Prognosestellung bezüglich Befunderhebung nach McKenzie

Kann bei Patienten mit einer Diskusproblematik mittels professioneller Befunderhebung nach dem Konzept von McKenzie eine Prognose bezüglich konservativen Behandlungsverlaufs erstellt werden?

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1 Abstract

Thematik: Die mechanische Diagnose und Therapie (MDT) nach McKenzie ist eine international bekannte Methode zur Behandlung von LBP. Das Spektrum an Forschungsarbeiten ist umfänglich und beruht auf zuverlässigen bis fehlerhaften Ausführungen.


Relevante Ergebnisse: In den Forschungsarbeiten ist die Definition des Zentralisationsphänomens nicht einheitlich gewährleistet. Der Ausbildungsstand betreffend MDT ist möglicherweise relevant für eine valide Prognosebildung. Beinschmerz und die Klassifikation als „non-centralizer“ weisen auf einen schlechten konservativen Heilungsverlauf hin.


Keywords: McKenzie, McKenzie concept, back pain, low back pain, centralization, therapy, assessment, intervertebral disc displacement und extension oriented treatment
2 Einleitung

2.1 Einführung in die Thematik von Low Back Pain und die Mechanische Diagnose und Therapie nach McKenzie


Trotz fortgeschrittener Techniken in der bildgebenden Untersuchung sind die Möglichkeiten zur Identifikation der Ursache der meisten Rückenschmerzen sehr schwierig. Laut McKenzie und May (2003a) sind nur gerade 15% der Rückenproblematiken spezifischen Krankheitsbildern zuzuweisen.

2.2 Hintergrund des McKenzie Konzeptes


Im vierten Kapitel wird das Konzept der MDT, die drei mechanischen Syndrome sowie das Merkmal der Zentralisation und der DP aufgegriffen, genauer erklärt und definiert.

2.3 Forschungsstand & Problemstellung
hinterfragen. Es kann als Beispiel einer Fehlinterpretation eine Studie genannt werden, welche sich auf die Auswertung des McKenzie Konzeptes bezieht, sich jedoch auf die Durchführung von Extensionsübungen beschränkt und das Prinzip der MDT sowie auf eine nach McKenzie relevante Klassifikation in Subgruppen verzichtet (Saner-Bissig et. al, 2007).

2.4 Motivation
Anstoss zur Themenfindung für die Bachelorarbeit gab die Aktualität der LBP Problematik in der heutigen Gesellschaft, die damit verbundenen hohen Gesundheitskosten sowie die grosse Spannweite an unterschiedlichen Behandlungsansätzen bei LBP. Besonderes Interesse galt bereits zu Beginn dem McKenzie Konzept, da es ein häufig erwähntes Konzept im Bezug zu LBP ist, einem konservativen Behandlungsansatz entspricht und empirische Forschungen Hinweise zu möglicher prognostischer Nutzung ergeben.


2.5 Ziel & Fragestellung
Der Schwerpunkt dieser Bachelorarbeit wird auf das Assessment des Konzepts von McKenzie gesetzt. Dabei soll die prognostische Aussagekraft bezüglich des Assessments nach McKenzie bei LBP Patienten mit Diskusproblematik beurteilt werden.

Es ergibt sich folgende Fragestellung: Kann bei LBP Patienten mit einer Diskusproblematik mittels professioneller Befunderhebung nach dem Konzept McEnzies eine Prognose bezüglich konservativem Behandlungsansatz gestellt werden?

Ziel dieser Bachelorarbeit ist, der oben definierten Fragestellung nachzugehen und Antworten bezüglich Validität der Prognose zu generieren.

3 Theoretische Einführung in das McKenzie Konzept

3.1 Robin McKenzie
Robin McKenzie machte 1952 eine Ausbildung an der New Zealand School of Physiotherapy. Bald darauf begann er mit seiner eigenen Physiotheraiepraxis und spezialisierte sich auf dem Gebiet der Wirbelsäulenproblematiken (McKenzie & May,

Durch die zufällige Beobachtung von Mr. Smith im Jahr 1956 kam er weg von den Mobilisations- und Manipulationstechniken und begann, sich zunehmend mit der Bewegung und Positionierung des Patienten zu befassen. Er fokussierte sich mehr auf das beobachtete Phänomen der Zentralisation und entwickelte das heute bekannte konzeptionelle Modell für das Derangementsyndrom, welches die Grundlage des heutigen McKenzie Konzeptes bildet (Saner et al. 2007).

3.2 Das Konzeptionelle Modell der Bandscheibenverlagerung
McKenzie griff auf die Lehren Cyriaxs zurück, welcher Rückenschmerzen und radikuläre Schmerzen auf eine interne Verlagerung der Bandscheibe zurückführt, unter der Annahme, dass mittels mechanischen Kräften (z.B. Manipulation oder Traktion) eine solche Verlagerung beeinflusst werden kann. (Cyriax, 1978, nach Saner et al., 2007) Bei degenerativen Prozessen der Bandscheibe können quer- und rundverlaufende sowie radiale Risse im Anulus fibrosus auftreten. Zusätzlich kann der Nucleus pulposus


3.3 Symptomatik bei der Bandscheibenverlagerung

3.3.1 Zentralisationsphänomen

Definition
Das Zentralisationsphänomen beschreibt die Verlagerung von distal ausstrahlenden Rückenschmerzen nach Zentral unter Anwendung gezielter Belastungsstrategien. Sollte keine distale Ausstrahlung in die untere Extremität vorhanden sein, zentralisiert sich der meist diffus verteilte Rückenschmerz auf ein besser eingrenzbares Zentrum, bis hin zum vollständigen Verschwinden (McKenzie & May, 2003b).

Die Definition entstand anhand der Beobachtung von dem Patienten Mr. Smith und weiteren experimentellen Versuchen von repetitiven Wirbelsäulenbewegungen und diversen Körperhaltungen (McKenzie & May, 2003b).

McKenzies Beobachtungen zeigten, dass das Bewegen in Richtung Extension am Häufigsten zu einer Verbesserung der Symptome bzw. zu einer Zentralisation und bis zu einer Symptomfreiheit führt. Ausstrahlende Symptome verschwinden, der Schmerz zentralisiert sich, sprich es kommt zu einer Verlagerung der Symptome zu einer quasizentralen Mittellinie. Gleichzeitig kann sich der zentral-lokale Schmerz an der Wirbelsäule anfänglich verstärken, bis es dann zur vollständigen Symptomfreiheit kommt. Bei Weiterführung der Zentralisationsübungen kann nicht nur eine Symptomfreiheit erreicht, sondern auch die Beweglichkeit verbessert werden. Somit zeichnet sich eine dauerhafte


3.3.2 Peripheralisation

3.3.3 Laterale Translation

Eine laterale Bandscheibenverlagerung wird als Ursache der lateralen Translation vermutet. Die Translation kann mit Übungen des lateralen Gleitens behandelt und infolge dessen reduziert werden. Die Schmerzen zentralisieren sich aufgrund der Rückverlagerung des Bandscheibenmaterials (Saner et al., 2007).

3.4 Klassifikationssystem


Die drei mechanischen Syndrome wurden aus dem konzeptionellen Modell der Bandscheibenverlagerung abgeleitet und sind wie folgt definiert:

- das Derangementsyndrom: Schmerz infolge interner artikulärer Verlagerung
- das Dysfunktionssyndrom: Schmerz infolge mechanischer Deformation strukturell beeinträchtigter Gewebe
- das Haltungssyndrom: Schmerz infolge übermässiger Belastung normaler Gewebe

Klinische Erscheinungsbilder, welche nicht anhand dieser Syndrome klassifiziert werden können, werden als „Sonstige“ benannt (Saner et al., 2007).

Die drei Syndrome unterscheiden sich aufgrund ihrer unterschiedlichen Reaktionen auf Belastung (repetitive Bewegungen in die Endstellung oder länger eingenommene Haltungen) sowie aufgrund des Krankheitsverlaufs (McKenzie & May, 2003b).

Das Klassifikationssystem bezog McKenzie vorerst nur auf die Lendenwirbelsäule, anschliessend weitet er die Klassifikation auf die Hals- und Brustwirbelsäule und schliesslich auf die musculoskeletalen Problematiken der Extremitäten aus.

In Abbildung 1 lässt sich der Ablauf einer Klassifizierung in die oben genannten Subgruppen nach McKenzie bei Durchführung des Assessments entnehmen. Mittels roter
Markierung in der Abbildung heben die Verfasserinnen dieser Arbeit die mehrmalige Klassifikationsüberprüfung hervor. Diese wird Diskussionsthema in Kapitel 6.3 sein.

3.4.1 Derangementsyndrom

Das Derangementsyndrom basiert auf der Annahme, dass verschobenes Gewebe, im Falle der Wirbelsäule sind Bandscheibenverlagerungen häufig, bei den Gelenken der Extremitäten sind es meniskoide Einklemmungen oder freie Gelenkkörper, die Schmerzen auslösen (Saner et al. 2007).

Symptomrepräsentation variieren. Es kann eine minimale Verlagerung sein, welche Schmerzen und eine geringe Funktionseinschränkung verursachen, bis hin zur vollständigen Verlagerung der Bandscheibe in den Spinalkanal hinein, wobei radikuläre Symptome und größere Bewegungsdefizite auftreten (McKenzie & May, 2003b).


3.4.2 Dysfunktionssyndrom

Das Dysfunktionssyndrom tritt als zweithäufigstes klinisches Syndrom auf. Bei diesem Syndrom zeigt sich eine mechanische Deformierung aufgrund des strukturell beeinträchtigten Gewebes (verkürztes Gewebe) als Folge eines Traumas. Entzündliche oder degenerative Prozesse können eine Fibrosierung auslösen, welche zu einem Elastizitätsverlust des Gewebes führt. Bei physiologischen Zugbelastungen auf das verkürzte oder fibrosierte Gewebe wird somit Schmerz hervorgerufen (Saner et al., 2007).


Zur Behandlung dieses Syndroms sind Übungen in die schmerzverursachende Richtung relevant, da aufgrund dessen das betroffene Gewebe wieder remodelliert werden kann und an die Endbewegungen adaptiert (May & Donelson, 2007).
Es wird mit repetierten Bewegungen in Richtung eingeschränktes Bewegungsausmass bewegt, dabei werden die Symptome typischerweise kurzfristig hervorgerufen (McKenzie & May, 2003b).

Subkategorien werden anhand der beeinträchtigten Bewegungsrichtung definiert. Eine beeinträchtigte Extension mit Schmerzangabe am Ende der Bewegung wird z.B. als Extensions-Dysfunktion benannt (Saner et al., 2007).

3.4.3 Haltungssyndrom


Die Behandlung bei diesem Syndrom fokussiert auf Patientenedukation mit Erarbeitung von alternativen, weniger belastenden Haltungen. Es wird zudem eine Haltungskorrektur sowie häufiges Unterbrechen längerer statischer Belastung vorgeschlagen (Saner et al., 2007).

3.4.4 Sonstige

In der Klassifikation „Sonstige“ sind die Fälle enthalten, in welchen kein spezifisch mechanisches Syndrom festgestellt werden kann. Bei dieser Kategorie sind weitere medizinische Überprüfung und Überweisungen in Betracht zu ziehen.

3.5 Selbstbehandlung des Patienten

Für das McKenzie Konzept kennzeichnend ist die Selbstbehandlung des Patienten bzw. die Beteiligung des Patienten bei der Behandlung. Es wurde klinisch festgestellt, dass der Patient selbst mit Übungen und Haltungspositionen die Symptomatik effektiver beeinflussen kann, als der Therapeut mit manuellen Techniken. So wendet McKenzie das Prinzip von spinaler Mobilisation und Manipulation oftmals nur bei Patienten an, welche

3.6 Assessment

3.6.1 Subjektiver Befund
Der subjektive Befund beinhaltet eine gezielte Befragung des Patienten, wobei der Therapeut erste Hinweise auf eine mögliche Klassifizierung erhält und den objektiven Befund hypothesengesteuert gestalten kann.

In der subjektiven Befundung werden Faktoren wie Alter, Arbeit, Vorgeschichte, Arbeit/ Freizeit, funktionelle Einschränkung, Symptomcharakter und Dauer der Symptome, Tagesmuster, spezifische Fragen, mechanische Präsentation, Limitierung der Aktivität sowie eine bildgebende Untersuchung abgeklärt.

Alter

Weiter nimmt das Alter Einfluss auf die körperliche Regenerationsfähigkeit und ist somit ein wichtiger Aspekt bezüglich Prognosestellung.
Vorgeschichte

Arbeit / Freizeit
Die berufliche Tätigkeit sowie nebenberufliche Aktivitäten, Lebensstil und Lebensveränderungen des Patienten können ausschlaggebend für die Problematik sein und auf potentiellen posturalen Stress und Überlastung hinweisen.

Funktionelle Einschränkung

Symptomabklärung
Schmerzcharakter
Um den Status des Patienten zu erfassen, sollen folgende fünf Kriterien Aufschluss geben:
- Zeit (konstanter/ intermittierender Schmerz, Frequenz der Symptomsteigerung/-minderung)
- Intensität (steigernd, mindernd anhand VAS 0-10)
- Ausbreitung des Schmerzes (zentral/ symmetrisch, unilateral/ asymmetrisch, spinale Symptome, Ausstrahlungen bis Oberschenkel/ unter das Kniegelenk)
- Mechanische Präsentation (Bewegungseinschränkungen, Zentralisation oder Peripheralisation)
- Limitierung der Aktivität

Symptom Dauer/ Zeit
Die Dauer der aktuellen Symptome gibt einen Hinweis darauf, ob es sich um ein akutes, subakutes oder chronisches Problem handelt und wie der Zustand des Gewebes ist: Stadium der Wundheilung oder persistierende Wundheilung, geschädigtes, entzündetes, überempfindliches oder dekonditioniertes Gewebe.

Dies gibt Aufschluss über die Dosierung bei den anschliessenden mechanischen Assessments.

Konstante Schmerzen werden bei entzündlichen Erkrankungen verursacht und sind häufig unmittelbare Reaktionen nach Traumata. Weiter präsentiert sich konstanter Schmerz auch als Resultat konstant mechanischer Deformation (Derangementsyndrom). Bei konstantem Schmerz ist die Berücksichtigung der Red Flags besonders essentiell.

Beim Intermittierendem Schmerz ist die Ursache nicht entzündlicher Art, bei einer Verschlechterung können aber entzündliche Prozesse ausgelöst werden. Schmerzverminderung oder vollständige Schmerzreduktion in Ruhe weist auf einen mechanischen Ursprung hin und ist postural oder ein Resultat von Dysfunktion oder Derangement.

Aktivität und Erholung indiziert. Patientenedukation und -instruktion in Form von verstärktem eigenständigem Training ist indiziert.


Bei weiterer, instabiler Situation, bei Hinweisen zu Red Flags oder untypischen Reaktionen bezüglich des mechanischen Assessments, sollten weitere Abklärungen (z.B. Bluttest oder bildgebende Assessments) vorgenommen werden.

**Tagesmuster**


**Spezifische Fragen**

Anhand dieser Fragen sollen allfällige Kontraindikationen oder Vorsichtsmassnahmen erkannt werden.

Das spezifische Erfragen nach Kribbeln, Taubheit, Schwäche und Gangunsicherheit geben Hinweise auf eine mögliche Nervenwurzelmitbeteiligung. Ziel dieser Fragen ist, spezifische Pathologien auszuschliessen, welche für eine mechanische Therapie kontraindizierend sind und allenfalls eine ärztliche Überweisung notwendig machen.
Konkret sollen Pathologien wie Krebs (unerklärlicher Gewichtsverlust), systemische Erkrankungen, vorangegangene grosse Operationen, Frakturen, Cauda equina Syndrom und Cord-Zeichen möglichst ausgeschlossen werden (= Red Flags). Auch das Erfragen des Allgemeinzustandes sowie der aktuelle Stand über Einnahmen von Medikamenten sind essentiell.

**Mechanische Präsentation**


**Limitierung der Aktivität**


**Bildgebende Untersuchungen**

Falls ein bildgebendes Dokument der Wirbelsäule vorhanden ist, kann dieses unter Umständen interessant sein, um mögliche Frakturen oder spezifische Pathologien auszuschliessen. Bildgebende Untersuchungen sollten jedoch nicht zu stark wegweisend

3.6.2 Objektiver Befund

Eine hypothetisch mechanische Diagnose oder ein mögliches nicht-mechanisches Syndrom sollte in Betracht gezogen werden, bevor mit der physischen Untersuchung begonnen werden kann. Aufgrund der Patienteninformationen sollte dem Therapeuten bewusst sein, was seine physische Untersuchung beinhaltet und wie stark die Dosierung sein darf, ob eine neurologische Untersuchung indiziert ist und Untersuchungen in Richtung der DP oder statische Belastung angebracht sind. Nach den ersten Belastungsänderungen bei Beginn der physischen Untersuchung sollen die aktuellen Symptome nochmals erfragt werden, um allenfalls aufgetretene Symptomveränderungen zu registrieren.

Im Anschluss an die physische Untersuchung sollte eine Klassifizierung nach den Syndromen möglich und ein angebrachtes therapeutisches oder zu testendes Belastungsmuster („loading strategy“) definiert worden sein.


Sitzhaltung und deren Schmerzverhalten

Bereits während der Krankenanamnese kann die Sitzhaltung des Patienten beobachtet und notiert werden. Häufig sitzen die Patienten in einer gekrümmten Haltung, teilweise verändern sie ihre Sitzhaltung. Bevor die Sitzhaltung korrigiert wird, sollen die aktuellen Symptome inklusiv möglicher Ausstrahlungen notiert werden. Erst danach soll die Sitzhaltung durch den Therapeuten korrigiert und das Symptomverhalten erneut erfragt

**Stehposition**


Folgende Merkmale werden begutachtet:

- **Lordosis**: Sie ist die häufigste Abweichung und zeigt sich in einer abgeflachten Lendenwirbelsäule oder einer reduzierten Lordose. In seltenen Fällen ist die Lordose betont. Bei ernsteren, akuten Problematiken kann eine kyphotische Haltung beobachtet werden, die Patienten ertragen keine aufrechte Stehhaltung.

