Diagnostic accuracy: sensitivity and specificity of the ScreenAssist Lumbar Questionnaire in comparison with primary care provider tests and measures of low back pain: a pilot study

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Objective: The purpose of this study was to estimate the diagnostic accuracy of the ScreenAssist Lumbar Questionnaire (SALQ) to determine the presence of non-musculoskeletal pain or emergent musculoskeletal pain, in terms of its sensitivity and specificity, when compared with the assessment and diagnosis made by primary care providers.

Methods: Subjects were patients presenting to a primary care physician's office with the main complaint of low back pain. SALQ data were collected within 24 hours of the appointment. A 2-month post-visit chart review was performed in order to compare scores and recommendations made by the questionnaire with the assessment and diagnosis made by the physician.

Results: The SALQ demonstrated a sensitivity of 100% (95% CI=0.445–1.0) and specificity of 92% (95% CI=0.831–0.920). The negative likelihood ratio was 0.11 (95% CI=0.01–1.54) and the positive likelihood ratio was 9.36 (95% CI=2.78–32). If the SALQ was positive, the post-test probability was 0.60. If the SALQ was negative, the post-test probability was 0.017.

Discussion: Results from this study suggest that the SALQ can be used as an adjunct to the subjective history taking in a physical therapy evaluation to assist in the recognition of non-musculoskeletal or emergent musculoskeletal conditions requiring referral.

Keywords: Low back pain, Medical screening, Red flags

Introduction

Medical screening for physician referral is an important element of the physical therapy examination that has been highlighted by the introduction of direct access to physical therapy in the USA. Direct access allows for physical therapists to evaluate individuals seeking care for musculoskeletal conditions without a referral from a physician. Provisions include the ability of the physical therapist to refer a client to appropriate healthcare practitioners when symptoms or conditions are present that require services beyond the therapist's scope of practice. Proponents have noted that physical therapists can screen for medical pathology in individuals presenting with musculoskeletal pain.^{1–4} It has been shown in models for primary care physical therapy that therapists with experience in their area of practice and advanced clinical training are able to treat and

refer patients appropriately.^{5–9} A major concern of opponents to direct access is that therapists may be unable to recognize serious medical pathology in clients that would require referral to a physician or other healthcare provider for optimal care.¹⁰ Determining the appropriate referral and effective communication of concerns when clients do present with non-musculoskeletal symptoms can be difficult.

Screening for red flags (Table 1) has been advocated to screen for medical pathology and has traditionally been used in physical therapy.^{11–16} Red flags include clinical symptoms that raise the possibility of the presence of serious disease. Despite the obvious need to screen for red flags, red flag symptoms alone may result in multiple false positive results generating unnecessary diagnostic testing and further healthcare expense.^{15,17}

Several key points are relevant when considering screening for non-musculoskeletal pathology. History taking is imperative to effective medical screening.^{11,12,14,16} Textbooks for physical therapists

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focus on the history and interview for recognizing signs and symptoms of non-musculoskeletal disease.^{11–13,15} It is from this initial subjective information that therapists begin to form hypotheses on probable causes of non-musculoskeletal pain.^{18,19} Clinical reasoning and quality of hypothesis generation is only as good as the information collected.^{12,14,16,20} If the correct hypotheses are not formulated, additional inquiries could be misdirected.^{20,21} The ScreenAssist Lumbar Questionnaire (SALQ) was developed to assist therapists in the collection of relevant subjective information to perform a systems review and to help determine if the presence of a red flag symptom warrants referral.

The SALQ was developed through the cooperation of a physical therapist and internal medicine physician. The objective was to provide physical therapists with a tool that could be used to assist with the medical screening process and with communication of information to other medical providers in a concise and organized format. The SALQ (Appendix 1) consists of 29 questions. Each of the questions is scored 0–5. A score of 0 indicates that the symptom is not present. A score of 3 is the medical definition of presence of the symptom. A score of 5 was to illustrate the symptom at its highest level with individual continuing to have the ability to participate in outpatient therapy. Questions cover constitutional symptoms, the gastrointestinal system, the genitourinary system, neurology, rheumatology, and hematology. The scores to the questions are then grouped for interpretation. Interpretation includes recommendations for referral and for urgency of referral. These interpretations are recommendations only and need to be assessed by the evaluating therapist in combination with the client's medical history, procedural history and medication regimen. Not all responses are scored because several questions are present to assist the therapist in communicating useful information to alternate medical providers to assist with further assessment decisions.

