Evaluation of a treatment-based classification algorithm for low back pain

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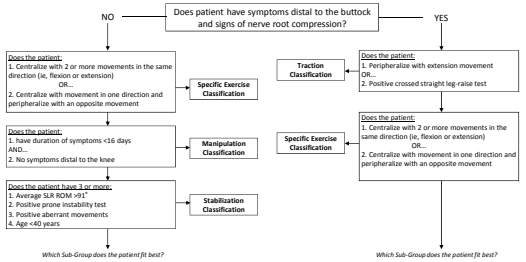
Background

Many individual studies have investigated subgroups of low back pain (LBP) that respond best to certain interventions. A classification algorithm was created to combine these individual study sub-grouping criteria into a clinical decision-making guide that is mutually exclusive and comprehensive. In order to do this, certain changes to the individual study criteria had to be made. This study aims to evaluate these changes.

Individual Study Sub-grouping Criteria

Treatment subgroup	Individual Sub-group Criteria
Manipulation [1] (must meet 4 or more)	• Duration of symptoms less than 16 days • At least one hip with > than 35 degrees of internal rotation • Lumbar hypomobility • No symptoms distal to the knee • FABQ work score of less than 19
Stabilization [2] (must meet 3 or more)	• Age less than 40 years • Average straight leg raise greater than 91 degrees • Aberrant movement present • Positive prone instability test
Specific Exercise [3,4]	• Demonstrated centralization or a directional preference (an improvement in pain intensity) during repeated movement testing in ANY ONE position (standing, sitting, or lying)
Traction [5] (must meet all)	• Sign and symptoms of nerve root compression (position straight leg raise or reflex, sensory, or muscle strength deficit) AND • Pain and/or numbness extending distal to the buttock in the past 24 hours AND • Peripheralization of pain with extension OR positive crossed straight leg raise

Classification Algorithm



MANIPULATION		STABILIZATION		SPECIFIC EXERCISE		TRACTION	
Factors favoring	Factors against	Factors favoring	Factors against	Factors favoring	Factors against	Factors favoring	Factors against
•Hypomobility with spring testing •Low FABQ scores (FABQW <19) •Hip internal rotation ROM >35°	•Symptoms below the knee •Increasing episode frequency •Peripheralization with motion testing •No pain with spring testing	•Hypermobility with spring testing •Increasing episode frequency •3 or more prior episodes	•Discrepancy in SLR ROM (>10°) •Low FABQ scores (FABQPA < 9)	•Directional preference for extension or flexion •Centralization with motion testing •Peripheralize in direction opposite centralization	•Low back pain only (no distal sx) •Status Quo with all movements	•Peripheralization of symptoms with no ability to centralize with movement	•Low back pain only (no distal sx) •No signs of nerve root compression

Top boxes = clear classification; Bottom table = unclear classification

Specific Aims

To determine the prevalence of patients meeting each treatment subgroup/none of the subgroups/more than one subgroup using the individual study criteria and to compare these rates to the classification algorithm treatment subgroup prevalence rates.

To determine the reliability of the classification decision when using the classification algorithm.

Methods

- 250 patients with acute/subacute LBP were recruited from USA and Australia
- Each patient underwent a standardized assessment and was classified into a treatment group using the classification algorithm
- Each patient was also classified using the individual study subgrouping criteria
- 31 patients were assessed twice to determine the reliability of the algorithm.

Main Results

Prevalence rates: Individual Study Sub-grouping Criteria

Treatment subgroups	Prevalence % (95% CI)
Patient can meet multiple subgroups (prevalence rates do not sum to 100%)	
• Manipulation	35.2 (29.3 to 41.1)
• Stabilization	12.8 (8.7 to 17.0)
• Specific Exercise	44.8 (38.6 to 51.0)
• Traction	9.6 (6.0 to 13.3)
Patient can meet only one subgroup/subgroup combination (prevalence rates sum to 100%)	
No subgroups	***25.2 (19.8 to 30.6)***
One subgroup	***49.6 (43.4 to 55.8)***
• Manipulation	15.2 (10.8 to 19.7)
• Stabilization	6.4 (3.4 to 9.4)
• Specific Exercise	21.6 (16.5 to 26.7)
• Traction	6.4 (3.4 to 9.4)
Two subgroups	***22.8 (17.6 to 28)***
• Manipulation + Stabilization	1.6 (0.04 to 3.16)
• Manipulation + Specific Exercise	15.6 (11.1 to 20.1)
• Manipulation + Traction	0.4 (-0.38 to 1.18)
• Stabilization + Specific Exercise	2.4 (0.5 to 4.3)
• Specific Exercise + Traction	2.8 (0.75 to 4.85)
Three subgroups	***2.4 (0.5 to 4.3)***
• Manipulation + Stabilization + Specific Exercise	2.4 (0.5 to 4.3)

Prevalence rates: The Classification Algorithm

	Classification algorithm (n= 250)	'Clear Classification' (n=165)	'Unclear Classification' (n=85)
Manipulation	42.0 (35.9 to 48.1)	31.2 (25.5 to 36.9)	10.8 (7.0 to 14.7)
Stabilization	17.6 (12.9 to 22.3)	7.6 (4.3 to 10.9)	10.0 (6.3 to 13.7)
Specific Exercise	30.8 (25.1 to 36.5)	17.6 (12.9 to 22.3)	13.2 (9.0 to 17.4)
Traction	9.6 (6.0 to 13.3)	9.6 (6.0 to 13.3)	----
Total	***100***	***66.0 (60.1 to 71.9)***	***34.0 (28.1 to 39.9)***

Reliability of the Classification Decision using the Algorithm

- Inter-rater reliability was moderate (kappa = 0.52; 95%CI 0.27 to 0.77)
- Reliability of clear classification was good (kappa = 0.69; 95% CI 0.42 to 0.96)
- Reliability of unclear classifications was poor (kappa = 0.23; 95% CI -0.21 to 0.66)

The classification algorithm prioritises manipulation over specific exercise.