Es ist von Bedeutung, ob die laterale Translation schon immer vorhanden war oder sich seit den aufgekommenen Rückenschmerzen präsentiert. Weiter relevant ist, ob die Translation vom Patienten korrigiert werden kann und wie sich die Symptome bei Korrektur verhalten. Möglicherweise hat der Patient aufgrund bequemerer Haltung eine translatierte Position eingenommen und ist gut fähig, eine symmetrische Haltung einzunehmen. In diesem Fall ist es kein lateraler Shift. Ursache eines aktuellen lateralen Shifts bei mechanischen Rückenschmerzen kann ein Derangement aufgrund eines Bandscheibenvorfalls sein.

**Neurologische Tests**

**Beweglichkeitsverlust**
Primäres Interesse im Assessment gilt der Untersuchung der Bewegungsqualität/-quantität und des Schmerzverhaltens. Das Bewegungsausmass, das Bewegungsmuster, die Schmerzreaktion, Zuversicht und Wille bezüglich Bewegen sowie den Krümmungsgrad beim Bewegen werden begutachtet.

Manifestiert sich Schmerz während der Bewegung, soll geklärt werden, ob der Schmerz während oder am Ende der Bewegung aufkommt, und ob Schmerz oder Steifheit der bewegungslimitierende Faktor ist.

**Repetierte Bewegungen**

Es wird angenommen, dass die Bewegung, welche am meisten Einfluss auf den Schmerz hat, sich am meisten auf die Pathologie und die Schmerzursache auswirkt. Flexion und Extension haben in der Regel die grösste Auswirkung auf den Schmerz. Aus diesem Grund wird initial nur in sagitaler Bewegungsebene getestet.
Bewegungen in der Frontalebene werden getestet, wenn die Befundung der repetierten Bewegungen in sagitaler Ebene die Symptome verschlechtern, peripheralisieren oder wenn keine symptomatische oder mechanische Verbesserung ersichtlich wird. Das repetitive Bewegen kann, je nach Ausgangsstellung, stehend oder liegend unterschiedliche Reaktionen bewirken.

Bewegungsrichtungen
Flexion
Alle drei Subgruppen können spezifische Symptomreaktionen in Flexion zeigen. Bei einer Adhäision oder Angst wird eine sagitale Beugung vermieden. Die Adhäision der Nervenwurzel bewirkt, dass der Patient in Richtung der Adhäision auf die schmerzhafte Seite bewegt.

Repetierte Flexionsbewegung stehend oder liegend


Extension
Eine Abweichung von sagitaler Extensionsrichtung ist möglich, aber weniger relevant. In der Regel ist es ein Resultat eines Derangements.
**Repetierte Extensionsbewegungen stehend oder liegend**


**Seitliche Translation**

Wie schon erwähnt, ist die Untersuchung in der Frontalebene nicht immer indiziert. Falls indiziert wird eine Translation der Hüfte zur einen Seite vollzogen, was eine Translation auf die andere Seite bewirkt.

**Klassifikationsspezifische Symptomreaktionen auf repetierte Bewegungen**

Eine Minderung, Aufhebung oder Zentralisation der Schmerzen sind reliable Parameter für die induzierte Bewegungsrichtung, um mechanische Deformation zu reduzieren. Eine Erhöhung oder Peripheralisation der Schmerzen ist desgleichen reliabel und gibt die zu vermeidende Bewegungsrichtung vor.

Anhand repetitiven Bewegens können die drei mechanischen Syndrome differenziert sowie beim Derangementssyndrom eine DP definiert werden. Des Weiteren kann mittels Schmerzantwort und Veränderung des Bewegungsausmasses während des repetitiven Bewegens beurteilt werden, ob die gegebene Belastungsintensität angebracht ist oder für das weitere Management angepasst werden sollte.

**Repetierte Bewegungen beim Derangementssyndrom**

Bei diesem Syndrom ist die Beweglichkeit in der Regel beeinträchtigt. Ohne Nervenwurzelreizung zeigt sich die Abweichung in der Regel in die Gegenrichtung der schmerzhaften Seite. Die Abweichung kann variabel sein und sich an einem Tag in die eine Richtung, am nächsten Tag in die andere Richtung äussern.

Ein repetitives Bewegen in eine Richtung kann zu einer Zentralisation oder Linderung der Symptome führen. Konnte die DP ermittelt werden, sind keine weiteren
Testungen mehr notwendig. Im weiteren Management wird die DP zur entscheidenden Bewegungsrichtung.


**Repetierte Bewegungen beim Dysfunktionssyndrom**

**Repetierte Bewegungen beim posturalen Syndrom**

**Keine deutlichen Zeichen auffindbar**

Wurde bei der physischen Untersuchung kein symptomatisches oder mechanisches Reaktionsverhalten ermittelt, kann eine mechanische Evaluation mit einer spezifischen Belastungsstrategie zu Hause weitergeführt werden. Dabei muss der Patient aber
dringend über das Peripheralisationsphänomen und allfällige Abbruchkriterien informiert werden.

3.6.3 Weiterführende Untersuchungen

Besteht der Verdacht, dass das Hüft- oder Iliosacralgelenk die Quelle des Schmerzes sind, muss die Lendenwirbelsäule kategorisch ausgeschlossen werden, damit eine weitere Testung indiziert ist.

3.7 Bekräftigung des Konzepts

4 Methodisches Vorgehen

Bereits mit einer vorgängigen Dispositionsarbeit begann die Literatur- und Studiensuche zum Thema McKenzie. Anhand vorhandener Literatur und angepasst an den aktuellen Forschungsstand wurde eine provisorische Fragestellung generiert, welche nach weiterer Literatur- und Studienrecherche im Rahmen der Bachelorarbeit angepasst wurde.


Folgende Reviews lieferten wichtige Hinweise zu Theorie, Literatur und Forschungsansätzen:

• Slade C. S., Keating L. J. (2007). Unloaded movement facilitation exercise compared to no exercise or alternative therapy on outcomes for people with nonspecific chronic low back pain: a systematic review. Journal of Manipulative and Physiological Therapeutics, 301-311

Die Teilnahme am dritten Deutschen Symposium für MDT im März 2012 zum Thema Klinische Muster erkennen und behandeln, organisiert vom McKenzie Institut Deutschland, Schweiz, Österreich, ermöglichte einen weiteren Einblick in die MDT Thematik und lieferte wertvolle Anstösse und Ergänzungen für diese Arbeit.

Die Einschränkung der Studienauswahl berücksichtigt einige relevante Aspekte bezüglich des McKenzie Konzepts und beinhaltet folgende Kriterien:
• Sampel: LBP Patienten mit akuten, subakuten oder chronische Symptomen.
• Die Testung des Samples auf das Zentralisationsphänomen als wichtiger Faktor in der Prognosestellung für den konservativen Behandlungsverlauf bei Derangement beziehungsweise bei Diskusproblematik
• Die Klassifikation des Samples in Subgruppen

Scale (NRS)*, „Visual Analog Scale (VAS)*, „Roland Morris Disability Questionnaire (RMDQ)*, „Oswestry Disability Index (ODI)* und „Beck Depression Inventory (BDI)*.

Eine im Fliesstext formulierte Kurzzusammenfassung der Studien wurde erstellt (Kapitel 5.1), um den Lesern der Bachelorarbeit eine Übersicht über den Inhalt der bearbeiteten Studien zu verschaffen. Des Weiteren wurden relevante Daten und Resultate der Studien in Tabellenform erfasst (Kapitel 5.2). Die Vergleichbarkeit der Studien soll hiermit erleichtert werden.

Im Teil der Diskussion (Kapitel 6) wurden die Daten und Resultate der neun Studien diskutiert, einen Theorie-Praxis-/Praxis-Theorie Transfer erstellt sowie ein Bezug zur Fragestellung geschaffen. Die Arbeit schliesst mit der Schlussfolgerung (Limitierung der Arbeit, Zukunftsaussicht und Schlusswort) ab.

4.1 Übersicht der Studien

Tabelle 1

<table>
<thead>
<tr>
<th>Autor</th>
<th>Publikationsjahr</th>
<th>Titel</th>
</tr>
</thead>
<tbody>
<tr>
<td>David Browder, John D Childs, Joshua A Cleland, Julie M Fitz</td>
<td>2007</td>
<td>Effectiveness of an Extension-Oriented Treatment Approach in a Subgroup of Subjects With Low Back Pain: A Randomised Clinical Trial</td>
</tr>
<tr>
<td>Mark Laslett, Birgitta Öberg, Charles N. Aprill, Barry McDonald</td>
<td>2005</td>
<td>Centralization as a predictor of provocation discography results in chronic low back pain, and the influence of disability and distress on diagnostic power</td>
</tr>
<tr>
<td>Audrey Long, Ron Donelson, Tak Fung</td>
<td>2004</td>
<td>Does it Matter Which Exercise? A Randomized Control Trial of Exercise for Low Back Pain</td>
</tr>
<tr>
<td>Mark Werneke, Dennis L. Hart</td>
<td>2001</td>
<td>Centralization Phenomenon as a Prognostic Factor for Chronic Low Back Pain and Disability</td>
</tr>
<tr>
<td>Mark Werneke, Dennis L. Hart, David Cook</td>
<td>1999</td>
<td>A Descriptive Study of the Centralization Phenomenon, A Prospective Analysis</td>
</tr>
<tr>
<td>Roland Donelson, Charles Aprill, Robert Medcalf, William Grant</td>
<td>1997</td>
<td>A Prospective Study of Centralization of Lumbar and Referred Pain: A Predictor of Symptomatic Discs and Anular Competence</td>
</tr>
<tr>
<td>Audrey Long</td>
<td>1995</td>
<td>The Centralization Phenomenon, Its Usefulness as a Predictor of Outcome in Conservative Treatment of Chronic Low Back Pain (A Pilot Study)</td>
</tr>
<tr>
<td>Ronald Donelson, Gregory Silva, Kenneth Murphy</td>
<td>1990</td>
<td>Centralization Phenomenon Its Usefulness in Evaluating and Treating Referred Pain</td>
</tr>
</tbody>
</table>

Hofstetter Angela, Ricklin Sandra
5 Resultate

5.1 Zusammenfassungen der beurteilten Studien
Untenstehend werden die behandelten Studien mit den wichtigsten Informationen zusammengefasst. Sie sind im Folgenden chronologisch, mit der aktuellsten beginnend, aufgeführt.

1. The Comparative Prognostic Value of Directional Preference and Centralization: A Useful Tool for Front-Line Clinicians?


sich als wichtiger prognostischer Faktor, dominierend im Vergleich zu Depression und anderen biopsychosozialen Faktoren, und erweist sich als nützliches klinisches Werkzeug.

2. Effectiveness of an Extension-Oriented Treatment Approach in a Subgroup of Subjects With Low Back Pain: A Randomized Clinical Trial


3. Centralization as a predictor of provocation discography results in chronic low back pain, and the influence of disability and distress on diagnostic power

Laslett M., Öberg B., Aprill Ch. N., McDonald B. (2005)


4. Does it Matter Which Exercise?
A Randomized Control Trial of Exercise for Low Back Pain
Die Studie setzte sich mit der Übungsauswahl bei der Behandlung von LBP Patienten auseinander und lehnt an das McKenzie Konzept an. Inhalt der Studie war der Vergleich des Outcome bei LBP Patienten mit subjektspezifischem Übungsprogramm, angepasst an die individuelle DP versus Übungsprogramm ohne Übereinstimmung mit subjektspezifischer DP. Das Studiendesign wird als multizentriertes RCT bewertet.

Die Studienteilnehmer (n=312) wurden anhand eines standardisierten MDT Assessments (durchgeführt von einem anerkannten oder diplomierten McKenzie Therapeuten) nach individueller DP klassifiziert, und dementsprechend einer Symptomsgruppe (DP nach Extension, Flexion oder Lateralflexion) zugeteilt. Mittels Randomisierung wurden die Samples (n=230) einer Behandlungsgruppe zugeschrieben: 1) „matched“: unidirektionale, end-range Übungen in Richtung individuelle DP; 2) „Opposit“: unidirektionale, end-range Übungen in die Gegenrichtung der individuellen DP; 3) „Evidence-based care (EBC)“: multidirektionale, Übungen in mittlerer Bewegungsamplitude und Dehnungen für Hüft- und Oberschenkelmuskulatur.

Folgende Outcome-Daten wurden erhoben: „pain“, „intensity“, „location“, „disability“, „medication use“, „degree of recovery“, „depression“ und „work interference“. In allen Outcome-Variablen zeigte sich eine signifikante Verbesserung in der „matched“-Gruppe verglichen mit den andern beiden Behandlungsgruppen (P < 0.001). Die Studie unterstützt die Validität des subjektspezifischen Behandlungsansatzes nach individueller DP und schliesst auf ein verbessertes Outcome und effektive Behandlungsstrategie zur Schmerzkontrolle sowie zur Schmerzelimitierung.

5. Centralization Phenomen as a Prognostic Factor for Chronic Low Back Pain and Disability
nach der letzten Therapie konnten 83.9% der Patienten kontaktiert werden. Die Interviews wurden von einer Pflegerin durchgeführt, welche weder über die Klassifikation und die demographischen Daten, noch über deren Reaktion auf die Behandlung Bescheid wusste. Folgende fünf abhängige Variablen wurden auf 23 Einflussfaktoren (Tabel 1 in der Studie) überprüft: Maximale Schmerzintensität, Status der Wiederaufnahme der Arbeit, das Fehlen wegen Krankheit, Aktivitäten zu Hause, und der weitere Gebrauch von medizinischen Einrichtungen. Von den 23 abhängigen Faktoren schienen nur die folgenden drei die fünf abhängigen Variablen zu beeinflussen: offenkundiges Schmerzverhalten, erreichter „Oswestry Disability Score“ beim Beenden der Physiotherapie und die Schmerzmuster Klassifikation mit p<0.05. Die einzigen der 23 Einflussfaktoren, welche signifikant waren, um auf chronische Schmerzen oder Behinderung hinzuweisen, sind die Klassifikation als „centralizers“ oder „non-centralizers“ und das Vorhandensein von ausstrahlenden Schmerzen in das Bein beim ersten Assessment. Aufgrund einer tiefen Sensitivität (0.15-0.3) verliert dieses Resultat an Aussagekraft. Trotzdem schliessen die Autoren daraus, dass Risikopatienten, welche chronische Schmerzen oder Behinderung entwickeln könnten, schon bei einem ersten mechanischen Assessment nach McKenzie erkannt werden können. Die zwei Einflussfaktoren Klassifikationsgruppe „non-centralizers“ und Schmerzausstrahlungen bis ins Bein stellen ein erhöhtes Risiko zur Chronifizierung dar.

6. A Descriptive Study of the Centralization Phenomenon, A Prospective Analysis

Werneke M., Hart D. L., Cook D., 1999


7. A Prospective Study of Centralization of Lumbar and Referred Pain: A Predictor of Symptomatic Discs and Anular Competence


Donelson et al. (1997) verglichen mittels dieser prospektiven, verblindeten Studie das mechanische Assessment nach McKenzie mit diagnostischen Diskusinjektionen bezüglich Schmerzreaktion (Lokalisation und Intensität) und Bandscheibenzustand. Die Daten von 63 chronischen LBP Patienten, welche zur diskographischen Untersuchung überwiesen wurden, wurden erhoben. Diplomierte MDT Therapeuten beurteilten die Patienten nach mechanischem Assessment und kategorisierten sie je nach Schmerzreaktion als „centralizer“, „peripheralizer“ oder „no-change“. Mittels Diskographie und Diskusinjektion erfolgte die Kategorisierung in positive/ negative diskogene Schmerzen sowie in normale (organisiert) oder abnormale (unorganisiert, mit Rissen in der Endplatte und/oder anularen Fissuren) Diskogramme. Es zeigte sich eine hohe Inzidenz an positiven Diskogrammen bei den „centralizers“ (74%) und „peripheralizers“ (69%). Die Möglichkeit zwischen positiven und negativen Diskogrammen mittels Schmerzreaktion zu differenzieren erschien signifikant (P<0.001). Die Differenzierung zwischen einem kompetenten und nicht-kompetenten Anulus fibrosus bei positiven Diskogrammen zeigte sich bei den „centralizers“ signifikant besser als bei den „peripheralizers“ (P< 0.042).

Laut Donelson et al. (1997) liefert das mechanische Assessment nach McKenzie relevante Informationen und kann reliabel zwischen diskogenen und nicht-diskogenen Schmerzen sowie zwischen kompetenten und inkompetenten Discs differenzieren. Somit können potentiell hohe Kosten aufgrund ineffektiver Behandlung und teurer diagnostischer
Verfahren verhindert werden. „centralizers“ haben mit MDT nach McKenzie möglicherweise eine günstigere Prognose ohne operative Massnahmen.