The purpose of this study was to estimate the diagnostic accuracy of the SALQ compared with the assessment and diagnosis made by primary care providers in subjects presenting with the primary

complaint of low back pain. If a high degree of diagnostic accuracy could be determined, then the questionnaire could provide physical therapists with a simple, easy-to-use, but formal instrument for identifying patients with non-musculoskeletal back pain or patients with emergent musculoskeletal causes of back pain requiring referral to a medical provider. In order to accomplish the purpose of this study, an answer to the following question was sought: Does the score and associated recommendation for referral on the SALQ concur with the results of the assessment and diagnosis by a primary care physician managing clients with the primary complaint of low back pain when a 2-month post-visit chart review is performed?

Patients and Methods

Participants

The research was approved by the University of Evansville Institutional Review Board. Informed consent was obtained and the rights of the participants were protected. Subjects were consecutive patients presenting to two primary care physicians' offices with the main complaint of low back pain. Inclusion criteria consisted of low back pain bound superiorly by T12 and inferiorly by the buttock crease with or without lower extremity symptoms, pain present greater than 24 hours,²² age greater than 18 years, the ability to read and understand the English language, and being alert and oriented to person, place, time, and situation. Subjects were given consent forms to permit collection of questionnaire and demographic information as well as for the review of medical records for 2 months after the visit. Subjects were contacted by phone by the investigator within 24 hours of their initial appointment for low back pain to complete the SALQ. Between 8 and 9 weeks after the initial visit, a chart review was performed. The presence of a positive gold standard diagnostic test for visceral pathology or referral to a non-musculoskeletal specialist was the criterion for a positive reference standard result for non-musculoskeletal pathology. The presence of new fracture or neurological signs and symptoms (loss of bowel and bladder control, saddle area numbness, multiple level paresthesias with corresponding motor and reflex loss) indicating that need for immediate surgery was the criteria for emergent musculoskeletal pain. In this study, the gold standard diagnostic tests were determined by the Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society.²³

The purpose of Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society²³ is to assist primary care providers in the evaluation and management of clients with low back pain by providing available evidence. The literature search conducted to support

Table 1 Signs and symptoms associated with red flags in low back pain^{11–14}

Nocturnal pain
Bladder dysfunction
Saddle paresthesia
Bilateral sciatica with negative straight leg raise
Bilateral multi-segmental signs
Three or more nerve root involved unilaterally
Step deformity
Weak and painful hip flexion
Fever, chills, sweats
Unintended weight loss
Arterial claudication symptom

Figure 1 Flow diagram of subject participation.

the development of this Guideline was extensive and included studies from MEDLINE (1966 through November 2006), the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, and EMBASE. A multidisciplinary panel of experts was utilized to develop the questions and scope used to guide the report, review its results, and formulate recommendations. The key questions did investigate the use of red and yellow flags to determine the presence of non-musculoskeletal pathology including cancer, infection, cauda equina syndrome, and ankylosing spondylitis. The efficacy of use of radiography and magnetic resonance imaging was also considered. The practice Guideline includes four recommendations for the evaluation of low back pain and three recommendations for the management of low back pain. The Guideline required over 2 years to develop has been endorsed by the American

Academy of Family Physicians and the American College of Physicians.

Test methods

Participating physicians conducted a focused history and physical examination during their initial assessments of the patients. Diagnostic imaging and testing was performed for patients when severe or progressive neurological deficits were present or when underlying conditions were suspected on the basis of history and physical examination. The physicians included in the study were proficient in practicing according to the Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society for the Evaluation and Management of Low Back Pain.²³ Each physician had over 15 years of experience in outpatient primary care. During the 3-month period in which subjects

were seen for the initial assessment, one physician had 11 patients that met the inclusion criteria and the other had 19 patients that met the inclusion criteria. The participants accounted for approximately 1% of each physician's practice.

