific to the use of IFT for SA-LBP. The prevalence of TENS use was considerably lower than that of IFT, despite evidence to support its use in this population. One systematic review found differential effects depending on the definitions of SA-LBP.[55] When the quality of trials was represented by tight criteria of internal validity, however, the review found no high-quality evidence for treatment efficacy. An EBCPG concluded that there is a lack of evidence supporting the inclusion or exclusion of TENS/electrical stimulation in the management of SA-LBP (defined as LBP of 4–12 weeks' duration).[24] The New Zealand guidelines[44] reported grade A evidence that TENS results in no improvement for acute LBP (defined as LBP less than 3 months). Finally, a review of randomized controlled trials found that IFT was more effective than placebo treatment for LBP, especially with appropriate electrode position.[43] Thus, there is some limited clinical evidence to suggest that IFT can be effective in the management of SA-LBP.

In this study heat, US, and IFT were the most commonly charted EPAs; in the focus groups, however, participants reported that they use cold and acupuncture more often. Although no literature specific to the effectiveness of cold for LBP was located in a search of multiple databases, the following physiological effects of cryotherapy were noted: (1) an initial increase in muscle strength followed by a subsequent reduction in strength; (2) a reduction in performance of motor skills, with slowing of voluntary movement and a loss of dexterity; and (3) an initial strong sensory stimulation followed by reduction in pain.[69] With respect to the evidence on acupuncture, a meta-analysis[70] and two systematic reviews[71,72] revealed that although there is evidence that acupuncture is more effective than sham acupuncture in providing short-term relief of chronic LBP, there is insufficient evidence to make any conclusions with respect to its effectiveness in SA-LBP.

The focus-group participants indicated that EPA interventions were used to provide motivation and encouragement to clients. These therapists are experiencing the interesting phenomenon that has been described in the medical literature whereby early success with a client favours successful outcomes. Evans described the importance of *expectancy* when administering a placebo analgesic.[73] When expectancy is linked with a conditioned response in a client who experiences and then expects reduced pain,[74] this can lead to a positive mental approach with respect to the outcome of a therapeutic intervention.[75]

Exercise

Physiotherapists prescribe many specific types of exercise. In the absence of supporting evidence for one particular physiotherapeutic exercise or technique, the International Paris Task Force on Back Pain concluded that the key to success is physical activity itself, activity in any form.[8] The benefits of exercise are numerous, extending from the level of specific tissues to most systems in the body,[76] and almost every client in the study was prescribed some form of exercise. Although activity was not charted, we learned from the focus groups that physiotherapists are prescribing activity to SA-LBP clients to combat the inactivity inherent in the condition.

Our analyses revealed that the most frequently prescribed specific exercises were in the category of core stabilization. This exercise approach involves deep spinal muscles,[77,78] with the main objective of creating stiffness in the spine.[79] The treatment programme requires control and challenge exercises,[47] each of which requires a different treatment protocol.[80,81] The evidence to support this protocol is predominantly based on laboratory studies. The high prevalence in our study is interesting, because not only can these exercises be difficult to teach and to learn, they also require a high number of repetitions to master. It can take a client from several days to several weeks to learn the skill of activating specific deep muscles.[47] In addition, for measurable strengthening to occur, exercise must continue for at least 8 weeks;[81] however, the charts in the present study reflected a decline in exercise over time. Evidence supporting the effectiveness of core stabilization exercises for LBP is limited, and, to date, the use of this approach in SA-LBP has not been studied.[48–50]

In the present study there was a low prevalence of the McKenzie approach (6–8% of charts), yet there is some evidence to support its use in SA-LBP.[82,83] The effectiveness of this intervention may depend on a definitive diagnosis and on the use of client-initiated exercises with built-in safety measures. These aspects make it more straightforward to study the intervention, tap into its psychosocial aspects, and employ an activation approach. Although there are few studies of sufficient quality to determine the effectiveness of exercise specificity in SA-LBP,[33,35] this is an area of growth and development, and research efforts in this area should be increased.

It is interesting to reflect on which interventions were not found in the charts. There is a growing body of knowledge that supports the use of multidisciplinary interventions and of group and graded (or quota-based) exercise. Studies have revealed that these approaches are associated with earlier return to work and reduced absenteeism,[84–86] as well as with improvements on reports of distress and disability.[87] While it is not readily apparent how these types of exercise can be incorporated into primary-practice physiotherapy, this evidence suggests that further examination is warranted.

CONCLUSION

This mixed-method study reveals aspects of management of SA-LBP that merit further investigation. We found that treatment of injured workers with SA-LBP follows a pattern of continuous treatment using joint mobilization and core-strengthening exercises, with declining use of EPAs for pain management and increasing use of aerobic and more general exercises over time. The pattern found in the charts—decreasing passive and increasing active interventions over time—is consistent with the focus-group participants' description of how they approach treatment of clients with SA-LBP: ''time to jump in'' and ''to get them on board with coming out of that acute phase and into that more active phase.'' However, we discovered a higher prevalence of interventions for which there is less evidence of effectiveness (e.g., joint mobilization, stabilization exercises) and a lower prevalence of interventions supported by more evidence (e.g., soft-tissue techniques, TENS, graded exercises). These treatment patterns must be investigated for effectiveness from both short-term and long-term perspectives if physiotherapy is to have a positive impact on the incidence and prevalence of chronic LBP.

KEY MESSAGES

What Is Already Known on This Subject

The subacute phase of healing in low back pain presents an opportune time for physiotherapists to help clients to improve and also to assist in avoiding the development of chronic low back pain. Physiotherapists offer a series of interventions at this time that includes various types of manual therapy, electrophysical agents, and exercise.

What This Study Adds

The study documents the value of mixed methods in studying physiotherapy practice and reveals a strong pattern of interventions for subacute low back pain. These findings provide data on which to base effectiveness studies, which are very important to guide further development of treatments for subacute low back pain.

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