8. The centralization Phenomenon, Its usefulness as a Predictor of Outcome in Conservative Treatment of Chronic Low Back Pain

Long A. L., 1995


9. Centralization Phenomenon, It’s usefulness in evaluating and treating referred pain

Donelson R., Silva G., Murphy K. 1990


5.1.1 Resultate von den Beurteilungen

<table>
<thead>
<tr>
<th>Tabelle 2</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>Klare Darlegung des Ziels?</td>
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<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>NEIN</td>
</tr>
<tr>
<td>Wurde relevante Literatur mit einbezogen?</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
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<td>Design beschrieben?</td>
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<td>JA</td>
<td>JA</td>
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<td>JA</td>
<td>JA</td>
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<td>JA</td>
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<tr>
<td>Rechtfertigung der Grösse des Samples?</td>
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<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>NEIN</td>
<td>JA</td>
<td>JA</td>
</tr>
<tr>
<td>Aussagekraft des Samples beurteilt?</td>
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<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>NEIN</td>
<td>NEIN</td>
<td>NEIN</td>
<td>NEIN</td>
</tr>
<tr>
<td>Beschreibung der Intervention im Detail?</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>NEIN</td>
<td>NEIN</td>
</tr>
<tr>
<td>Beeinflussung des Samples verhindert?</td>
<td>Nicht erwähnt</td>
<td>Nicht erwähnt</td>
<td>NEIN</td>
<td>JA</td>
<td>JA</td>
<td>Nicht erwähnt</td>
<td>JA</td>
<td>JA</td>
<td></td>
</tr>
<tr>
<td>Wurden Resultate anhand statistischer Auswertungen dargelegt?</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
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<td>JA</td>
</tr>
<tr>
<td>Klinische Wichtigkeit wurde festgehalten?</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
</tr>
<tr>
<td>„Drop-outs“ wurden vermerkt und erklärt?</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>NEIN</td>
<td>JA</td>
<td>NEIN</td>
</tr>
<tr>
<td>Die Schlussfolgerung der Autoren war auf die Resultate und statistischen Berechnungen gestützt?</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
<td>JA</td>
</tr>
</tbody>
</table>

5.1.2 Design der Studien

In folgender Tabelle sind die Studiendesigns aufgeführt. Das Design ist entscheidend für die wissenschaftliche Qualität und Aussagekraft einer medizinischen Studie (Röhrig, du Prel, Blettner, 2009).

Tabelle 3

<table>
<thead>
<tr>
<th>Studie</th>
<th>Studiendesign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Browder, Childs, Cleland, Fritz (2007)</td>
<td>Multizentriertes RCT (Wegen methodologischer Defizite und einem kleinen</td>
</tr>
<tr>
<td></td>
<td>Sampel ist weitere Forschung nötig.)</td>
</tr>
<tr>
<td>Laslett, Öberg, Aprill, McDonald (2005)</td>
<td>„Prospective, blinded, concurrent, reference standard-related validity design“</td>
</tr>
<tr>
<td></td>
<td>Die Aussagekraft der Studie ist wegen des Studiendesigns limitiert, womit</td>
</tr>
<tr>
<td></td>
<td>weiterführende Forschung notwendig ist.</td>
</tr>
<tr>
<td>Werneke, Hart, Cook (1999)</td>
<td>Prospektive Analyse</td>
</tr>
<tr>
<td>Donelson, Aprill, Medcalf, Grant (1997)</td>
<td>Prospektive, verblindete Studie</td>
</tr>
<tr>
<td>Long (1995)</td>
<td>Pilotenstudie (der Autor gibt eine Empfehlung zur weiterführenden Forschung</td>
</tr>
<tr>
<td></td>
<td>ab)</td>
</tr>
<tr>
<td>Donelson, Silva, Murphy (1990)</td>
<td>Retrospektive Studie und Report (Sie generiert die Grundlage zu weiterführende Forschung: prospektive klinische Studien waren in Bearbeitung)</td>
</tr>
</tbody>
</table>

5.2 Übersichtstabellen zu den Studien

In den noch folgenden Tabellen werden verschiedene Aspekte der Studien miteinander verglichen. Sie bilden die Grundlage für die anschließende Diskussion.
5.2.1 Vergleich der Definitionen von Zentralisation

<table>
<thead>
<tr>
<th>Studie</th>
<th>Definition von Zentralisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Browder, Childs, Cleland, Fritz (2007)</td>
<td>Abbau/Aufhebung der Symptome oder Verlagerung der Symptome nach proximal in Richtung Mittellinie der LWS. Zudem musste bei dieser Studie die Zentralisation in wenigstens einer Testungsposition (Stand/BL) und nur bei Extensionsübungen auftreten.</td>
</tr>
<tr>
<td>Donelson, Aprill, Medcalf, Grant (1997)</td>
<td>Schnelle Verlagerung des ausstrahlenden Schmerzes nach proximal oder Verschwinden der Schmerzen, wenn keine Ausstrahlungen vorhanden sind.</td>
</tr>
<tr>
<td>Donelson, Silva, Murphy (1990)</td>
<td>Zentralisation bezeichnet eine schnell auftretende Verlagerung eines distal ausstrahlenden oder peripheren Schmerzes zu einer proximalen oder mehr zentralen Position.</td>
</tr>
</tbody>
</table>
5.2.2 Vergleich der Samples

Tabelle 5

<table>
<thead>
<tr>
<th>Studie</th>
<th>Beschreibung des Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Browder, Childs, Cleland, Fritz 2007</td>
<td>48 akute LBP Patienten mit Symptomen bis distal des Gesäßes, welche mit Extension zentralisierten (Das Sample ist limitiert generalisierbar, aufgrund Sampelrekrutierung in einem Militärsetting.).</td>
</tr>
<tr>
<td>Laslett, Öberg, Aprill, McDonald 2005</td>
<td>107 Patienten mit anhaltendem LBP seit 4-8 Wochen</td>
</tr>
<tr>
<td>Werneke, Hart 2001</td>
<td>223 Patienten mit Symptomen für weniger als 6 Wochen, mit oder ohne Ausstrahlung ins Bein.</td>
</tr>
<tr>
<td>Werneke, Hart, Cook 1999</td>
<td>289 Patienten mit Symptomen für weniger als 6 Wochen, mit oder ohne Ausstrahlung ins Bein.</td>
</tr>
<tr>
<td>Donelson, Aprill, Medclaf, Grant 1997</td>
<td>63 chronische LBP Patienten mit Symptomen über 3 Monate, welche zur diskographischen Untersuchung überwiesen wurden.</td>
</tr>
<tr>
<td>Donelson, Silva, Murphy 1990</td>
<td>87 Patienten eingeteilt in 3 Gruppen: LBP seit weniger als 4, 4-12 oder mehr als 12 Wochen, alle mit Ausstrahlungen ins Gesäß, Oberschenkel oder Wade.</td>
</tr>
</tbody>
</table>
### 5.2.3 Vergleich der Assessments

Tabelle 6

<table>
<thead>
<tr>
<th>Studie</th>
<th>Assessment</th>
</tr>
</thead>
</table>
### 5.2.4 Vergleich der Interventionen

Tabelle 7

<table>
<thead>
<tr>
<th>Studie</th>
<th>Intervention</th>
</tr>
</thead>
</table>
| Browder, Childs, Clelan, Fritz (2007) | In den ersten zwei Wochen hatten sie 2x/ Wo. Therapie und für weitere 2 Wo. noch 1x/ Wo. Alle erhielten eine exakte Beschreibung ihrer Übungen mittels eines Büchleins.  
Extensionsgruppe: Aktive Übungen und manuelle Mobilisation in die Extension.  
Kräftigungsgruppe: isolierte Kontraktionen von M. transversus abd. und den primären Stabilisatoren/ Mobilisatoren der Wirbelsäule. |
| Laslett, Öberg, Aprill, McDonald (2005) | Es wurden keine eigentlichen Interventionen durchgeführt. |
| Long, Donelson, Fung (2004) | 3 Behandlungsgruppen:  
- „matched“: Unidirektionale „end-range“ Übungen, passend zur DP des Assessments.  
- „opposite“: Unidirektionale „end-range“ Übungen in die Gegenseite der DP.  
Das Behandlungsprotokoll der beiden beschränkte sich auf die DP-Prinzipien, bewusster Verzicht auf die Mobilisations- und Manipulationskomponente nach MDT Methode  
- „evidence-based“: Multidirektionale „mid-range“ Übungen und Dehnungen für Hüft- und Beinmuskulatur. |
Patienten ohne Zentralisation: individuelles Rehabilitationsprogramm mit Bezug zum aktiv bleiben und Vermeidung peripheralisierender Bewegungen. |
| Donelson, Aprill, Medcalf, Grant (1997) | Keine direkte Intervention. |
### 5.2.5 Psychosoziale Faktoren und Schlussfolgerungen der Autoren

<table>
<thead>
<tr>
<th>Studie</th>
<th>Abwägung der Rolle von Psychosozialen Faktoren</th>
<th>Schlussfolgerung der Autoren</th>
</tr>
</thead>
</table>
Frotsetzung Tabelle 8

<table>
<thead>
<tr>
<th>Studie</th>
<th>Abwägung der Rolle von Psychosozialen Faktoren</th>
<th>Schlussfolgerung der Autoren</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Donelson, Aprill, Medclaf, Grant 1997</strong></td>
<td>Für das Outcome relevant waren psychosoziale Faktoren wie Schmerzintensität, -charakter und -lokalisierung.</td>
<td>Das mechanische Assessment nach McKenzie kann reliabel zwischen diskogenen/ nicht-diskogenen Schmerzen sowie zwischen kompetentem/ inkompetentem Disc differenzieren. „Centralizers“ haben mit MDT nach McKenzie möglicherweise eine günstigere Prognose ohne operative Massnahmen.</td>
</tr>
<tr>
<td><strong>Long 1995</strong></td>
<td>Das Ausmass an Behinderung wurde anhand des „Oswestry Disability Index“ am Anfang und Ende der Behandlungsphase untersucht, es stellte ein eigenständiges Outcome dar.</td>
<td>Das CP hilft im Management und der Zielsetzung von Patienten mit LBP.</td>
</tr>
<tr>
<td><strong>Donelson, Silva, Murphy 1990</strong></td>
<td>Es wurden keine psychosozialen Aspekte mit einbezogen.</td>
<td>Das CP ist sehr häufig und korreliert stark mit guten bis sehr guten konservativen Behandlungsresultaten, unabhängig von der Dauer der Symptome.</td>
</tr>
</tbody>
</table>

6 Diskussion

6.1 Aussagekraft der Studien

Eine Priorisierung der Studien betreffend Aussagekraft erachten die Verfasserinnen dieser Arbeit als schwierig, da sich die methodologischen Defizite in den Studien unterschiedlich präsentieren und schwer zu vergleichen sind.

Auf zwei Aspekte möchten die Verfasserinnen dieser Arbeit aber speziell hinweisen:

- Mehrere Studien verweisen auf eine nur kleine Sample-Grösse und sind möglicherweise nur reduziert repräsentativ: Long et al. (2008), Browder et al. (2007), Laslett et al. (2005), Donelson et al. (1990).

6.2 Prognostische Aussagekraft des CP

6.3 Inkonsequente, ungenaue Definierung des Zentralisationsphänomens
sind nach Werneke et al. (1999) folgende Punkte in den Forschungsarbeiten ebenfalls unklar:

- Dokumentation der Zentralisation nur bei der initialen oder bei allen darauf folgenden Sitzungen
- Kompletten oder partiellen Reduktion der ausstrahlenden Symptome
- Unterscheidung zwischen induzierten und normalen Heilungsverlauf
- Notwendigkeit einer Objektivierbarkeit des CP’s mittels Körperdiagramm (Abb.2)
- Sofortige Einteilung in die „non-centralization group“ oder Abwarten, wenn sich bei der ersten Befundung keine Veränderung in der Schmerzlokalisation zeigen


6.4 Objektivierbarkeit des CP


Abb.2, Werneke et al. (1999), S.679
Donelson et al. (1997) diskutierten eine weitere Dokumentationsmöglichkeit des Schmerzverhaltens, wobei der Schmerz mittels Eigendokumentation durch den Patienten notiert wurde. Diese Dokumentationsform bewerteten sie jedoch als zu subjektiv, um reliabel zu sein.

6.5 Konzeptanwendung in den Studien

6.6 Ausbildungsstand der Therapeuten bezüglich McKenzie Techniken

6.7 Zentralisation und Diskographie

6.8 Einfluss des natürlichen Heilungsverlaufs

natürlichen Heilungsverlaufs auf das Outcome minim ein. Er verweist auf seine Studie mit Silva und Murphy (1990), in welcher eine hohe Rate an „centralizers“ schneller ein gutes Outcome erreichen konnten, als dass von einem natürlichen Heilungsverlauf ausgegangen werden kann.

6.8.1 Indizien für eine Chronifizierung von Schmerz und Behinderung


6.8.2 STarT Back screening Tool – Forschung an der Keele University

Als aktuelles Beispiel verweisen die Verfasserinnen dieser Arbeit auf die Forschungsarbeiten der Keele University mit Entwicklung des „STarT Back screening Tools“. „Das STarT Back screening Tool“ wird als einfach anwendbares Werkzeug in der primär medizinischen Versorgung zur Subgruppierung von LBP beschrieben. Dieses Tool beinhaltet neun Fragen und klassifiziert Patienten in die drei Kategorien „low risk“, „medium risk“ (physische und psychosoziale Indikatoren für ungünstiges Outcome, aber ohne hohes Level an psychologischen Indikatoren) und „high risk“ (hohes Level an psychologisch prognostischen Indikatoren mit/ ohne physische Indikatoren) für zukünftige beeinträchtigende LBP Problematiken. Die Kategorisierung basiert auf der Präsenz von
potentiellen, modifizierbaren physischen und psychosozialen sowie prognostischen Indikatoren für anhaltend beeinträchtigende Symptome. Das Studienprotokoll eruiert das „STarT Back Trial“ betreffende Effektivität bezüglich Klinik und Kosten bei Patienten mit nicht spezifischem LBP in „primary care“ (Hay et al., 2008).


6.9 Vergleichbarkeit der Patienten-Samples
LBP war ein Einschlusskriterium in der Studienrecherche dieser Bachelorarbeit. Des Weiteren wurde aber nicht zwischen akutem, subakutem und chronischem LBP differenziert (siehe Tabelle 5).


6.10 Bezug zur Fragestellung
Der Schwerpunkt der Bachelorarbeit wurde auf das Assessment des MDT Konzepts gesetzt, wobei die prognostische Aussagekraft bezüglich des Assessments nach McKenzie bei LBP Patienten mit Diskusproblematik beurteilt wurde.

Mittels ausgewählter Studien konnte vor allem die prognostische Aussagekraft des CP nach McKenzie belegt sowie dessen starke Korrelation zu guten bis sehr guten


6.11 Theorie-Praxis Transfer
Das konzeptionelle Modell McEnzies ist mit grundlegenden theoretischen Aspekten begründet. So basiert das Klassifikationssystem nach McKenzie beispielsweise auf diversen struktur- und funktionsspezifischen Ansätzen, wie das strukturspezifische Modell der Bandscheibenverlagerung und funktionsspezifischen Ansätzen der mechanischen Diagnose und Therapie.

Die praktische Umsetzung des Konzeptes wurde empirisch erforscht. Die Effektivität des McKenzie Konzeptes in der Praxis sowie die prognostische Aussagekraft des CP konnten belegt werden.

Patienten als relevanten Aspekt in der physiotherapeutischen Behandlung, welcher ins Management eines jeden LBP Patienten aufgenommen werden kann.

6.12 Praxis-Theorie Transfer
Wie bereits in Kapitel 2.3 erwähnt, zeigt sich das Spektrum an Forschungsarbeiten bezüglich des McKenzie Konzepts umfassend mit einer Spannbreite von sehr zuverlässigen bis auf Fehlinterpretationen beruhenden empirischen Studien. Der Praxis-Theorie Transfer zeigt sich hiermit als teilweise ungenügend.

Des Weiteren wird der Praxis-Theorie Transfer aufgrund uneinheitlicher Definierung des CP sowie fraglicher standardisierter Konzeptanwendung (siehe Kapitel 6.3 und 6.5) erschwert.


7 Schlussfolgerung

7.1 Limitierung der Arbeit

Weiter müssen einige Limitierungen bezüglich der Studiendesigns akzeptiert werden, da nur eine spärliche Zahl an RCT’s zu dieser Thematik vorhanden sind.

Auf eine genaue Sampel-Abgrenzung bezüglich Symptomdauer (akut, sub-akut, chronisch) wurde aufgrund vergrösserter Studienvielfalt verzichtet. Die allgemeine Vergleichbarkeit der Studien wird dadurch aber limitiert.

Im Diskussionsteil (Kapitel 6) der Bachelorarbeit wurde der Fokus mehrheitlich auf die thematischen Aspekte gelegt und die Aussagen der verschiedenen Studien verglichen und diskutiert. Die Aussagekraft der Studien bezüglich Qualität wurde dabei etwas in den Hintergrund gestellt.

7.2 Zukunftsaussicht


7.3 Schlusswort
Trotz bereits vorhandener Reviews bezüglich Effektivität des McKenzie Konzeptes und der prognostischen Aussagekraft des CP, hat die Bachelorarbeit seine Berechtigung. Es konnten neue Aspekte der psychosozialen Faktoren im Bezug auf LBP integriert werden und eine Verknüpfung zu den hochaktuellen Aspekten der Keel University Studie geschaffen werden.

8 Quellenverzeichnis

8.1 Literaturverzeichnis


Publikationen. Deutsches Ärzteblatt, Jg. 106, Heft 11, 184-189. DOI: 10.3238/arztebl.2009.0184


8.2 Abbildungsverzeichnis


9 Danksagung
Wir möchten uns ganz herzlich bei unseren Familien und Freunden bedanken, die uns während den Schreibarbeiten begleitet und bei der Entstehung dieser Arbeit mitgefeiert haben.


Many thanks also to R. Donelson who showed a keen interest in our work and kindly sent us some of his studies which otherwise would not have been accessible to us.


10 Eigenständigkeitserklärung

Wir erklären hiermit, dass wir die vorliegende Arbeit selbstständig, ohne Mithilfe Dritter und unter Benutzung der angegebenen Quellen verfasst haben.

Ort und Datum________________________

________________________

Hofstetter Angela

________________________

Ricklin Sandra
11 Anhang

11.1 Anzahl Worte
Anzahl Wörter im Abstract: 200
Anzahl Wörter der Arbeit: 11981

11.2 Beurteilungsbögen der Studien
Critical Review Form, Quantitative Studies

REFERENCE:
The Comparative Prognostic Value of Directional Preference and Centralization: A Useful Tool for Front-Line Clinicians?
Long A., May S., Fung T.