The SALQ was completed by the investigator and subject by phone interview within 24 hours of the visit for low back pain. The investigator read each question to the client and rated the response on the 0–5 scale given for each symptom. After the questionnaire was completed, the investigator recorded the answers on the score sheet associated with the questionnaire. The score sheet categorizes symptoms individually and in clusters to determine the need for referral. Appendix 1 contains the SALQ and scoring guide. The subject was assigned a subject number and placed in one of two categories, referral recommended and referral not recommended. Additional information collected included questions regarding age, general health, history of low back pain, pain severity, and duration of low back pain. At the 2-month follow-up, the investigator performed a chart review to collect information on diagnostic testing, follow-up appointments and referrals made in regard to the complaint of low back pain. The assessment and diagnosis performed by the primary care physician was documented. The investigator did not reference or utilize information collected at the telephone interview. The investigator and participating physicians remained blind to each other's assessment throughout the study.

Statistical tests

The validity of the SALQ was evaluated by its ability to accurately determine the presence or absence of non-musculoskeletal pain or dysfunction. Sensitivity, specificity, likelihood ratios, and post-test probability for non-musculoskeletal or emergent musculoskeletal pain were calculated with associated 95% confidence interval (CI).

Results

Participants

Subjects were consecutive patients seen in a family practice or internal medicine physician's office for the complaint of low back pain during a 3-month period. A total of 30 subjects met the inclusion criteria, 29 of whom completed the study. The subject who did not complete the study was excluded because the physician terminated care prior to the 2-month follow-up chart review. The individual was discovered to be receiving narcotic medications from multiple providers for the same complaint of pain. Individuals receiving narcotic prescriptions from this physician must sign a written contract stating that narcotics will not be sought from other providers.

Test results

The questionnaire recommended that 6 of the 29 subjects be referred to a physician. Descriptive statistics were calculated for the two groups, those that were recommended for referral using the SALQ and those that were not recommended for referral using the SALQ. Table 2 contains a summary of these results. There was a statistically significant difference when looking at the severity of low back pain reported. This factor should be seen as more important than the other demographic/descriptive factors in determining the presence/absence of non-musculoskeletal low back pain, but not definitive, in and of itself.

Of the six subjects that the SALQ recommended referral to a physician or alternate medical provider, three were diagnosed by their physician with a non-musculoskeletal cause of low back pain defined by a positive gold standard diagnostic test at the 2-month chart review. One was diagnosed with emergent musculoskeletal pain defined by positive radiography for multiple fractures. Two of these six patients were diagnosed by their physician with musculoskeletal low back pain that could be treated conservatively.

Table 2 Demographic information

Variable	Referral recommended	Referral not recommended	Calculations
Gender (count)	3 male/3 female	12 male/11 female	$P>0.05$
Age (median)	66.5 years ir=10	62 years ir=23	$P>0.05$
History of LBP (count)	4 yes/2 no	12 yes/11 no	$P>0.05$
Subjective health			$P>0.05$
Poor	1	1	
Fair	1	7	
Good	4	13	
Very good	0	1	
Excellent	0	1	
Duration of pain			$P>0.05$
1–4 weeks	2	4	
4–8 weeks	1	5	
8+ weeks	3	14	
Severity of LBP			$P<0.05$
Mild	0	4	
Moderate	1	15	
Severe	5	4	

Note: ir, interquartile range.

with therapy. Appendix 2 provides a table of demographic information for these subjects, questions on the SALQ that resulted in the recommendation for referral and diagnostic testing performed by the physician.

The SALQ demonstrated a sensitivity of 100% (95% CI=0.44–1.0) and specificity of 92% (95% CI=0.81–0.92) compared to the assessment and diagnosis performed by the primary care physician. The negative likelihood ratio was 0.11 (95% CI=0.01–1.54) and the positive likelihood ratio was 9.36 (95% CI=2.78–32). To allow calculation of the negative likelihood ratio, 0.5 was added to each cell. Using the prevalence of individuals presenting with non-musculoskeletal or emergent musculoskeletal back pain found in this study (4/29) and the associated positive and negative likelihood ratios, post-test odds were calculated. If the SALQ is positive, the post-test probability is 0.60. If the SALQ is negative, the post-test probability is 0.017. Table 3 contains the cross tabulation of results.