25% of patients do not meet any of the treatment subgroups based on the individual study criteria suggesting when using the algorithm with these patients, we would need to use the bottom table. However, 34% of patients have unclear classifications when using the algorithm = 9% of patients that should have clear classification but don't.

25% of patients meet more than one treatment subgroup based on the individual study criteria. This confirms the need for hierarchical ordering of the algorithm so that a patient is only assigned to one subgroup. It is unclear what treatment a patient should get first if they meet more than one subgroup.

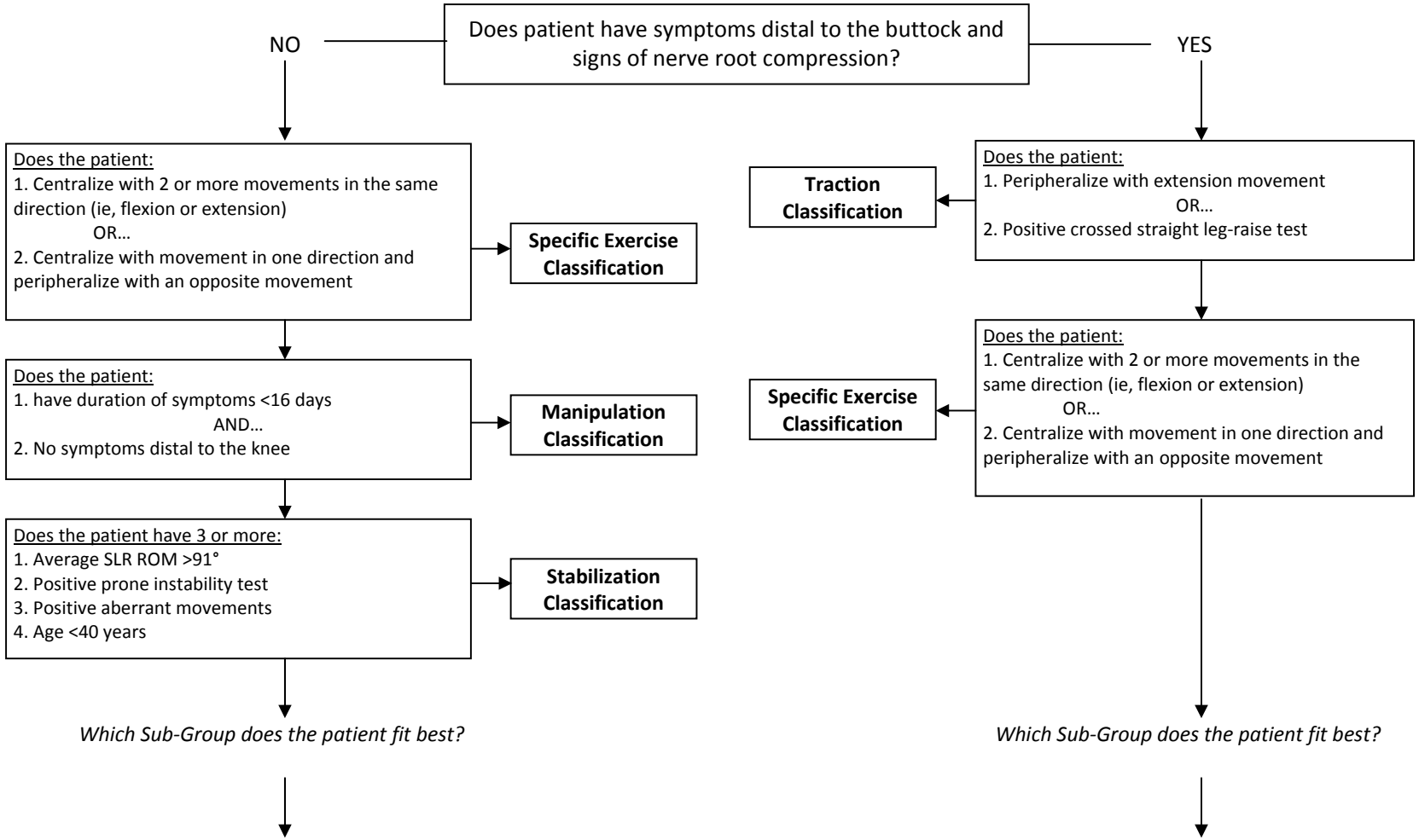
Having an unclear classification when using the algorithm appears to adversely affect the reliability of the classification decision.

Conclusions

This provides important clinical data to guide potential revisions to the algorithm. That 25% of patients meet more than one subgroup has implications for sequencing of treatments in the algorithm. The finding that 25% of patients do not meet any subgroups will help guide revisions to the bottom table of the algorithm (which guide unclear classifications).

Future directions of research:

Further research is needed to explore the treatment options for patients that meet more than one subgroup – which treatment should they get? Future research should also explore the potential addition of other treatments to the algorithm (as evidence permits).



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