<table>
<thead>
<tr>
<th>STUDY PURPOSE: Was the purpose stated clearly?</th>
<th>STUDY PURPOSE: Outline the purpose of the study:</th>
</tr>
</thead>
<tbody>
<tr>
<td>X   Yes</td>
<td>Factors which were most likely to predict successful outcome have been determined. A range of baseline variables were analyzed to understand which individual factor predicts a good short-term prognosis.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LITERATURE: Was relevant background literature reviewed?</th>
<th>LITERATURE: Describe the justification of the need for this study:</th>
</tr>
</thead>
<tbody>
<tr>
<td>X  Yes</td>
<td>• There has been interest in determining prognostic factors which might affect the outcome of an episode of LBP. It would help to shape management strategies and assist with early identification of the risk for developing chronic pain and disability.</td>
</tr>
<tr>
<td>No</td>
<td>• The number of prognostic variables as possible effectors of prognosis is extremely high, circuitous and unrealistic for clinicians to assess. The question is which factors are the most important ones and can be used to judge individuals, and how can clinicians determine which patient is most likely to respond to a particular treatment.</td>
</tr>
<tr>
<td></td>
<td>• It is not clear if centralization/ non-centralization are better predictors of an outcome than psychosocial variables. Prior studies already have shed light on this topic.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESIGN: randomized cohort (population-based)</th>
<th>DESIGN: Describe the study design:</th>
</tr>
</thead>
<tbody>
<tr>
<td>X  before and after</td>
<td>It is a multivariate analysis of prognostic variables. The subjects were screened for participation in the previously published RCT from Long, Donelson, Fung (2004).</td>
</tr>
<tr>
<td>___ case-control</td>
<td></td>
</tr>
<tr>
<td>___ cross-sectional</td>
<td></td>
</tr>
<tr>
<td>(1+ group at 1 point in time)</td>
<td></td>
</tr>
<tr>
<td>___ single case design</td>
<td>Can the author answer the study question with the study design?</td>
</tr>
<tr>
<td>___ case study</td>
<td>Partially. In a regression analysis they specify 17 baseline variables and assess them as good or fair/poor outcome. Finally they suggested which variables were most likely to predict a good outcome. This simple rating may be an important part of a practical screening tool and provides support for further research in assessing the long-term benefits as well.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Can the author answer the study question with the study design?</th>
<th>Can the author answer the study question with the study design?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were the design and/or method used introducing biases? If so describe:</td>
<td>Were the design and/or method used introducing biases? If so describe:</td>
</tr>
<tr>
<td>It is a secondary analysis of data that was gathered for a RCT, and as such it lacks a number of methodological criteria that are recommended for prognostic studies. (see also the ‘main limitations’ on page 4 hereinafter)</td>
<td>It is a secondary analysis of data that was gathered for a RCT, and as such it lacks a number of methodological criteria that are recommended for prognostic studies. (see also the ‘main limitations’ on page 4 hereinafter)</td>
</tr>
</tbody>
</table>
## SAMPLE SIZE:

<table>
<thead>
<tr>
<th>Was sample size justified?</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N = 312</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

### Sample Description:

- 312 subjects with:
  - Low back pain
  - With/without leg symptoms
  - With/without one neurological sign
  - Demonstrating DP during mechanical assessment

(→ see the RCT (Does it matter which exercise? A RCT of exercise for low back pain (Long A, Donelson R, Fung T (2004) hereinafter.))

### How was sample identified? Was it a representative sample?

- 312 subjects were screened for participation in a previously published RCT
- 241 subjects (77.2%) had complete data which were available at entry. They did discharge and formed the cohort for the current analysis.

The sample size was relatively small, but it was enough to avoid a type II error.

### If there were more than one group, was there similarity and differences between the groups? Describe:

A group allocation was conducted for the previous RCT: The subjects were randomized into three different groups: "matched", "opposite" or "evidence-based care (EBC)".

For this second analysis: the subjects were assessed on the basis of the outcome-variables. The subjects that had completed treatment were compared inter alia with the drop-outs of the sample.

### Was informed consent and assent obtained?

Nothing was mentioned.

## OUTCOMES:

### Specify the frequency of outcome measurement:

Within the original RCT protocol, subjects were allowed a maximum of 6 sessions in 2 weeks.

### Outcome areas

**Prognostic variables:**
- Baseline variables: Age, gender, Marital Status, Quebec Task Force (QTF) category anatomic pain location, acuity and first or recurrent episode, work status, back and leg pain rating, pain interference rating, back and leg pain bothersomeness, treatment assignment (DP status, matched/ unmatched treatment), Roland-Morris Disability Questionnaire (RMDQ), medication, Beck depression scale
- Patient Rating: good or fair/poor outcome after 2 weeks

### List measures used

Some of the important measured parameters for the baseline variables:

⇒ Quebec Task Force (QTF) acute, sub-acute, chronic and QTF 1,2,3,4
  (1=back,2=thigh, 3=calf, 4=with neurological signs)
⇒ Roland-Morris Disability Questionnaire (RMDQ)
⇒ Directional preference/ Centralization yes/no and matched versus unmatched treatment
⇒ "a good outcome" was defined with a minimal reduction of 30% on their Roland-Morris Disability Questionnaire (RMDQ) and by the patients report of resolved and ready for discharge or better but required a few more sessions.

### Reliable and Valid?

⇒ QTF: the discriminant validity is provided (Werneke, Hart (2004))
⇒ RMDQ: It is a reliable and valid tool that is sensitive of changes (Ostelo & Vet (2005) quote Davidson 2009)
**INTERVENTION:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Not Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention was described in detail?</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Contamination was avoided?</td>
<td></td>
<td></td>
<td>X</td>
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</table>

Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting.

Descriptive statistics were reported for 17 baseline variables from a previous RCT to determine which baseline variables were most predictive of a good outcome at 2 weeks, after maximal 6 treatments. A step-wise logistic regression analysis was performed. The Pearson chi Square test was used for categorical baseline variables and the independent-sample t-test for continuous baseline variables to compare the subjects who had completed the treatment and the subjects who dropped out. Only the variables with p<0.05 underwent further analysis: Sensitivity, specificity and odds ratios were calculated.

**RESULTS:**

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Results</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline variables</td>
<td>8 of 17 variables correlated significantly with good outcome and were included into the regression analysis. Only 2 variables (leg bothersomeness and treatment assignment) were integrated in the final model. They predicted 77.6% of those with a good outcome.</td>
<td>p&lt;0.05; P (0.000 – 0.040); score (4.254 – 42.403) for both variables: P (0.001)</td>
</tr>
<tr>
<td>Treatment effect</td>
<td>35% of the randomized sample met the good outcome criteria. The treatment group representing the DP/centralization subgroup that received matched treatment was 7.8 times more likely to achieve a good outcome. Subjects without DP at the initial mechanical evaluation were 3.4 times more likely to have a good outcome if they were given further MDT-management.</td>
<td>the RMDQ scores were reduced by a mean of 9.7 points (SE 0.69), or 58.2% (SE 3.2) in the good outcome group; in the poor outcome group with mean change in RMDQ scores were 0.45 (SE 0.33) or 2.06% change (SE 3.61)</td>
</tr>
</tbody>
</table>

If not statistically significant (i.e., p < 0.05 or 0.01), was study big enough to show an important difference if it should occur (power and sample size)?

The sample size was relatively small, but still sufficient to avoid a type II error.
**Clinical importance was reported?**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not addressed</th>
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<tr>
<td></td>
<td>X</td>
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What is the clinical importance of the results (that is, even if the results were statistically significant were the differences large enough to be clinically meaningful)?

The initial RCT and this second analysis emphasize the short-term positive prognostic finding of DP as long as this is matched to appropriate directional exercises. DP and centralization seem to be important clinical findings that can be used as indicators of good prognosis and management strategies. Further, it supports the use of a “bothersome rating” in future trials. Subjects with DP/centralization who were introduced in unmatched exercises were negatively associated with a good outcome (for example: Wrong exercise prescriptions may affect negatively a good outcome).

**Drop-outs were reported?**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<td>X</td>
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</table>

If yes, why did they drop out? How were drop-out participants included in the statistical analysis?

14% of the sample did not complete treatment. The reason is not documented, but the dropouts did tend to be younger (p=0.043), single (p<0.001), having a first episode of LBP (p=0.038), taking more medication (p=0.045) and had a higher depression score (p=0.002). Dropouts differed only in respect of 5 of 17 baseline variables. They did not differ substantially in respect of the other 12 variables.

**CONCLUSIONS AND CLINICAL IMPLICATIONS:**

The conclusions drawn by the authors were appropriate given study methods and results.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<td>X</td>
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</tbody>
</table>

What did the author conclude?

Pain duration, leg pain intensity, work status, depression, and QTF anatomic pain location were all weak predictors of outcome. Subgroup-matched treatment appears to be a useful tool for front-line clinicians and an important factor that dominates other variables, including depression. Centralization seems to be a stronger predictor of outcomes than psychosocial variables.

What were the main limitations of the study as stated by the author(s) and from your point of view?

- Because of the study design (second analysis with data from a previous RCT) it lacks a number of methodological criteria: i.e. the heterogeneous inception cohort, the relatively small sample size, the short-term follow-up
- Variables which have gotten more important in recent years (i.e. fear avoidance, patient expectations, distress, job satisfaction, work place factors) were not included
- The long-term benefits require further study

What are the implications of these results for your practice?

This analysis supports the MDT assessment (including DP/centralization) in its predictive value. DP/centralization with matched treatment is considered as a useful tool for clinicians and overtops other variables, including depression. Furthermore, it is still a good outcome even if DP could not be determined during the first mechanical evaluation.

**References**


Effectiveness of an Extension-Oriented Treatment Approach in a Subgroup of Subjects With Low Back Pain: A Randomized Clinical Trial
Browder D. A., Childs J. D., Cleland J.A., Fritz J. M.
Physical Therapy Volume 87, Number 12, pp 1608-1618, 2007

STUDY PURPOSE:
Was the purpose stated clearly?
_X_ Yes
___ No

Outline the purpose of the study:
The examination of an extension-oriented treatment approach (EOTA) in a subgroup of subjects with low back pain (LBP) hypothesized to benefit from the treatment compared with a lumbar spine strengthening exercise program.

LITERATURE:
Was relevant background literature reviewed?
_X_ Yes
___ No

Describe the justification of the need for this study:
- Efforts to identify effective nonsurgical treatment approaches (for example exercise for the LBP management) has been unsuccessful and resulted in many equivocal treatment recommendations in practice guidelines for LBP.
- The equivocal treatment approaches may attribute to the failure of researchers to adequately account for the importance of subgrouping or classifying subjects. It is a high research priority to develop methods for identifying subgroups of subjects with LBP and matching them to treatments, where they most likely can benefit.
- It is generally agreed that patients experience centralization with lumbar extension movements benefit from an EOTA, but most previous studies have not included it into the study design or as an inclusion criteria.

DESIGN:
_X_ randomized
___ cohort
(population-based)
___ before and after
___ case-control
___ cross-sectional
(1+ group at 1 point in time)
___ single case design
___ case study

Describe the study design:
Multicenter randomized clinical trial

Can the author answer the study question with the study design?
Yes, but the sample size is small and the sample may not be generalizable because its recruitment from a military setting. The long-term-effect is not warranted with the 6-months follow-up because of a small participation rate. The lack of follow-up may have resulted in an exaggeration of differences between the groups. The study indicates a persistent need for additional research.

Were the design and/or method used introducing biases? If so describe:
- The study has a small sample size (n=48) and methodological shortcomings.
- The re-examinations were not always conducted by an examiner who was unaware of the group allocation of the subjects.
- Advanced training or certification of the therapists was not a requirement
- The patient-charging involved patients with a history of lumbar surgery (longer than 6months ago), although they had not a good potential to respond to an EOTA and do not fit into the homogenous groups

SAMPLE SIZE:
N = 300 subjects were screened, 48 subjects passed the baseline examination and randomization
Was sample size justified?
_X_ Yes
___ No
___ N/A

Sample Description:
Inclusion criteria were:
- Age between 18 and 60 years
- Presentation of LBP and symptoms of any duration extending distal to the buttocks on at least one lower extremity
- The centralization phenomenon during examination in active movement testing in extension
- Score of at least 30% in a modified Oswestry Low Back Pain Disability Questionnaire (ODQ)

Exclusion criteria were:
Red flags potentially indicate pathological condition, current pregnancy or surgery to the lumbar spine in the past 6 months
**How was sample identified? Was it a representative sample?**
Patients who receive physical therapy for a primary complaint of LBP and who comply with the inclusion criteria were considered for participation. It is only a small sample size which may not be generalizable because its recruitment from a military setting.

**If there were more than one group, was there similarity and differences between the groups? Describe:**
Subjects were randomly assigned to one of two exercise groups:
1. EOTA group (n=26)
2. Strengthening group (n=22)

   - 5 subjects from the EOTA group reported a past history of lumbar surgery (longer than 6 months ago); in the Strengthening group no subjects with lumbar surgery were reported.

**Was informed consent and assent obtained?**
Nothing is mentioned.

---

### OUTCOMES:

**Specify the frequency of outcome measurement:**
1 and 4 weeks after randomization follow-up examinations were performed. Follow-up examinations included reassessment of the self-report measures. These self-report measures have been collected again per mail 6 months after discharge.

<table>
<thead>
<tr>
<th>Outcome areas</th>
<th>List measures used</th>
<th>Reliable and Valid?</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Self-report measures:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disability</td>
<td>⇒ modified Oswestry Low Back Pain Disability Questionnaire (ODQ) (scores ranging from 0 – 100)</td>
<td>⇒ ODQ: a high level of reliability, validity, responsiveness</td>
</tr>
<tr>
<td>• Pain</td>
<td>⇒ Numeric Pain Rating Scale (NPRS) (11-point pain rating scale from 0-10)</td>
<td>⇒ NPRS: a clinical meaningful measurement</td>
</tr>
<tr>
<td>• symptom location/centralization</td>
<td>⇒ Body diagram for symptom location and at follow-up the extent of centralization</td>
<td>⇒ Body diagram: excellent reliability for recording symptom location</td>
</tr>
<tr>
<td>• fear/avoidance</td>
<td>⇒ Fear-Avoidance Beliefs Questionnaire (FABQ)</td>
<td>⇒ The FABQ is a reliable and valid measurement. Further research into its use as a diagnostic tool is warranted. (Williamson, 2006)</td>
</tr>
<tr>
<td>(2) physical examination with re-examination and its comparison</td>
<td>⇒ neurological assessment of strength (muscle force-generating capacity), sensation, muscle-stretch reflexes, and straight leg raise test, measurements of active lumbar range of motion with a single inclinometer, posterior-to-anterior mobility of the lumbar spine</td>
<td></td>
</tr>
</tbody>
</table>
**INTERVENTION:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention was described in detail?</td>
<td>Yes</td>
<td>No</td>
<td>Not addressed</td>
<td></td>
</tr>
<tr>
<td>Contamination was avoided?</td>
<td>Yes</td>
<td>No</td>
<td>Not addressed</td>
<td></td>
</tr>
</tbody>
</table>

Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting.

**Quantity of therapy:**
- for the first 2 weeks: twice
- for the third and fourth week: once

Total: 6 sessions over 4 weeks

In addition, all subjects received a copy of an exercise instruction booklet with detailed descriptions of exercises. They were instructed to perform these exercises at home on the days they did not receive physical therapy and to record their adherence in an exercise log. The treating therapist reviewed it at each therapy session. Both groups were given recommendation to maintain their usual activity within the pain limits.

The treatments involve the following interventions:

1) **EOTA group:** exercise and mobilization to advance lumbar extension with the aim of producing centralization of symptoms.
   - Exercises: in prone and standing position, 3 sets of 10 repetitions
   - Mobilization: 1 series of 10 to 20 grade I to IV oscillations
   - Additional exercises at home during the 4-week treatment period: 1 set of 10 repetitions lumbar extension exercise every 2 to 3 waking hours
   - Education: how to maintain the natural lumbar lordosis while sitting, avoiding sitting for longer than 20-30 minutes, interrupting activities and position that caused their symptoms to peripheralize or increase their symptoms, encouraging to perform activities and positions that centralize or improve the symptoms.

2) **Strengthening group:** strengthening program to improve isolated contraction of the deep abdominal muscles and to strengthen primary stabilizers of the spine.
   Additional home-program: performing the therapy program once a day.

**RESULTS:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results were reported in terms of statistical significance?</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
<td>Not addressed</td>
</tr>
</tbody>
</table>

**What were the results?**

**Outcomes**
- disability (ODQ)

**Results**
- A significant Group x time interaction
- A significant greater improvement in the EOTA-group at each follow-up

**Statistical Significance**
- P = 0.02
- Mean Difference Between groups from baseline (95% CI):
  - Week 1: 8.9
  - Week 4: 14.4
  - Month 6: 14.6

- Significant less improvement in the EOTA-group in subjects with history of surgery in comparison with the subjects without history of surgery

**Outcomes**
- pain (NPRS)

**Results**
- No significance in group x time interaction
- Only significant greater improvement at the 1 week follow-up

**Statistical Significance**
- P = 0.07
- Mean difference between subjects:
  - Week 1: 14.7 points
  - Week 4: 19.0 points
  - Month 6: The difference at approaches significance: P=0.07

**Outcomes**
- central symptoms

**Results**
- After 1 week:
  - EOTA-group: 7 subjects, strengthening-group: 1

**Statistical Significance**
- P=0.04
After 4 week:
EOTA-group: 7 subjects,
strengthening-group: 4
subjects
⇒ P=0.47

After 1 week:
EOTA-group: 17
subjects, strengthening-
group: 6 subjects
⇒ P=0.008

After 4 weeks:
EOTA-group: 13
subjects, strengthening-
group: 5 subjects
⇒ P=0.05

Was the analysis that is the type of statistical tests used, appropriate for the type of outcome measures and the methodology?

Yes
No
Not addressed

Explain:
- If not statistically significant (i.e., p < 0.05 or 0.01), was study big enough to show an important difference if it should occur (power and sample size)?
80% power was provided by the sample size per group to detect a clinically important difference of 10 points between groups. A common standard deviation of 12.0 and a 2-side hypothesis with an alpha level of 0.05 was assumed.