Of the four subjects in the study who demonstrated positive gold standard tests and received a diagnosis of non-musculoskeletal or emergent musculoskeletal pain by their physician, there were four different diagnoses. One subject was diagnosed with a traumatic pubic and sacral fracture with radiographic confirmation. Computed tomography (CT) of the pelvis was performed verifying the fracture with no internal organ injury. The second of the four subjects had a urinalysis positive for blood, followed by a pelvic CT with renal cysts noted. Magnetic resonance imaging (MRI) of the lumbar spine was performed with a mass noted at L2/3 involving the thecal sac. The individual was then referred to a nephrologist and neurosurgeon. The third of the four subjects was diagnosed with shingles on observation of the rash along the L5 dermatome associated with the herpes zoster virus. At a 1-month follow-up, it was noted that the rash and associated pain had resolved. The fourth subject had a pelvic CT with a hemorrhagic cyst noted on the right kidney. He was referred to urology for biopsy.

Two subjects received a score that indicated the need for referral on the SALQ but were assigned a diagnosis of musculoskeletal pain by a physician and were referred to physical therapy. The two subjects were therefore determined to have false-positive

results on the SALQ. The first subject demonstrated the following scores to questions on the SALQ that resulted in the referral recommendation. Question number 2 regarding weight loss was answered as losing >2% but ≤4% body weight per week irrespective of diet. Question 4 regarding fatigue was answered as complains of fatigue daily, but not all day long. Question 22 regarding presence of daytime pain was answered as constant pain but resolves with analgesics. The subject had a radiograph with an L4 compression fracture noted. MRI confirmed that this was an old fracture. Additional tests performed included abdominal CT, and lab testing including complete blood count and erythrocyte sedimentation rate. These diagnostic tests were also negative. She was referred to physical therapy with a TLSO fitting for iliocostalis friction syndrome. Her pain level had decreased by 50% with use of the TLSO and exercise.

The second subject demonstrated the following scores to questions that resulted in the referral recommendation. Question 22 regarding presence of daytime pain was answered as constant pain but resolves with analgesics. Question 26 regarding pain relieving factors was answered as unable to relieve pain with change in position. Question 27 regarding pain precipitating factors was answered as constant uncomfortable pain. This had a previous history of multiple transient ischemic attacks with neurological deficit. He had a MRI of the brain with no new focal deficits. He had a MRI of the lumbar spine with significant foraminal stenosis noted in the lower lumbar spine. An arterial Doppler of the lower extremities was performed with adequate lower extremity blood flow noted. Physical therapy was consulted and the individual's pain resolved to previous level of chronic low back pain with pain rated as mild after 5 weeks of therapy.

Discussion

Screening for red flags has been advocated to identify medical pathology and has traditionally been used in physical therapy.^{11–16} Despite the obvious need to screen for red flags, red flag symptoms alone may produce multiple false-positive results generating unnecessary diagnostic testing and further healthcare expense.¹⁵ Sizer *et al.*¹¹ introduced the alternative of

Table 3 Cross-tabulation of results

SALQ score	DX+	DX–	Total
Referral recommended	4 (true-positive)	2 (false-positive)	a + b = 6
No referral recommended	0 (false-negative)	23 (true-negative)	c + d = 23
Total	a + c = 4 + 0	b + d = 25	

Note: Non-musculoskeletal pain or emergent musculoskeletal LBP as defined by physician-initiated referral to non-musculoskeletal specialist at the 2-month chart review or the presence of visceral pathology identified by diagnostic testing performed.

categorizing red flags for the spine and utilizing clusters of symptoms to assist in determining presence of non-musculoskeletal disease. The SALQ uses a similar classification system by grouping symptoms based on severity of the symptom and associated complaints. The purpose of this pilot study was to determine if the SALQ could be a useful tool to identify the need for medical referral in patients complaining of low back pain.

In this preliminary study, the SALQ demonstrated a sensitivity of 100% (95% CI=0.44–1.0) and specificity of 92% (95% CI=0.81–0.92). The negative likelihood ratio was 0.11 (95% CI=0.01–1.54) and the positive likelihood ratio was 9.36 (95% CI=2.78–32). Post-test odds were also calculated using the prevalence of having a condition needing medical referral found in this study of 4/29 or 0.14. If the SALQ is positive, the post-test probability is 0.60. If the SALQ is negative, the post-test probability is 0.017.

There is decrease in post-test probability or prevalence of non-musculoskeletal pain when the SALQ does not recommend referral from 14% to 1.7%. This suggests that the SALQ could provide physical therapists with a formal instrument for identifying patients with non-musculoskeletal back pain or patients with emergent musculoskeletal causes of back pain requiring referral to a medical provider. However, consideration must be given to the small sample size and large range for the negative likelihood ratio. As a screening tool, having a high sensitivity is imperative to avoid the negative consequences of incorrectly diagnosing a patient with musculoskeletal pain when a medical issue is present. This could result in delayed treatment of the condition. Depending upon the nature of the underlying medical condition, there could be a negative outcome or increased risk to the individual's health.