What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful)?
- The study provides preliminary evidence that an EOTA is more effective than a strengthening program for patients with symptoms peripheralizing at least to the buttocks and centralizing with extension movements.
- The study approves additional research to define more narrowly the subgroups which best respond to an EOTA.
- The results allow the assumption that patients with a history of surgery may benefit more from a different treatment approach, even if centralization within extension movements initially was present.

Drop-outs were reported?
Yes
No

If yes, why did they drop out? How were drop-out participants included in the statistical analysis?
The Intention-to-treat principles were used for subjects who dropped out.

CONCLUSIONS AND CLINICAL IMPLICATIONS:
The conclusions drawn by the authors were appropriate given study methods and results.
Yes
No

What did the author conclude?
The study results support the belief that patients who demonstrate centralization with extension movements during examination may preferentially benefit from a treatment focused on repeated extension movements.

What were the main limitations of the study as stated by the author(s) and from your point of view?
- The generalizability to other population should be assumed with caution, because of the study-performance in military settings.
- The low 6-months follow-up rate may be partially an effect of extended deployments with no possibility to contact subjects.
- The loss to the 6-months follow-up may have exaggerated or attenuated the differences between the treatment groups. It needs to be interpreted with caution.
- A relatively homogenous group of subjects (likely to respond to an EOTA) has been collected, but subjects with a history of lumbar surgery did not have much potential to respond to an EOTA.
- The EOTA protocol which included exercises and mobilization may not have been
sufficient to get a maximal improvement. The treatment effect may have been enhanced by using a higher dosage of exercise or mobilization.

**What are the implications of these results for your practice?**

Even if the McKenzie concept is not mentioned directly in this study it shows correlation with it. The centralization phenomenon during extension movements was used as an inclusion criterion as well as an assessment criterion. The study supports the thesis that subjects who centralize with extension and who were given a matched treatment program had greater reductions in disability.

References:

REFERENCE:
Centralization as a predictor of provocation discography results in chronic low back pain, and the influence of disability and distress on diagnostic power
Laslett M., Öberg B., Aprill Ch. N., McDonald B.
The Spine Journal 5, pp 370-380, 2005

**STUDY PURPOSE:**
Was the purpose stated clearly?

- **Yes**
- **No**

Outline the purpose of the study:
The aim of this study was to detect the diagnostic predictive power of centralization and the influence of disability in patient distress on diagnostic performance in chronic low back pain patients. They used the provocation discography as a standard for diagnosis criteria.

**LITERATURE:**
Was relevant background literature reviewed?

- **Yes**
- **No**

Describe the justification of the need for this study:
- The most imaging methods of evaluating low back pain cannot differentiate between painful and not painful pathologies. Only provocation discography is a credible method of directly testing the disc and identifying discogeneric pain. But not all patients should receive this test because it is expensive and invasive. And the inter-examiner reliability is merely acceptable.
- There are only a few clinical assessment methods which were potentially capable of identifying low back pain of discogenic origin, such as vibration and centralization or peripheralization of referred pain during a McKenzie assessment. The inter-examiner reliability for the McKenzie assessment is acceptable when carried out by trained examiners.
- Patients’ disability and distress seems to be associated with increasing pain during discography and false-positive rates.

**DESIGN:**
Describe the study design:
Prospective, blinded, concurrent, reference standard-related validity design

Can the author answer the study question with the study design?
Were the design and/or method used introducing biases? If so describe:
Although the centralization could occur quickly, the observation of the assessment after the method of McKenzie was too short. The effect of the first assessment could not be followed over a few days so perhaps not all centralizers could be found and perhaps not all true centralizers were allocated to the centralization group. This indicates an intervention bias.
### Sample Description:
Persistent low back pain, with or without referred pain in the lower extremity, Symptoms 4-8 weeks, no relative contraindication for provocation discography and no severe degeneration, 107 patients but only 69 received a full evaluation, 21 a partial and 17 no examination.

Basic demographic and medical data was recorded at the first interview, it included: Pain (VAS 100-mm for current, best and worst pain), 23-point Roland-Morris Disability Questionnaire (disability), Zung Depression Index (psychological distress), Modified Somatic Preception Questionnaire (MSPQ), Distress Risk Assessment Method (DRAM).

### How was sample identified? Was it a representative sample?
Patients who were referred from various private radiology practices to specialists in diagnosis of spinal pain were invited to participate in the study. A few were self-referred.

### If there were more than one group, was there similarity and differences between the groups? Describe:
They had just one group but two consecutive tests → A physical examination and a discography.

### Was informed consent and assent obtained?
Yes, and if the subjects did not confirm the informed consent they were excluded.

### Outcomes:
Specify the frequency of outcome measurement:
Evaluation at one point in time

#### Outcome areas
- Potential confounding factors on the diagnostic power of centralization were estimated (disability, psychological distress and illness behavior)
- Correlation between centralizers-non-centralizers and positive-negative discography

#### List measures used
- 23-point Roland Morrison Disability Questionnaire
- Zung Depression Index
- Modified Somatic Percepcion Questionnaire (MSPQ)
- Distress Risk Assessment Method (DRAM)
- VAS (100-mm)

#### Reliable and Valid?
- All questionnaires are validated forms and often used

### Intervention:
Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting.
At the initial interview: basic demographic and clinical data as well as the history of their low back pain were collected. The subjects completed the McKenzie Assessment (30-60 minutes) concluded by two trained physical therapists, which included for example the following: Assessment of the lumbar lordosis, presence of a visible lateral shift and standardized repeated end-range movements. The examiners recorded centralization and peripheralization and worked with the VAS.

Subsequently after the mechanical assessment, the subjects had a standardized discography. (also conducted by an experienced discographer or under his attendance)
Blinding: Physical therapists conducting the clinical examination were unaware of previously collected data from the initial interview as well as previous imaging studies of their subjects. Also the discographer was blinded to the results of the physical examination. Data was collected from May until October 2002.

### RESULTS:

Results were reported in terms of statistical significance?

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What were the results?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Results</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>⇒ Correlation between centralizers/ non-centralizers and positive/ negative discography and the confounding factors</td>
<td>⇒ Higher Roland-Morris questionnaire, MSPQ and worst pain intensity scores were associated with positive discography.</td>
<td>⇒ There is no statistical significance but trends could be detected</td>
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<td></td>
<td>⇒ Centralization has high specificity in those subjects categorized as not being severely disabled.</td>
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<td>⇒ When Centralization is reported during an initial McKenzie assessment a positive provocation discography is highly likely</td>
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Was the analysis that is the type of statistical tests used, appropriate for the type of outcome measures and the methodology?

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Explain:

If not statistically significant (i.e., p < 0.05 or 0.01), was study big enough to show an important difference if it should occur (power and sample size)?

The sample size was too small (only 69 completed a full assessment) and the categorization in the subgroups of centralizers and non-centralizers was not followed up over a period of several days.

Clinical importance was reported?

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What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful)?

In patients with chronic low back pain but without distress and severe disability it is suggested that discography may be dispensable if a McKenzie treatment could be conducted. Due to the fact that the result of a discography is already known and there will be a good prognosis for conservative treatment.

Drop-outs were reported?

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If yes, why did they drop out? How were drop-out participants included in the statistical analysis?

They started with 118 subjects but eleven dropped out because of technical reasons during the provocation discography, leaving 107 patients that were included in the study.

CONCLUSIONS AND CLINICAL IMPLICATIONS:

The conclusions drawn by the authors were appropriate given study methods and results.

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</table>

What did the author conclude?

Centralization is related to a positive discography with a specificity of 89%. Thereof patients without severe disability have a specificity of 100% and patients with severe disability have a specificity of 80%.

Therefore a discography would be dispensable if the whole McKenzie assessment is carried out in patients without distress or severe disability. Because the results of a discography are known already and the outcome of a conservative therapy is expected to be good.
What were the main limitations of the study as stated by the author(s) and from your point of view?
The sample size was too small but a much larger sample size would have required more trained physical therapists, which was not possible for this study. The patients could not be evaluated over several days after the McKenzie method, because the discography had to take place directly after the first assessment. The study shows a high specificity but a low sensitivity.

What are the implications of these results for your practice?
If patients have high levels of distress, they mostly could not tolerate a full physical assessment after McKenzie. The classification into centralizers and non-centralizers has to be followed up over a period of several days. In addition a correlation of positive discography and centralization could be assumed but has not been sufficiently statistically detectable.

REFERENCE:
Does it Matter Which Exercise?
A Randomized Control Trial of Exercise for Low Back Pain
Long A., Donelson R., Fung T.
Spine Volume 29, Number 23, pp 2593-2602, 2004

STUDY PURPOSE:
Was the purpose stated clearly?
_X_ Yes
___ No

LITERATURE:
Was relevant background literature reviewed?
_X_ Yes
___ No

DESIGN:
_X_ randomized
___ cohort
(population-based)
___ before and after
___ case-control
___ cross-sectional
(1+ group at 1 point in time)
___ single case design
___ case study
⇒ multicentered randomized controlled trial

Outline the purpose of the study:
Comparison of the outcome of a subject-specific exercise prescription related to the individual “participant`s DP” with a prescription of non-concordant exercises.

Describe the justification of the need for this study:
- Several systematic reviews have shown the importance of exercising in the treatment of LBP, but there is insufficient evidence supporting specific types of exercises
- Exercise trials with homogeneous LBP populations demonstrated equivocal results. Alternatively, trials demonstrated the efficacy of treatments that defined LBP subgroups
- One of the top research priorities of the International Forum Primary Care Research in Low Back Pain is to identify subgroup of LBP
- McKenzie is one subgroup classification method that amongst others provide preliminary evidence of patient-specific treatments based on assessment findings

Describe the study design:
Multicentered randomized controlled trial

Can the author answer the study question with the study design?
Yes – they could deduct that exercises matching the patient`s DP significantly improved outcomes in comparison with nonmatching exercises and advice, and then appear to be an effective pain control/elimination treatment strategy.
Were the design and/or method used introducing biases? If so describe:
- The original design required MDT-trained therapists for the baseline assessment. The following treatment is suggested to be taught by MDT-trained therapists for group 1 and by non-McKenzie trained therapists for the groups 2 and 3. Because of a high drop-out rate due to dissatisfaction with having to change therapists after the initial assessment, subjects were allowed to continue treatment with their assessing therapists (MDT-trained PT)
- The outcome measures were administered by nonmedical staff. But sometimes, when there was no nonmedical staff available, the treating PT handed questionnaires to the subjects.

Sample Size:
N = 312 subjects were recruited, 201 subjects were eligible for analysis
Was sample size justified?
- X Yes
- No
- N/A

Was Power Discussed?
- X Yes
- No
- N/A

Sample Description:
Inclusion criteria:
- Low back pain
- With or without leg symptoms
- With or without one neurological sign
- Age: 18-65 years
- Demonstrating a DP during the mechanical assessment

(exclusion criteria are noted in Table 1 in the study, further subject baseline characteristics in Table 3 and baseline subject characteristics by treatment group in Table 4)

How was sample identified? Was it a representative sample?
Before sample randomization there was a reliable identification process to validate a LBP subgroup. It made the study sample homogeneous which probably added to the fact that the differences found between the treatment group outcomes were significant. LBP patients that possibly comply with the study-demands were asked to participate.
The qualifying process included in- and exclusion criteria (see Table 1 in the study hereinafter).

If there were more than one group, was there similarity and differences between the groups? Describe:
There are three groups treated with different prescriptions:
1) Matched-group: received unidirectional end-range lumbar exercises matching the direction of the subject’s DP
2) Opposite-group: received unidirectional end-range exercises contrary to their DP
3) Evidence-based care (EBC)-group: receive multidirectional, midrange lumbar exercises and stretches for hip and thigh muscles

→ There were no differences between the three groups in any baseline characteristics or outcome measures after randomization.

Was informed consent and assent obtained?
The Community Ethics Review Board of the Alberta Heritage Foundation for Medical Research granted approval for the study.
The eligible subjects were asked for participation in an informed consent.

Outcomes:
Specify the frequency of outcome measurement:
Frequency of outcome measurement: at baseline and 2 weeks later
→ Blinded, nonmedical reception staff detected the outcome measures
**Outcome areas**

- Back and leg pain intensity rating
- LBP-Medication
- Rating of activity interference at work/home
- Patients-classification by pain location and neurologic status
- Depression
- Satisfaction
- Compliance score

**List measures used**

- 11-point visual analogue scale, 24-item Roland Morris Disability Questionnaire
- Subjects-classification: takers/ non-takers, quantification of total number of pills per day
- Rating scale from 0-5
- Quebec Task Force severity rating (QTF 1-4)
- 21-item Beck Depression Inventory (BDI)
- Satisfaction questionnaire (Subject’s response to treatment, readiness for discharge, need for further treatment, ability to return to work/ leisure activities
- Take-home compliance-tracking sheet to record the number of exercise sessions per day (score 0-5)

**Reliable and Valid?**

Data analysis:
All subjects data sheets and questionnaires were sent to the Alberta study center. A technician manually entered the data. Random, double entry methods documented entry accuracy.

There was a hypothesis testing, a drop out and subgroup analysis and an intention-to-treat analysis. Descriptive statics and frequencies distributions of all variables were determined; there specifically was a two-way analysis of variance for all continuous variables. A correlation analyses determined the association among the interval/ratio variables. McNemar x² was used to confirm the heterogeneity of the changes within the treatment groups.

**INTERVENTION:**

Intervention was described in detail?

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Contamination was avoided?

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Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting.

- Treatment Protocol: a minimum of 3 and a maximum of 6 visits over 2 weeks
- Therapists: 12 PT’s, all credentialed or diplomated in MDT (1-8 years experience) and having at least the standardized, validated examination from the McKenzie Institute International
- The three treatment-prescriptions:
  1) Matched-group: received unidirectional end-range lumbar exercises matching the direction of the subject’s DP
  2) Opposite-group: received unidirectional end-range exercises contrary to their DP
  3) Evidence-based care (EBC)-group: received multidirectional, midrange lumbar exercises and stretches for hip and thigh muscles

**RESULTS:**

Results were reported in terms of statistical significance?

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What were the results?

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<tr>
<td></td>
<td>Outcomes</td>
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<td>DP-Classification in baseline assessment</td>
<td>⇒ From 320 subjects: 83% prefer extension, 7% flexion, 10% lateral movement</td>
<td>⇒ P values: 0.016-&lt;0.001</td>
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<tr>
<td>Treatment effect (in every outcome variable)</td>
<td>⇒ Statistically significantly greater improvement for the Matched group compared with Opposite-group and EBC-group</td>
<td>⇒ P values &lt;0.005</td>
</tr>
<tr>
<td>Satisfaction with care</td>
<td>⇒ Statistically significantly greater improvement for the Matched-group compared with the Opposite-group and EBC-group</td>
<td>⇒ P &lt; 0.001</td>
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<td>Changes in QTF severity Classification (pain location/ neurologic status)</td>
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>1/3 of the Matched-group (36.8%) reported improvement compared with the Opposite-group (10.6%) and the EBC-group (19.3%)

Nobody from group 1 reported any deterioration, in group 2 12.8% and in group 3 17.5% reported deterioration.

### Was the analysis that is the type of statistical tests used, appropriate for the type of outcome measures and the methodology?

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#### Explain:

If not statistically significant (i.e., p < 0.05 or 0.01), was study big enough to show an important difference if it should occur (power and sample size)?

Treatment effect: 68% of the 201 subjects returned the compliance questionnaire. The overall compliance rating was good (3-4 sets/day). That did not differ significantly across treatment groups ($P = 0.121$). But statistically, the improvement in every outcome variable for the matched group was significantly greater compared to the opposite- or EBC-group ($P < 0.001$).

According to the calculation of the effect sizes the hypothesis testing required a minimal sample size of 38 per treatment group in order to achieve a power of 0.90 with an alpha level of 0.05.

### Clinical importance was reported?

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#### What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful)?

- No subject in the matched group reported worsening or pain further into the legs. This is stated as an important finding which reflects the overall safety of the DP-matched exercises, when it is applied by a properly trained clinician who elected the patients DP.
- A LBP subgroup was validated in a reliable identification process before Randomization. It made the study sample homogeneous which probably added to the fact that the differences found between the treatment group outcomes were significant.

### Drop-outs were reported?

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#### If yes, why did they drop out? How were drop-out participants included in the statistical analysis?

Withdrawals were analyzed in an intention-to-treat analysis, drop-outs were documented.

### CONCLUSIONS AND CLINICAL IMPLICATIONS:

#### The conclusions drawn by the authors were appropriate given study methods and results.

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#### What did the author conclude?

- Exercises matching the patient’s DP significantly improved outcomes compared to non-matched exercises and advice, and appear to be an effective pain control and elimination treatment strategy. This refutes prior systematic reviews concluding that specific exercises are not warranted.
- The study adds further validity by demonstrating that a subject-specific treatment is superior to other treatments and states good outcomes for subgroup-specific treatment.
- The data introduce evidence for the existence of counterproductive exercises in many LBP patients.

#### What were the main limitations of the study as stated by the author(s) and from your point of view?

- The treatments in the Opposite- and EBC-group were also performed from MDT-trained physiotherapists.
- Because of care-seeking patients it was impractical to apply a “no treatment” control group and neither the subjects nor physiotherapists could be blinded to the treatment. Subjects were shielded from their directional preference.
There were a large number of subjects who were unable or unwilling to complete the full 2 weeks of treatment. This confirms the pragmatic and ethical impossibility of maintaining the randomized treatments over a longer period.

**What are the implications of these results for your practice?**

The results give further validation and support for the MDT assessment as a tool for diagnosis and an indicator to establish prognosis. The good prognosis with DP and centralization findings at baseline assessment is significantly diminished if exercise prescriptions do not match the DP findings.

---

**REFERENCE:**

Centralization Phenomenon as a Prognostic Factor for Chronic Low Back Pain and Disability

Werneke M., Hart D. L.

Spine Volume 26, Number 7, pp 758-765, 2001

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<table>
<thead>
<tr>
<th>STUDY PURPOSE: Was the purpose stated clearly?</th>
<th>Outline the purpose of the study:</th>
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<tbody>
<tr>
<td><em>X</em> Yes</td>
<td>The aim is to investigate the predictive value of the centralization phenomenon in a multivariate model. They factor the psychosocial variables into the study because they were identified in the literature as important risk factors for patients with an acute onset of nonspecific low back pain which subsequently develop chronic pain and disability.</td>
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<th>LITERATURE: Was relevant background literature reviewed?</th>
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<td><em>X</em> Yes</td>
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<th>DESIGN: Describe the study design:</th>
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<tr>
<td>___ randomized cohort (population-based)</td>
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<td>___ before and after</td>
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<td>___ case-control</td>
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<td>___ cross-sectional</td>
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<td>___ 1+ group at 1 point in time</td>
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<td>___ single case design</td>
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<td>___ case study</td>
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> Nothing exactly is mentioned from the authors

<table>
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<tr>
<th>Can the author answer the study question with the study design?</th>
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<tr>
<td>The generalizability for patients with chronic LBP and neurologic defects has not been established and further research is required.</td>
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<th>SAMPLE SIZE: Sample Description:</th>
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<td>N = 223</td>
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<tr>
<th>How was sample identified? Was it a representative sample?</th>
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<tr>
<td>It is a secondary analysis of a previously described sample from Werneke et al. (1999). They made a one year follow-up. These patients were referred to one of two independent medical centers for physical therapy services by physicians for conservative treatment between January 1996 and June 1997. They left out the neck patients and joined the group of centralizers with the partial reduction group.</td>
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<td>___ Yes</td>
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</table>
If there were more than one group, were there similarities and differences between the groups? Describe:
The authors compared the centralizers with the non-centralizers.

Was informed consent and assent obtained? 
Yes.

OUTCOMES:
Specify the frequency of outcome measurement:
The following independent variables were assessed one year after discharge from the physical therapy services. The Patients were contacted by telephone.

<table>
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<tr>
<th>Outcome areas</th>
<th>List measures used</th>
<th>Reliable and Valid?</th>
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<tr>
<td>The five dependent variables:</td>
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<tr>
<td>- Maximal pain intensity during the past week</td>
<td>⇒ Numeric analog scale (NRS) 0-10, with 10 as the highest pain experienced (0-5=low, 6 or more =high)</td>
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<td>- Return to work status (RTW)</td>
<td>⇒ Good=working full time, full duty or less than optimal=less than full time/ duty (part/ full time and light duty, part time and full duty, not working)</td>
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<td>- Sick leave or downtime at work (SL)</td>
<td>⇒ Lost days at home because of LBP (good=0-7 days lost since discharge, poor=more than 7 days lost at work since discharge)</td>
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<td>- Activity interference at home (AIAH)</td>
<td>⇒ Numbers of days that caused the patient to reduce activity for more than half a day (good=0-7 d, poor&gt;7 d)</td>
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<tr>
<td>- Continued health care usage (CHCU)</td>
<td>⇒ Number of consultations/ visits to another health care provider for his LBP (good=0, poor=1 or more)</td>
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INTERVENTION: Intervention was described in detail?  
X Yes  
No  
Not addressed

Contamination was avoided?  
X Yes  
No  
Not addressed

Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting.
The subjects had to complete different questionnaires at the intake. Medical information like demographic, pain, historical, job and psychosocial factors were gathered. After filling in these intake questionnaires, all patients received a mechanical evaluation following McKenzie’s assessment methods. The patients had followed individualized treatment methods for the needs of each patient after the assessment. The number of visits was not defined.
The one year follow-up after each patients discharge was conducted by a blinded nurse by contacting them telephonically.

RESULTS: Results were reported in terms of statistical significance?  
X Yes  
No  
NA  
Not addressed

What were the results?

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<tr>
<th>Outcomes</th>
<th>Results</th>
<th>Statistical Significance</th>
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<tbody>
<tr>
<td>⇒ The relation between each of the 23 independent variables affected the dependent variables. Overt pain behaviors, perceived disability at discharge and pain pattern classification were the most common variables affecting the dependent variables.</td>
<td>⇒ Nine of the 23 independent variables affected the dependent variables.</td>
<td>⇒ All P&lt; 0.05</td>
</tr>
<tr>
<td>⇒ Multivariate logistic regression analyses for</td>
<td>⇒ Only pain pattern classification (ppc) and leg pain (lp) at intake were</td>
<td></td>
</tr>
<tr>
<td></td>
<td>⇒ 95% confidence interval for odds ratio in pain</td>
<td></td>
</tr>
<tr>
<td>independent variables in relation to the dependent variables</td>
<td>significant for predictive chronic pain and disability.</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td></td>
</tr>
</tbody>
</table>

| intensity and ppc: 1.4-6.4, RTW and ppc: 3.4-26, SL and ip: 1.5-10.5, AIAH and ppc: 2.4-11.3, CHCU and ip: 2-10.1 | all with P< 0.05 |

**Was the analysis that is the type of statistical tests used, appropriate for the type of outcome measures and the methodology?**

- **X** Yes
- **No**
- **Not addressed**

**Explain:**
Classification in the non-centralization group was a predictor of not returning to work, continuing pain symptoms, extended activity interference or downtime at home and continued usage of health care, and patients with leg pain at intake showed also high sick leave or downtime at home at the one year follow-up. But these two variables do not appear powerful because of a low sensitivity. Therefore it just indicates a trend.

**If not statistically significant (i.e., p < 0.05 or 0.01), was study big enough to show an important difference if it should occur (power and sample size)?**

The follow-up rate was small (83.9%) but 180 subjects still remained.

**Clinical importance was reported?**

- **X** Yes
- **No**
- **Not addressed**

**What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful)?**

The results of the present study do not support that nonphysical factors are the most important predictors for detecting chronic low back pain and disability. This study provides evidence of the anatomic pain location and the classification in pain pattern groups as significant factors for the identification of patients who would fail to respond to early, active rehabilitation and who would develop chronic disability.

**Drop-outs were reported?**

- **X** Yes
- **No**

**If yes, why did they drop out? How were drop-out participants included in the statistical analysis?**

180 (83.9%) out of the 223 patients attended the one-year follow-up. The ones lost were on average younger than the one that still could be contacted (32.7± 8.2, 38.9± 9.9)

**CONCLUSIONS AND CLINICAL IMPLICATIONS:**

The conclusions drawn by the authors were appropriate given study methods and results.

- **X** Yes
- **No**

**What did the author conclude?**

The “at-risk” patient group for developing chronic pain and disability can be identified early after an acute attack of non-serious low back pain syndromes. The patients from the “at-risk” group are classified as non-centralizers after a dynamic assessment. Therefore, the classification according to the method of McKenzie could be a tool for the prognosis of the development of chronic low back pain and disability as well as leg pain at intake.

**What were the main limitations of the study as stated by the author(s) and from your point of view?**

They did not apply a comprehensive and structured psychological interview which could be a reason that psychological factors were not more dominant in predicting chronic pain and disability. But the tools used have been recommended by the literature and they are reliable first-stage psychological screening tools.

The generalizability for patients with chronic low back pain and neurologic deficits could not be established.

It is not entirely clear what the patients have been doing since discharge from the physical therapy. Due to this fact it is not clear what really led to the outcome recorded at the one year follow-up.

**What are the implications of these results for your practice?**

If a patient shows no change in his pain location during the first 7 visits and there is a risk of chronic pain and disability. This risk subsists as well if the patient is categorized as non-centralizer or shows leg pain at intake.
**STUDY PURPOSE:**

<table>
<thead>
<tr>
<th>Was the purpose stated clearly?</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>X</em> Yes</td>
</tr>
<tr>
<td>___ No</td>
</tr>
</tbody>
</table>

Outline the purpose of the study:

The study had four purposes:

1. Standardization of the operational definition of centralization phenomenon
2. Investigation of the incidences of centralization in patients with acute low back and neck syndromes
3. Quantification of the reliability of classification of the patients in three pain pattern groups (centralization, non-centralization, partial-reduction)
4. Establishing the differences in outcome between the groups with physical therapy

**LITERATURE:**

<table>
<thead>
<tr>
<th>Was relevant background literature reviewed?</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>X</em> Yes</td>
</tr>
<tr>
<td>___ No</td>
</tr>
</tbody>
</table>

Describe the justification of the need for this study:

- The authors of this study did not find any other studies which investigated the clinical value of the centralization phenomenon as a prognostic factor for the management of patients with acute neck and back syndromes when they had initiated the study (1999)

**DESIGN:**

<table>
<thead>
<tr>
<th>__randomized</th>
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<tbody>
<tr>
<td>___ cohort (population based)</td>
</tr>
<tr>
<td>___ before and after</td>
</tr>
<tr>
<td>___ case-control</td>
</tr>
<tr>
<td>___ cross-sectional</td>
</tr>
<tr>
<td>(1+ group at 1 point in time)</td>
</tr>
<tr>
<td>___ single case design</td>
</tr>
<tr>
<td>___ case study</td>
</tr>
</tbody>
</table>

Nothing exactly is mentioned from the authors

Describe the study design:

A prospective analysis of a descriptive study.

Can the author answer the study question with the study design?

No, not entirely, because there was no long-term follow-up. There is no evidence if the outcome will be maintained over time. There was also no standardized treatment in the groups, because it depends on pain location responses during the mechanical assessment. So it was not really possible to answer purpose no. 3

Were the design and/or method used introducing biases? If so describe:

The physical therapists doing the assessments and the treatments were the same, therefore they knew in which subgroup their patients were classified and maybe they also had certain expectations of the outcomes. To the fact that the therapy was individualized, it is not possible to evaluate which therapy was best for a good outcome. Although this was not a purpose of this study, they can also not reliably establish the differences in outcome between the groups.

**SAMPLE SIZE:**

<table>
<thead>
<tr>
<th>N = 289</th>
</tr>
</thead>
</table>

Was sample size justified?

| _X_ Yes |
| ___ No |
| ___ N/A |

Sample Description:

18-65 years, diagnosed with neck or low back pain syndromes with or without referred symptoms, symptoms for less than six weeks, 77.2% low back pain, 22.8% cervical symptoms and labour situation (71.6% workers compensation benefits, 87% not working or with modified duty, 13% working full duty)

How was sample identified? Was it a representative sample?

The subjects were referred by a physician for conservative treatment in one of two independent medical centers for physical therapy services between January 1996 and June 1997.

If there were more than one group, were there similarities and differences between the groups? Describe:

The patients were categorized after the mechanical assessment in three pain pattern groups: centralization (c.), non-centralization (non-c.) and partial-reduction (p.-r.). Neck or back pain patient groups were at first separated but they were merged because of no statistical significant differences.
Was informed consent and assent obtained?
Yes, the patients had to sign a consent form to participate in the study.

OUTCOMES:
Specify the frequency of outcome measurement:
Before and after the first assessment and at the beginning and end of each therapy for an individualized number of visits.

<table>
<thead>
<tr>
<th>Outcome areas</th>
<th>List measures used</th>
<th>Reliable and Valid?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10-point pain intensity descriptive scale (10= severe pain, requiring management in the emergency room)</td>
<td>The Oswestry scale is a validated questionnaire for identifying disability</td>
</tr>
<tr>
<td></td>
<td>Body diagram for coding the referred pain</td>
<td>The therapists instructed the patients in a standardized manner to fill in the diagram for coding the referred pain, this was already used before in another study (Long, 1995)</td>
</tr>
<tr>
<td></td>
<td>Oswestry Or Neck Disability Index</td>
<td></td>
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</tbody>
</table>

INTERVENTION:
Intervention was described in detail?

<table>
<thead>
<tr>
<th>X Yes</th>
<th>No</th>
<th>Not addressed</th>
</tr>
</thead>
</table>

Contamination was avoided?

<table>
<thead>
<tr>
<th>X Yes</th>
<th>No</th>
<th>Not addressed</th>
</tr>
</thead>
</table>

Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting.

The subjects had to complete all questionnaires and forms at the intake and then received a mechanical assessment according to the method of McKenzie by five trained therapists. After the first assessment, the subjects had diverse treatment with 24-48 hour intervals between the visits with the same therapist who did the first assessment. Specific treatments varied according to the needs of each patient according to the results of the first assessment. The centralizers were treated by the directional preference and non-centralizers got an individualized active rehabilitation plan and avoided the movements of peripheralization.

RESULTS:
Results were reported in terms of statistical significance?

<table>
<thead>
<tr>
<th>X Yes</th>
<th>No</th>
<th>NA</th>
<th>Not addressed</th>
</tr>
</thead>
</table>

What were the results?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Results</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occurrence of pain pattern</td>
<td>c.: 31.2% back, 24.6% neck non-c.: 21.7% back, 24.6% neck p.- r.: 43.7% back 46.4% neck</td>
<td>No significant difference between occurrences of pain pattern</td>
</tr>
<tr>
<td>Patients’ syndrome characteristics at initial intake by pain pattern</td>
<td>centralizers: referred pain more to shoulder/buttock than arm/leg non-c.: referred pain more to arm/leg than shoulder/buttock</td>
<td>In the non-centralizers group the referred pain location was often more distal than in the centralizers</td>
</tr>
<tr>
<td>Perceived function</td>
<td>c. and p.-r. equal but better than non-c.</td>
<td>P&lt;0.001 non-c.</td>
</tr>
<tr>
<td>Pain intensity</td>
<td>c. and p.-r. equal but better than non-c.</td>
<td></td>
</tr>
</tbody>
</table>
- Number of visits by pain pattern
  \[ \Rightarrow c. \text{ had fewer visits than non-c. and p.-r. no difference to non-c. and p.-r.} \]
  \[ \Rightarrow P<0.001 \text{ non-c.} \]
- Partial-reduction group analysis
  \[ \Rightarrow \text{if no change by the 7th visit in pain location, no significant outcome was measured in pain intensity or perceived function} \]
  \[ \Rightarrow C.: 3.9 \pm 0.4 \text{ Non.-c.: 8.0 } \pm 0.4 \text{ p.-r.: 7.7 } \pm 0.3 \]
  \[ \Rightarrow \text{Gradual decrease in pain location after: Three visits 51.6\%, Five visits 73.7\%, Seven visits 92.6\%} \]

**Was the analysis that is the type of statistical tests used, appropriate for the type of outcome measures and the methodology?**

<table>
<thead>
<tr>
<th></th>
<th>X: Yes</th>
<th>No</th>
<th>Not addressed</th>
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</table>

**Explain:**

The patients of the centralization category had fewer visits with greater improvement in pain intensity and perceived function compared to patients categorized as non-centralizers, and when centralization was observed, the complete restore of pain could be expected in several days. The partial-reduction group achieved the same outcome as the centralizers but with more visits. But if the pain did not centralize more proximally after 7 visits, there was no further improvement in the outcome found and displayed an important fact for the management of acute spinal symptoms.

**Clinical importance was reported?**

<table>
<thead>
<tr>
<th></th>
<th>X: Yes</th>
<th>No</th>
<th>Not addressed</th>
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</table>

**What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful)?**

The centralization phenomenon could be observed in the initial assessment or the first subsequent treatment. It is a phenomenon that could be reliably identified. The subjects of the non-centralizers tended to have more distal symptoms than the centralizers.

**Drop-outs were reported?**

<table>
<thead>
<tr>
<th></th>
<th>X: Yes</th>
<th>No</th>
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</tbody>
</table>

**If yes, why did they drop out? How were drop-out participants included in the statistical analysis?**

351 subjects were referred by a physician for conservative treatment but 51 were excluded because of not meeting the admission criteria or refusal to participate. Another 11 patients dropped out after the initial physical therapy evaluation.

**CONCLUSIONS AND CLINICAL IMPLICATIONS:**
The conclusions drawn by the authors were appropriate given study methods and results.

<table>
<thead>
<tr>
<th></th>
<th>X: Yes</th>
<th>No</th>
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<tbody>
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</table>

**What did the author conclude?**

The centralization pain pattern occurred only in 30% of these study subjects. The reason for this could be the use of an overlay template to identify pain location changes, with which centralization could be identified without the influence of pain intensity changes. Therefore the evaluation was more objective. The authors also recommend such an overlay template to be used in further projects investigating the centralization phenomenon. Furthermore it is important to adequately differentiate between induced centralization and the natural reduction or abolition of pain over time (The authors suppose that for the partial-reduction group). Furthermore if no change was measured in the pain location after 7 visits, an improvement could not be expected with conservative care as well as the fact that non-centralizers were at higher risk for chronic disability.
**What were the main limitations of the study as stated by the author(s) and from your point of view?**
The predictive value of centralization could not be assessed using the design, methods and results of this study. This is due to the fact that there were variations in treatment and pain location across pain pattern groups. Furthermore, there was no long-term follow-up to evaluate subsequent outcome or the maintenance of the treatment-responses over time.

**What are the implications of these results for your practice?**
It is important to differentiate an induced centralization phenomenon from the natural history of pain reduction over time as well as isolation of the pain location changes from the pain intensity changes. The centralization occurs more often if the referred pain manifests only up to the buttock than in the leg as well as if rapid change in pain location could be monitored, a complete recovery with conservative care could be expected. Because the non-centralizers had the worst outcome the authors suppose they are at higher risk for chronic disability and should receive a multidisciplinary treatment.

---

**REFERENCE:**
A Prospective Study of Centralization of Lumbar and Referred Pain: A Predictor of Symptomatic Discs and Anular Competence
Donelson R., Aprill C., Medcalf R., Grant W.
Spine Volume 22, Number 10, pp 1115-1122, 1997

**STUDY PURPOSE:**
Outline the purpose of the study:
Evaluation of the relation between the pattern of pain responses (centralization/peripheralisation) and discographic findings (discographic pain provocation and anular competency).