When looking at the demographic information, severity of low back pain did demonstrate a statistically significant difference between the two groups. Five of the six subjects that received a score recommending referral on the SALQ, reported severe pain. The critical value for Chi-square at the 0.05 level of confidence with two degrees of freedom is 7.82. Because the Chi-square value of 10.06 exceeds the critical value of 7.82 at the 0.05 level of confidence, the ratings of the severity of low back pain for subjects with recommendation for referral on the SALQ are significantly greater than for the ratings of those subjects without recommendation for referral.

Because there is overlap between the two groups regarding severity of low back pain, this factor should be seen as more important than the other demographic/descriptive factors in determining the

presence/absence of non-musculoskeletal low back pain, but not definitive, in and of itself.

There are several limitations in this study. This pilot study had a small sample size of 29 subjects resulting in large CIs for sensitivity, specificity, and likelihood ratios. This is the first study performed on the SALQ with no other data available for comparison. The prevalence of a non-musculoskeletal cause of low back pain in this study was comparatively high at 14%. The study performed by Henschke *et al.*¹⁵ demonstrated a much lower prevalence of 0.9% with the majority demonstrating vertebral fracture. Choosing a single reference standard that could be used to determine the presence or absence of disease when multiple systems could be referring pain to the same region of the body was difficult. Although gold standard tests are available in isolation for particular diagnoses, the reference standard needed for comparison of a screening tool must account for multiple medical pathologies that could result in the same symptom of low back pain. The Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society for the Evaluation and Management of Low Back Pain²³ was chosen as the reference standard due to the extensive research, collaboration of specialists involved in its design and its acceptance in the medical community. The 2-month chart review did demonstrate that both physicians followed the evaluation and management recommendations associated with the guideline. Of the individuals that were diagnosed with musculoskeletal pain, follow-up with the physician was performed and reduction or resolution of the symptoms reported.

Conclusion

Having an objective tool, as an alternative to use of red flags in isolation, can assist therapists in clinical decision making regarding the need for referral of clients presenting with low back pain. The positive outcome of this pilot study supports the possible future value of the SALQ. Owing to the limitations of small sample size and resulting large confidence intervals, further validation is necessary to determine the value of these findings.

APPENDIX 1

ScreenAssist Lumbar Spine Questionnaire

1. Constitutional Fever

0 if none

1 if felt warm but never took temp

2 if recorded a Temp: above normal but <99.5

3 if recorded a Temp: 99.5 but <101

4 if recorded a Temp: 101 but <103

5 if recorded a Temp: 103 or higher

2. *Constitutional* **Weight loss**

- 0 if none
- 1 if occurred but expected weight loss associated with current diet
- 2 if not dieting but losing between 0 and 2% body weight per week
- 3 if dieting but losing more weight than expected
- 4 if losing >2% but ≤4% body weight per week irrespective of diet
- 5 if losing >4% body weight per week irrespective of diet

3. *Constitutional* **Night sweats**

- 0 if none
- 1 if once in last 10 nights
- 2 if > once in last 10 nights but ≤ every 3 nights
- 3 if > once every 3 nights but ≤ once a night
- 4 if every night but no change in bedclothes needed
- 5 if every night and changing bedclothes needed

4. *Constitutional* **Fatigue**

- 0 if none
- 1 occurs but well explained by lack of sleep or vigorous exercise
- 2 spontaneously occurs but ≤ 2 times a week
- 3 if occurs 2 or more times a week but < daily
- 4 if complains of fatigue daily, but not all day long
- 5 if constant fatigue

5. *Constitutional* **Medical compliance self-assessment**

- 0 if always taking meds and never missing follow-up (F/U) appointments
- 1 if takes meds and keeps F/U visits but does not feel they are necessary
- 2 if compliant with 75% but <100% of meds or F/U visits
- 3 if compliant with 25% but <75% of meds or F/U visits
- 4 if compliant with <25% of meds or F/U visits but does not refuse either
- 5 if refuses medications and medical F/U visits