**LITERATURE:**
Was relevant background literature reviewed?
- Yes
- No

**DESIGN:**
Describe the study design:
A prospective, blinded study

---

<table>
<thead>
<tr>
<th>Was the purpose stated clearly?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STUDY PURPOSE:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outline the purpose of the study:</td>
<td>Evaluation of the relation between the pattern of pain responses (centralization/peripheralisation) and discographic findings (discographic pain provocation and anular competency).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Was relevant background literature reviewed?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LITERATURE:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Describe the justification of the need for this study: | - Discography, performed objectively even in the hand of an expert, it is the golden standard in diagnosing symptomatic discs. Though invasive it is limited in its use.  
  - When the annulus and the hydrostatic disc mechanism are intact, a lesion-specific spinal bending can apply decreasing stress on the symptom-generating annulus/nerve root. Thereby the pain centralize and/or abolish and the patient’s lesion or directional preference can be identified.  
  - Diagnostic opinion across all health disciplines converge once pain has peripheralized to the distal leg and foot. An intervertebral disc herniation is then commonly diagnosed. |

<table>
<thead>
<tr>
<th>Design:</th>
<th>Randomized cohort (population-based)</th>
<th>Before and after case-control</th>
<th>Cross-sectional (1+ group at 1 point in time)</th>
<th>Single case design</th>
<th>Case study</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td></td>
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</tbody>
</table>
**SAMPLE SIZE:**

<table>
<thead>
<tr>
<th>N = 63</th>
</tr>
</thead>
</table>

Was sample size justified?

- Yes
- No
- N/A

Was Power Discussed?

- Yes
- No
- N/A

---

**Sample Description:**

Patients with low back pain (with varying degrees of lower extremity pain and altered sensation), symptoms presented for more than 3 months and referrals for discography by neurosurgeons, orthopedists or physiatrists because of continued pain, failure of a variety of conservative treatments and one or more MRI’s which have not compelled surgical indications.

Exclusion criteria: Patients with prior lumbar surgery including chemonucleolysis

**How was sample identified? Was it a representative sample?**

Patients were drawn largely from metropolitan New Orleans, with many interurban and some interstate referrals. All were referred by professionals for discography.

The assessment-session was singular and limited to 30-45 minutes. Therefore it could be possible that the percentage of centralizers in the study sample may have been higher if either longer or multiple assessment sessions had been performed.

**If there was more than one group, were there similarities and differences between the groups? Describe:**

There was no allocation into groups.

**Was informed consent and assent obtained?**

Informed consent regarding preliminary mechanical assessment according to McKenzie was obtained.

---

**OUTCOMES:**

**Specify the frequency of outcome measurement:**

**Outcome areas**

<table>
<thead>
<tr>
<th>Pain effect (location and intensity) during the mechanical assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic disc injection: Resistance to injection</td>
</tr>
<tr>
<td>Pain response during disc injection</td>
</tr>
<tr>
<td>Frontal and lateral radiographs at endpoint / nucleograms</td>
</tr>
</tbody>
</table>

**List measures used**

- Abolition, Centralization and Peripheralization of referred pain
- Characterization as “poor”, “fair”, “firm” and endpoint characteristics of “sustained” or “unsustained” resistance
- Spontaneous verbalization, secondary signs (grimace, withdrawal, moaning), physiologic changes (increase in pulse rate) and asking the patient about character, distribution and intensity of pain in comparison with the primary symptoms (Graduation as “no pain”, “similar pain”, “exact pain”, “atypical pain”)
- Graduation as “normal (organized)” or “abnormal (disorganized with endplate disruption and/or anular fissures)”

**Reliable and Valid?**

The self-report of symptom response such as pain intensity and functional response to symptoms are subjective; too subjective to be reliable. But self-reporting of pain patterns is quite objective and measurable, with a high intertester reliability (8 studies were quoted; second line on p. 1119)

Pain response was assessed by the discographer and a second observer.
### INTERVENTION:
Intervention was described in detail?

| __X__ Yes | ___No | ___Not addressed |

Contamination was avoided?

| ___Yes | ___No | __X__ Not addressed |

Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting.

All patients were assessed with a standardized mechanical evaluation by McKenzie and then were allocated in one of three categories: (1) Centralizers, (2) Peripheralizers, (3) No Change. Thereafter they underwent lumbar discography: contrast was instilled into the disc, volume was recorded, the resistance to injection was characterized and the nucleograms were graded. The pain response during injection was assessed. All data were documented and statically analyzed and compared.

### RESULTS:
Results were reported in terms of statistical significance?

| __X__ Yes | ___No | ___NA | ___Not addressed |

What were the results?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Results</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain behavior during the mechanical assessment</td>
<td>of 63 patients, 31 subjects (49.2%) were categorized as Centralizer, 16 subjects (25.4%) as Peripheralizer and 16 subjects (25.4%) as No Change.</td>
<td>P &lt; 0.007</td>
</tr>
<tr>
<td>Diagnostic disc injection</td>
<td>74% of the Centralizers and 69% of the Peripheralizer had a positive discogram</td>
<td>P &lt; 0.004</td>
</tr>
<tr>
<td></td>
<td>⇒ of 91% of the Centralizers and from 54% of the Peripheralizers had competent anular wall of the disc</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>⇒ 12.5% of the No Change group had a positive discogram with a complete anular wall</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>⇒ The ability to distinguish between a positive and negative discogram on the basis of pain response was highly significant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>⇒ The difference between Centralizers and Peripheralizers in patients with positive discograms and incidence of a competent anular disc wall was significantly greater</td>
<td>P &lt; 0.042</td>
</tr>
</tbody>
</table>

Was the analysis that is the type of statistical tests used, appropriate for the type of outcome measures and the methodology?

| __X__ Yes | ___No | ___Not addressed |

Explain:
The incidence of positive discograms was high with Centralizers and a low with the No Changers.

If not statistically significant (i.e., p < 0.05 or 0.01), was study big enough to show an important difference if it should occur (power and sample size)?

Power: Descriptive statistics accomplishing the initial data reduction. The Chi square analysis, t-test and z-test were used for statistical analysis to analyze differences in categorical variables. Significant testing was a priori established at P < 0.05 for acceptance.
**Clinical importance was reported?**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not addressed</th>
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<tbody>
<tr>
<td></td>
<td>X</td>
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</table>

What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful)?

The McKenzie assessment reliably differentiated between discogenic and non-discogenic pain (P<0.001) and between competent and an incompetent annulus (P<0.042) in patients with disc symptomatic and was greater in respect of magnetic resonance imaging in defining painful from non-painful discs.

The potential cost savings based on eliminating the needs for many ineffective treatments and expensive diagnostic tests would be significant and needs further study.

**Drop-outs were reported?**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
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</table>

If yes, why did they drop out? How were drop-out participants included in the statistical analysis?

There was only a one-time data-acquisition without any patient follow-up. Drop-outs were not reported.

**CONCLUSIONS AND CLINICAL IMPLICATIONS:**

The conclusions drawn by the authors were appropriate given study methods and results.

<table>
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<th>Yes</th>
<th>No</th>
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</table>

What did the author conclude?

To their knowledge such a strong correlation between disc morphology and clinical assessment findings has never been demonstrated before in any low back pain population.

The findings support the validity of McKenzie’s dynamic internal disc model and give support that patients who centralize despite their chronicity of LBP may still have a favorable prognosis for recovery with non-operative treatments using the directional exercises and postural strategy relating to the McKenzie assessment.

What were the main limitations of the study as stated by the author(s) and from your point of view?

- The study was limited to chronic back pain patients
- There was no patient follow-up because of the large number of physicians who were scattered over a wide geographic area
- The assessment-session was singular and limited to 30-45 minutes

What are the implications of these results for your practice?

The findings support the validity of McKenzie’s dynamic internal disc model and indicate the repeated end-range test movements in multiple directions for identification of the lesion-specific direction of asymmetrical disc loading. The study enables the judgment of anular competence and suggests that patients who show centralization despite their chronicity of LBP may have favorable prognosis of recovery with nonoperative treatment.

**REFERENCE:**

The centralization Phenomenon
It's usefulness as a Predictor of Outcome in Conservative Treatment of Chronic Low Back Pain (Pilot Study)
Long A. L.
Spine Volume 20, Number 23, pp 2513-2521, 1995

**STUDY PURPOSE:**

Was the purpose stated clearly?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
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</table>

Outline the purpose of the study:

The aim of this study was to replicate Donelson, Silva, Murphy (1990) findings in a prospective design, with the exception of using a sample of patients with chronic low back pain instead of a sample with acute low back and radiating pain. The prediction was that centralizers had better outcome than non-centralizers.

**LITERATURE:**

Was relevant background literature reviewed?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td></td>
<td>X</td>
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</table>

Describe the justification of the need for this study:

- Cost effects could be improved by identifying better means of selecting the patients who would benefit most from an interdisciplinary rehabilitation program.
Little research has been conducted to validate the clinical predictive usefulness of the centralization phenomenon in the year of publication of the study (1995).

**DESIGN:**
- randomized
- cohort (population-based)
- before and after
- case-control
- cross-sectional
- (1+ group at 1 point in time)
- single case design
- case study

Describe the study design:
Pilot study, prospective comparative survey

Can the author answer the study question with the study design?
No, because of the design of the study they can only deduce if further investigation concerning the same topic would be necessary.

Were the design and/or method used introducing biases? If so describe:
It was not possible to find out which was the aspect of treatment that was responsible for the different outcome observed because of large variations in treatment programs and multidisciplinary treatment. There were also not enough highly qualified McKenzie therapists available, which indicates a lack of good treatment and a lack of problem-solving skills. Another bias could happen in “one time maximal lift” especially at discharge because of motivational factors, fear of re-injury or a learning effect for handling with the test-equipment.

**SAMPLE SIZE:**
- N = 223

Was sample size justified?
- X Yes
- No
- N/A

Sample Description:
243 clients with chronic low back pain, with or without referred leg symptoms and demographics like sex, diagnosis, history of a previous back injury, mechanism of injury and referral sources were assessed. All subjects were receiving work compensation.

How was sample identified? Was it a representative sample?
The patients were assessed for entry into the work hardening program during a 10-months-period. The sample was screened medically and psychologically before the subjects entered the program and criteria for exclusion of a subject were discussed. Eventually 223 were available.

If there were more than one group, were there similarities and differences between the groups? Describe:
They compared two groups → centralizers and non-centralizers, the classification to those groups occurred after the mechanical assessment according to McKenzie. The two groups did not differ in demographic variables, not significantly in terms of pain location on initial assessment, not significantly in the initial psychometric test scores and not in terms of their type of occupation.

Was informed consent and assent obtained?
The subjects had to sign the consent to treatment otherwise they would have been excluded.

**OUTCOMES:**
Specify the frequency of outcome measurement:
Outcome measures were taken at intake and at different times during the treatment period and after discharge.

<table>
<thead>
<tr>
<th>Outcome areas</th>
<th>List measures used</th>
<th>Reliable and Valid?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective pain rating (at admission and discharge)</td>
<td>⇒ Numeric rating scale NRS 0-100</td>
<td>⇒ The NRS is a commonly used scale for rating pain, it can objectify a subjective pain perception, although not for everybody is 50 stands for the same pain</td>
</tr>
<tr>
<td>Distal pain (at week 1, 4 and 8 during the program)</td>
<td>⇒ Diagram for coding the most distal symptoms</td>
<td>⇒ The diagram for coding pain was an attempt to try to describe the clinical presentation of the population for making it more generalizable for other</td>
</tr>
<tr>
<td>Lifting capacity at one time (at admission and discharge)</td>
<td>⇒ Four standard lifts: lift from the floor, lift with handles (8 inches) from the floor, lift from knuckle to</td>
<td></td>
</tr>
</tbody>
</table>
### INTERVENTION:

<table>
<thead>
<tr>
<th>Intervention was described in detail?</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contamination was avoided?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### RESULTS:

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Results</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain intensity ratings (overall reduction of pain)</td>
<td>All subjects had a significant reduction of maximum and average pain ratings ($P &lt; 0.001$) and an increase in minimum pain ratings ($P &lt; 0.05$)</td>
<td>Significant change over time of maximum pain ratings in greater decreases for the centralizers compared to the n.-c. ($P &lt; 0.05$)</td>
</tr>
<tr>
<td>One-time maximal lift</td>
<td>All subjects increased their lifting ability ($P &lt; 0.001$)</td>
<td>no significance between the groups during assessment compared with at discharge</td>
</tr>
<tr>
<td>Oswestry percentage scores</td>
<td>All subjects significantly improved the scores ($P = 0.016$, initial: $36.24 \pm 13.79$, discharge: $28.24 \pm 16.89$))</td>
<td>no difference between the groups in changes during the program and between discharge and follow-up ($P = 0.973$)</td>
</tr>
<tr>
<td>Return-to-work status</td>
<td>At the first follow-up: significant difference; 68.4% of the centralizers and 52.2% of the non-centralizers returned to work.</td>
<td>significant difference between centralizers and non-centralizers ($P = 0.034$)</td>
</tr>
<tr>
<td></td>
<td>At the second follow-up: still a difference, but not significant</td>
<td>$P &gt; 0.05$</td>
</tr>
</tbody>
</table>

### Explain:

- If not statistically significant (i.e., $p < 0.05$ or $0.01$), was study big enough to show an important difference if it should occur (power and sample size)?

   The sample size was quite large but there were too many drop-outs stated, especially for the second follow-up.
<table>
<thead>
<tr>
<th>Clinical importance was reported?</th>
<th>What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful)?</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Yes</td>
<td>The current study indicates a correlation between centralization and better outcome data. The differences between centralizers and non-centralizers in “decreased maximum pain” and “return-to-work status” are clinically important outcomes. This shows the possibility of identifying a subgroup of chronic LBP patients, which may be benefit of an MDT assessment/program.</td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Not addressed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drop-outs were reported?</th>
<th>If yes, why did they drop out? How were drop-out participants included in the statistical analysis?</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Yes</td>
<td>243 subjects were assessed for a work hardening program but 20 dropped out for physical or psychological reasons. There were also drop-outs stated for both follow-ups in the outcome “return to work” but in both groups it was a similar amount.</td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONCLUSIONS AND CLINICAL IMPLICATIONS: The conclusions drawn by the authors were appropriate given study methods and results.</th>
<th>What did the author conclude?</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Yes</td>
<td>The authors conclude that the literature about the identification of factors contributing to chronicity is discordant and further studies should be conducted. After the current study the questions remain unanswered whether the centralization phenomenon predicts an outcome or the potential for chronicity. But this study indicates that the presence or absence of centralization could be helpful for generating appropriate goal settings in the rehabilitation setting and improve early case management. The centralization phenomenon may be an influencing factor of a complex decision-making process.</td>
</tr>
<tr>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What were the main limitations of the study as stated by the author(s) and from your point of view?</th>
<th>What are the implications of these results for your practice?</th>
</tr>
</thead>
<tbody>
<tr>
<td>High number of follow-up drop-outs, not exactly described what the program contained (especially the physical therapy), inexperienced therapists in diagnosing and treating according to the McKenzie concept</td>
<td>Although in the current study the treatment was not based on the McKenzie concept (work-hardening program) and therefore did not emphasize the centralization-specific movements, centralizers reflected better outcomes than non-centralizers. This shows the importance of the assessment for detecting centralizers. The McKenzie assessment has a high inter-tester reliability for detecting centralizers and could therefore be recommended.</td>
</tr>
</tbody>
</table>

REFERENCE:
Centralization Phenomenon
It’s usefulness in Evaluating and Treating Referred Pain
Donelson R., Silva G., Murphy K.
Spine, Volume 15, Number 3, pp 211-213, 1990

STUDY PURPOSE: Was the purpose stated clearly?
| Yes                                   |
| X No                                  |

LITERATURE: Was relevant background literature reviewed?
| X Yes                                 |
| No                                     |

DESIGN: Describe the study design:
| randomized                             |
| cohort (population-based)             |

Outline the purpose of the study:
The aim of the study is not clearly stated. According to the title of the study, the aim of the authors of the study was to investigate the usefulness of the centralization phenomenon in treating and evaluating referred pain.

Describe the justification of the need for this study:
- The study was conducted in 1990 and little was known then about the clinical phenomenon of the centralization of pain.
### before and after

- case-control
- cross-sectional
  (1+ group at 1 point in time)
- single case
- design
- case study

Nothing exactly is mentioned from the authors.

### Can the author answer the study question with the study design?

Yes, but it is not highly evidence based.

### Were the design and/or method used introducing biases? If so describe:

The authors did not describe no direct bias. But there is no description of the treatment the subjects had. Therefore it is impossible to find out what really caused the centralization which indicates a treatment bias. In addition the fact that the sample size in each subgroup was small it may not be representative.

### SAMPLE SIZE:

<table>
<thead>
<tr>
<th>N = 87</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>N/A</td>
</tr>
</tbody>
</table>

### Was sample size justified?

Yes

### Was Power Discussed?

No

### How was sample identified? Was it a representative sample?

The study was conducted in an orthopedic office and 87 out of 225 consecutive low back pain patients had pain radiating to the buttock, thigh or calf. They chose the 87 patients because of their radiating pain with the aim to analyze their manner of centralization.

### If there were more than one group, were there similarities and differences between the groups? Describe:

Three groups, divided because of the duration of their symptoms:
- 53 patients had symptoms for 4 weeks or less
- 15 patients had symptoms between 4 and 12 weeks
- 19 patients had symptoms for longer than 12 weeks

### Was informed consent and assent obtained?

Not addressed

### OUTCOMES:

### Specify the frequency of outcome measurement:

An assessment with standard clinical data and a mechanical assessment according to McKenzie and subsequent conservative treatment were conducted.