6. *Endocrine* **Diabetes mellitus**

- 0 if not diabetic
- 1 if not diabetic but a sibling or parent is
- 2 controlled (fasting BS <150 mg/dl or last HA1C <7.5%) & on no medicines for glucose control
- 3 controlled (fasting BS <150 mg/dl or last HA1C <7.5%) but on medication for glucose control
- 4 if keeps F/U visits but fasting BS between 150 and 250 mg/dl often or last HA1C between 7.5 and 9.5%
- 5 if fasting BS >250 mg/dl or not checking finger sticks or HA1C >9.5% or no DM F/U visits

7. *Gastrointestinal* **Vomiting**

- 0 if none
- 1 if vomiting once every 5 days
- 2 if vomiting not daily but < every 5 days
- 3 if vomiting daily but ≤ 3 times a day
- 4 if vomiting > 3 times a day but not constantly vomiting
- 5 if constantly vomiting

8. *Gastrointestinal* **Heartburn**

- 0 if none *Note: NSAIDs stands for Non Steroidal Anti Inflammatory Drugs (Ibuprofen, aspirin-like meds)
- 1 if having heartburn <15 minutes a week & not on NSAIDs & not on meds for heartburn
- 2 if heartburn occurs ≥15 minutes/week but < daily & not on NSAIDs & not on meds for heartburn
- 3 if not on meds for heartburn plus it started after using NSAIDs or if not on NSAIDs, daily but not constant
- 4 if taking meds to treat heartburn which may be controlled or refractory but not constant heartburn
- 5 if constant heartburn with or without meds

9. *Gastrointestinal* **Stool color**

- 0 if never had black nor bloody stools
- 1 if black or bloody stool once in last month
- 2 if black or bloody stools but occurring > once a month but < once a week
- 3 if black or bloody stools but occurring ≥ once a week but < every 2 days
- 4 if black or bloody stools but occurring every 2 days or more frequently but not 5 days in a row
- 5 if black or bloody stools for 5 days in a row or more

10. *Gastrointestinal* **Stool volume**

- 0 if no change from baseline or actually decreased
- 1 if client feels > baseline but <50% increase
- 2 if client feels 50% to <100% more than baseline
- 3 if client feels 100% to <200% more than baseline
- 4 if client feels 200% or higher but fully continent
- 5 if so excessive afraid of continence or if had incontinence

11. *Gastrointestinal* **Stool consistency**

- 0 if unchanged stools or well formed
- 1 if one loose stool but occurred over 7 days ago
- 2 if one loose stool >2 days ago but <7 days ago
- 3 if just one loose stool ≤2 days ago
- 4 if daily loose stool but ≤3 loose stools per day
- 5 if >3 loose stools per day