<table>
<thead>
<tr>
<th>Outcome areas</th>
<th>List measures used</th>
<th>Reliable and Valid?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four groups after the assessment:</td>
<td>No specific tests or measurements stated clearly.</td>
<td>The classification after the assessment into four groups is described, but not in detail. It is not clear whether pain elimination means that the subjects do not have pain anymore or just that the lowest radiation point moved more proximally. Furthermore it is not described, what they think of the physical and neurological outcome and how they analyzed the patients’ satisfaction with the outcome of their treatment.</td>
</tr>
<tr>
<td>Excellent: total pain elimination and return to full function</td>
<td>for neurological outcome: Straight leg raise Sensory tests Patellar and Achilles reflexes Motor function of the segment characteristic muscles</td>
<td></td>
</tr>
<tr>
<td>Good: partial pain elimination, subject happy with results, better physical and neurological results, back to work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair: partial pain relief, and not all of the three subcomponents fulfilled (physiological, neurological outcome, back to work)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor: no pain elimination</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Sample Description:

87 out of 225 consecutive low-back pain patients with radiation to the buttock, thigh, or calf, 17 to 65 years of age, 37 male and 50 female, duration of symptoms (4 weeks or less, between 4 and 12 weeks and longer than 12 weeks), 44 patients of 87 showed pain below knee
**INTERVENTION:**

<table>
<thead>
<tr>
<th>Intervention was described in detail?</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contamination was avoided?</td>
<td>Yes</td>
<td>No</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Provide a short description of the intervention including type of intervention, who delivered it, how often and in what setting.

First assessment included standard clinical assessments such as: straight leg raise, associated scoliosis, patellar and Achilles reflex test, sensory and motor tests as well as a mechanical assessment depending on McKenzies conducted by a trained therapist. Then the patients had individualized therapies followed by the McKenzie concept, but the therapies are not described more precisely.

---

**RESULTS:**

<table>
<thead>
<tr>
<th>Results were reported in terms of statistical significance?</th>
<th>Yes</th>
<th>No</th>
<th>NA</th>
</tr>
</thead>
</table>

What were the results?

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Results</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Subjects</td>
<td>⇒ 83% showed excellent to good results</td>
<td>⇒ Highly significant correlation between presence of centralization and good/excellent outcome (P&lt; 0.001) or between the absence of centralization and fair/poor outcome (P&lt;0.001)</td>
</tr>
<tr>
<td>Excellent results</td>
<td>⇒ 100% showed centralization at the first assessment</td>
<td></td>
</tr>
<tr>
<td>Good results</td>
<td>⇒ 77% showed centralization at the first assessment</td>
<td></td>
</tr>
<tr>
<td>Fair results</td>
<td>⇒ 57% showed centralization at the first assessment</td>
<td></td>
</tr>
<tr>
<td>Poor results</td>
<td>⇒ 37.5% showed centralization at the first assessment</td>
<td></td>
</tr>
</tbody>
</table>

Explain:

In all symptom-duration-groups a large number of centralizers was found. There are no significant differences between the duration of the symptoms and the frequency of centralizers: Symptoms for 4 weeks or less ⇒ 47/ 53 showed centralization and 46 with excellent and good results. Symptoms between 4 to 12 weeks ⇒ 13/ 15 showed centralization and 11 with good to excellent results. Symptoms longer than 12 weeks ⇒ 16/ 19 showed centralization and 15 with good to excellent results. The frequency of centralizers in the groups with poor or fair outcomes is much lower than in the groups with good or excellent outcomes.

If not statistically significant (i.e., p < 0.05 or 0.01), was study big enough to show an important difference if it should occur (power and sample size)?

Groups with a symptom duration of 4 to 12 weeks and those of more than 12 weeks were too small (4-12 weeks n=15, >12 weeks n=19).

<table>
<thead>
<tr>
<th>Clinical importance was reported?</th>
<th>Yes</th>
<th>No</th>
<th>Not addressed</th>
</tr>
</thead>
</table>

What is the clinical importance of the results (that is even if the results were statistically significant were the differences large enough to be clinically meaningful)?

The correlation between centralization during the first assessment and good or excellent conservative results is significant. This reinforces the usefulness of the McKenzie assessment for detecting rapidly reversible low back pain.

| Drop-outs were reported? | Yes | No |

If yes, why did they drop out? How were drop-out participants included in the statistical analysis?

No drop-outs during the assessment and the conservative treatment. But after the evaluation, four of the group “symptoms for 4 weeks or less” had a poor result, which means that they showed peripheralization. These four patients were the only patients from this study that required surgery.
<table>
<thead>
<tr>
<th>CONCLUSIONS AND CLINICAL IMPLICATIONS:</th>
<th>What did the author conclude?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The conclusions drawn by the authors were appropriate given study methods and results.</td>
<td>The centralization phenomenon does occur very often during a mechanical assessment according to McKenzie. And the incidence of good or excellent treatment outcomes after having shown centralization during the first assessment is very high. The authors also conclude that further studies concerning the centralization phenomenon should be conducted and are in progress.</td>
</tr>
<tr>
<td>What were the main limitations of the study as stated by the author(s) and from your point of view?</td>
<td>From my point of view they merely concentrated on the appearance of the centralization phenomenon during one assessment. There was no follow up on whether the centralization remained for a long time. Furthermore the treatment is not described, and this is also an essential aspect in the McKenzie concept. Therefore it is not possible to control whether or not the treatment was based on the McKenzie method.</td>
</tr>
<tr>
<td>What are the implications of these results for your practice?</td>
<td>This study backs up the theory that if a peripheral pain is centralizing, the method of your treatment would be good and could be carried on. The centralization phenomenon is also a good predictor for a positive conservative development.</td>
</tr>
</tbody>
</table>

Reference of the critical Review Form:
11.3 Messinstrumente von den beurteilten Studien
Aufgrund mehrfacher Verwendung der „Numeric Pain Rating Scale (NRS)“, der „Visual Analog Scale (VAS)“, des „Roland Morris Disability Questionnaire (RMDQ)“, des „Oswestry Disability Index (ODI)” und des „Beck Depression Inventory (BDI)” in den beurteilten Studien, werden diese in Tabellenform kurz präsentiert.

**Numeric Pain Rating Scale**

<table>
<thead>
<tr>
<th>Beschreibung</th>
<th>Anwendung</th>
<th>Reliabilität</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zur Evaluation der Schmerzintensität</td>
<td>Mündliches Erklären der Skala und Pat. soll seine momentan verspürten Schmerzen einer Zahl zuordnen</td>
<td>Interrater Reliabilität von Kappa= 0.71 (Ahlers et al. 2008)</td>
</tr>
<tr>
<td>Skala von 0-10, wobei 0 = kein Schmerz und 10 = schlimmst möglicher Schmerz</td>
<td></td>
<td>Hohe Korrelation von VAS und NRS Resultaten</td>
</tr>
</tbody>
</table>

(Ahlers et al., 2008)

**Visual Analogue Scale**

<table>
<thead>
<tr>
<th>Beschreibung</th>
<th>Anwendung</th>
<th>Reliabilität</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patienten müssen auf einer 10cm Linie, welche in 1cm-Abschnitte von 0-10 skaliert ist, ihre Schmerzintensität eintragen</td>
<td>Einzeichnen des momentan verspürten Schmerzes auf der vorbereiteten Linie (DeLoach et al., 1997)</td>
<td></td>
</tr>
<tr>
<td>Skala von 0-10, 0 = kein Schmerz, 10 = schlimmst möglicher Schmerz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(DeLoach, Higgins, Caplan & Stiff, 1997)
### Roland Morris Disability Questionnaire

**Beschreibung**
- Weit verbreitet zur Erfassung subjektiv erlebter Behinderung durch die vorhandenen Rückenschmerzen am aktuellen Tag
- Ohne großen Zeitaufwand für Pat. und Auswerter
- 24 Punkte Fragebogen
- Übersetzt in diverse Sprachen mit evtl. geringen Modifikationen
- Entstanden 1980 (Davidson, 2009)

**Anwendung**
- Pro Frage gibt es einen Punkt
- 0= keine Behinderung, 24= schwerste Behinderung
- Behinderung in Aktivitäten und Alltag soll sich nur auf die durch die Rückenproblematik ausgelöste Einschränkung beziehen
- Selbstständiges Ausfüllen durch den Pat. möglich

**Reliabilität**
- Reliablen, validiertes und änderungssensitives Instrument
- Klinisch wichtige Punktveränderungen müssen mindestens 3.5 sein (Ostelo & Vet (2005) zitiert nach Davidson 2009)

Die Tabelle basiert auf den Informationen von Exner & Keel (2000), sollten weitere Quellen verwendet worden sein, sind sie in der Tabelle vermerkt.

### Oswestry Disability Index

**Beschreibung**
- Häufig angewendetes Formular zur Auswertung von Behinderung bei Patienten mit Rückenbeschwerden
- Beurteilung von Einschränkungen der Pat. im Alltag
- 10 Fragen bezüglich Funktionsgebieten: Schmerzintensität, Körperpflege, Heben, Laufen usw.
- Max. 50 Punkte, pro Aufgabe Antwortmöglichkeiten von 0= keine Einschränkungen, 5= maximale Einschränkung
- 1976 von John O'Brian entwickelt und bis anhin mehrmals abgeändert
- In verschiedenen Sprachen vorhanden

**Anwendung**
- 10 Fragen mit je 6 Antwortmöglichkeiten, wobei nur eine angekreuzt werden darf
- Antwortmöglichkeiten ergeben 0-5 Punkte
- 10 Minuten Zeitaufwand
- Behinderungsgrad wird in Prozent angegeben \( \rightarrow \) erreichte Punktzahl geteilt in max. Punkte mal 100

**Reliabilität**
- Hohe Test-Retest-Reiabilität innerhalb kürzerer Abständen
- Bestehen gewisser Korrelationen zum Roland Morris Disability Questionnaire

(Tal 2009)
### Beck Depression Inventory Test

<table>
<thead>
<tr>
<th>Beschreibung</th>
<th>Anwendung</th>
<th>Reliabilität</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sehr häufig durchgeführter Test</td>
<td>• Nicht gedacht, dass sich der Pat. dadurch selbst diagnostiziert</td>
<td>• Für eine grosse Bandbreite an Patienten geeignet (Olino, Yu, Klein, Rohde, Seeley, Pilkonis, &amp; Lewinsohn, 2012)</td>
</tr>
<tr>
<td>• Testung von charakteristischen Einstellungen und depressiven Symptomen über die letzten zwei Wochen</td>
<td>• Mehrmalige Durchführung ist empfohlen, um einen Durchschnitt zu erhalten → Resultat ist stark von der Gemütslage abhängig</td>
<td>• Hohe Test-Retest Reliabilität (Hupricht &amp; Roberts, 2012)</td>
</tr>
<tr>
<td>• Standard für Aufklärung und psychologische Testung</td>
<td>• 21 Fragen mit 4 Antwortmöglichkeiten à 0-3 Punkten</td>
<td></td>
</tr>
<tr>
<td>• 21 Fragen mit je 4 Antwortmöglichkeiten</td>
<td>• Auswertungen auf einer Numerischen Skala von 0-63 Punkten, zeigt normale Stimmungsschwankungen bis hin zu starken Depressionen an</td>
<td></td>
</tr>
<tr>
<td>• 1961 von Beck, Ward, Mendelson und Erbaugh entworfen, selther zwei Mal überarbeitet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Zarcone, k. D.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 11.4 Glossar

**Bool'sche Operationen**


**Derangementsyndrom**


**Diskographie**

Die Diskographie ist ein selten angewendetes invasives Verfahren bei Verdacht auf Bandscheibenvorfall, wobei der Nucleus pulposus dargestellt wird. Es wird ein
Röntgenkontrastmittel direkt in den Nucleus pulposus injiziert. Diese Untersuchungstechnik wurde bei der Primärdiagnostik meist durch ein MRT ersetzt (Pschyremble, n. d.).

**Directional Preference (DP)**

**Dysfunktionssyndrom**

**Follow-up**
Das Follow-up entspricht einer Nachkontrolle des Outcome nach einer bestimmten Zeit in einer Forschungsarbeit. Es gibt „long term“- oder „short term“- Follow-up’s (Kool, n. d.).

**Haltungssyndrom**
Das Haltungssyndrom beschreibt das Auftreten von Symptomen infolge anhaltenden posturalem Stress. Dabei wird normales Gewebe hohen mechanischen Belastungen ausgesetzt, was sich durch Schmerzen äussert. Sobald die schmerzauslösende posturale Haltung korrigiert wird, verschwinden auch die Symptome. Das Bewegungsausmass ist frei und repetierte Bewegungen haben keinen Effekt (McKenzie & May, 2003a).

**Hawthorne-Effekt**
Dieser Effekt bezeichnet das Phänomen, dass Studienteilnehmer durch die ihnen vermehrte gewidmete Aufmerksamkeit eine bessere Leistung erbringen können oder ihr Verhalten verändern (Pschyrembel, n. d.).
**Interrater Reliabilität**
Die Interrater Reliabilität entspricht der Zuverlässigkeit einer wiederholten Testung einer Variablen durch verschiedene Beobachter (Meichtry, 2010a).

**Kappa**

**Low back pain (LBP)**
LBP ist der Englische Ausdruck für Kreuzschmerzen. Er bezeichnet ein oder beidseitige Schmerzen, hauptsächlich im Bereich des Kreuzbeins, der unteren LWS und der Iliosakralgelenken. Es tritt als sehr variables Beschwerdebild auf. Die Schmerzqualität kann teilweise dumpf, tiefsitzend und schlecht lokalisierbar sein, teilweise punktuell, mit Ausstrahlungen in die Leiste oder die untere Extremität (Pschyrembel, n. d.).

**MDT**
MDT steht als Abkürzung von „Mechanical Diagnosis and Therapy“ und ist ein Begriff zur Beschreibung des Konzepts nach McKenzie (McKenzie & May, 2003a).

**Multivariate Analyse**
Die multivariate Analyse ist eine statistische Datenanalyse, welche drei oder mehr Variablen untersucht und deren Abhängigkeit voneinander überprüft (Gabler Wirtschaftslexikon).

**Nucleogram**
Das Nucleogram ist das bildliche Resultat einer Diskographie. Es kann darauf erkannt werden, ob die injizierte Flüssigkeit innerhalb des Disc geblieben ist (Boyajian, 2007).

**Peripheralisation/ Peripheralisationsphänomen**
Dieses Phänomen beschreibt das Verlagern von Schmerzen weiter nach distal in die Extremitäten, was mittels gehaltenen Positionen oder repetierten Bewegungen ausgelöst werden kann. Es stellt das Gegenteil zur Zentralisation dar und ist somit auch ein Phänomen des Derangement-Syndroms. Eine temporäre Reproduktion von distalem

**P-Wert**

Der p-Wert wird als Wahrscheinlichkeit der beobachteten oder extremeren Daten definiert, wenn die Ausgangshypothese gilt (Meichtry, 2010b).

**Red Flags**


**Reliabilität eines Assessments**


**Sample**


**Sensitivität**

Mittels Sensitivität kann eine Aussage über das Testverfahren gemacht werden. Es gibt in Prozenten die richtig-positive Rate an Testresultaten mit Bezug zu allen getesteten Probanden an und zeigt hiermit auf, wie viel Prozent aller erkrankten auch als krank erkannt werden können. Die Sensitivität eines Testes ist ab einem Wert von 0.95 oder 95% sehr hoch (McKenzie & May, 2003a).
Signifikant
Ist ein Outcome signifikant, kann davon ausgegangen werden, dass das Resultat nicht zufällig aufgetreten ist, sonder für das gesamte Sample zutrifft (Statista, n. d.).

Spezifität
Mittels der Spezifität zeigt sich wie gut eine gesunde Testperson als gesund erkannt werden kann. Das heisst, es kann eine Aussage über die richtig-negative Rate in Prozent gemacht werden. Die Spezifität eines Testes ist ab einem Wert von 0.95 oder 95% sehr hoch (McKenzie & May, 2003a).

Subgruppierung im Klassifikationssystem nach McKenzie
Im McKenzie Konzept gibt es drei Hauptsyndrome (Derangement-, Dysfunktions- und Haltungs-Syndrom) und diverse Subgruppierungen dieser Syndrome (McKenzie & May, 2003a). In diversen Literaturen werden unterschiedliche Subgruppen innerhalb der Hauptsyndrome erstellt.

Univariate Analyse
Die univariate Analyse ist eine statistische Datenanalyse, welche nur eine Variable untersucht (Gabler Writschaftslexikon, n. d.).

Zentralisation/ Zentralisationsphänomen

Zung Depression Scale
11.5 McKenzie Assessment Bogen

THE McKENZIE INSTITUTE
LUMBAR SPINE ASSESSMENT

Date
Name
Sex M / F
Address
Telephone
Date of Birth
Age
Referral: GP / Orth / Self / Other
Work: Mechanical Stresses
Leisure: Mechanical Stresses
Functional Disability from present episode
Functional Disability score
VAS Score (0-10)

HISTORY

Present Symptoms
Present since
Commened as as a result of
Symptoms at onset: back / thigh / leg
Constant symptoms: back / thigh / leg
Intermittent symptoms: back / thigh / leg
Worse
bending
Sitting / rising
standing
walking
lying
am / as the day progresses / pm
when still / on the move
other
Better
bending
sitting
standing
walking
lying
am / as the day progresses / pm
when still / on the move
other
Disturbed Sleep
Yes / No
Sleeping postures: prone / sup / side R / L
Surface: firm / soft / sag
Previous Episodes
0 1-5 6-10 11+
Year of first episode
Previous History

Previous Treatments

SPECIFIC QUESTIONS
Cough / Sneez / Strain / +ve / -ve
Bladder: normal / abnormal
Gait: normal / abnormal
Medications: Nil / NSAIDS / Analg / Steroids / Anticoag / Other
General Health: Good / Fair / Poor
Imaging: Yes / No
Recent or major surgery: Yes / No
Night Pain: Yes / No
Accidents: Yes / No
Unexplained weight loss: Yes / No
Other:

McKenzie Institute International 2005©
Hofstetter Angela, Ricklin Sandra

(McKenzie Institute International, 2005)
11.6 Quellen des Anhangs


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