12. *Gastrointestinal* **Control of bowels**
 - 0 if complete control or longstanding continence problems proven benign by a workup
 - 1 if new rectal leakage occurs but not more than once a month
 - 2 if new rectal leakage occurs > once a month but ≤ once a week
 - 3 if new rectal leakage occurs > once a week but not daily
 - 4 if daily new rectal leakage but can wear same underwear throughout day
 - 5 if daily new rectal leakage & change of underwear needed or protective padding used
13. *Gastrointestinal* **Constipation**
 - 0 if none or unchanged bowel habits
 - 1 if felt constipated but not more than once a month
 - 2 if felt constipated > once a month but ≤ once a week
 - 3 if felt constipated > once a week but not daily
 - 4 if feeling constipated daily but not taking meds for a bowel movement
 - 5 if feeling constipated daily & needs meds for a bowel movement
14. *Genitourinary* **Blood in urine**
 - 0 if none
 - 1 if noted but not more than once a month
 - 2 if noted > once a month but ≤ once a week
 - 3 if noted > once a week but not daily
 - 4 if noted daily but not constantly
 - 5 if noted with every void
15. *Genitourinary* **Control of urine**
 - 0 if complete control or longstanding continence problems proven benign by a workup
 - 1 if new episodes of loss of control but not more than once a month
 - 2 if new episodes of loss of control > once a month but ≤ once a week
 - 3 if new episodes of loss of control > once a week but not daily
 - 4 if daily new episodes of loss of control but can wear same underwear throughout day
 - 5 if daily new episodes of loss of control & change of underwear needed or protective padding used
16. *Genitourinary* **Urinary frequency**
 - 0 if no change from baseline
 - 1 if increased frequency occurred but not more than once a month
 - 2 if increased frequency occurs > once a month but ≤ once a week
 - 3 if increased frequency occurs > once a week but not daily
 - 4 if increased frequency occurs daily but not constantly
 - 5 if increased frequency occurs constantly throughout the day
17. *Neurologic* **Frequency of lower extremity change in sensation**
 - 0 if none **Note: Score 0 if due to previously evaluated stroke or injury and unchanged since that event*
 - 1 if sensation change <10 minutes over last month
 - 2 if sensation change ≥10 minutes over last month but <15 minutes a week
 - 3 if sensation change ≥15 minutes a week but not daily
 - 4 if sensation change daily but not constant
 - 5 if constant sensation change
18. *Neurologic* **Frequency of lower extremity weakness**
 - 0 if none **Note: Score 0 if due to previously evaluated stroke or injury and unchanged since that event*
 - 1 if weakness occurred <10 minutes over last month
 - 2 if weakness occurred ≥10 minutes over last month but <15 minutes a week
 - 3 if weakness occurred ≥15 minutes a week but not daily
 - 4 if weakness occurs daily but not constant
 - 5 if constant sensation of weakness
19. *Neurological* **Extent of lower extremity weakness**
 - 0 if none **Note: Score 0 if due to previously evaluated stroke or injury and unchanged since that event*
 - 1 if seems weak but no loss of function
 - 2 if noticing weakness while walking (stopping or shorter distances) but can walk without falling
 - 3 if noticing weakness will fall while walking or relying on wheelchair or other assisted mobility
 - 4 if able to move legs but cannot walk nor go from seated to standing
 - 5 if unable to move lower extremity
20. *Rheumatological* **Skin morphology**
 - 0 if none **Note: Morphology change implies telangiectasia, subcutaneous nodule, malar rash, or discoid rash*
 - 1 if only 1 instance of morphology change & known for >1 year
 - 2 if only 1 instance of morphology change but started within last year
 - 3 if up to 3 morphology changes that are known for >1 year or 2 new morphology changes within last year
 - 4 if 4 morphology changes, known for >1 year or 3 new morphology changes within last year
 - 5 if all 4 morphology changes that are new within last year

21. *Hematological* **Immune suppression**

- 0 if none *Note: Systemic steroids include Prednisone, Solumedrol, Kenalog, Depomedrol
- 1 currently not immunosuppressed, but will take systemic steroids for ≤ 1 week ≤ 2 times a year
- 2 currently not immunosuppressed but receives systemic steroids > 2 times a year
- 3 currently on systemic steroids or other immunosuppressants, but no transplant history & HIV-negative
- 4 HIV-positive or transplant history
- 5 known very low white blood cell count (WBC count < 2) due to medical therapy or illness

22. *Lumbosacral* **Lumbosacral daytime pain**

- 0 if none *Note: Responses 1–3 assume no analgesic medications are used
- 1 if pain noted but none for > 1 week
- 2 if pain occurred ≤ 1 week ago but lasts $< \frac{1}{2}$ of the day
- 3 if pain occurred ≤ 1 week ago but lasts $\geq \frac{1}{2}$ of the day will resolve without analgesics
- 4 if constant pain but resolves with analgesics
- 5 constant pain, uncontrolled with analgesics

23. *Lumbosacral* **Lumbosacral night time pain**

- 0 if none *Note: Responses 1–3 assume no analgesic medications are used
- 1 able to sleep entire night once a comfortable position is found
- 2 pain awakens due to positional change, but able to fall back asleep
- 3 awaken often without attributing to positional change, can fall back asleep
- 4 if having pain but able to sleep with analgesic medications
- 5 if problems sleeping due to pain and analgesics do not improve situation

24. *Lumbosacral* **Lumbosacral extent of pain referral**

- 0 if no lumbosacral pain
- 1 if lumbosacral pain, never referred
- 2 pain refers away from back but < 1 instance a week
- 3 pain refers away from back ≥ 1 once a week but not daily
- 4 if pain refers away from back daily but can resolve with positional change
- 5 if pain refers away from back daily and cannot resolve with positional change

25. *Lumbosacral* **Lumbosacral quality of pain**

- 0 if none
- 1 if dull & no analgesics needed
- 2 if dull & analgesics are used for relief
- 3 if sharp & no analgesics are used
- 4 if sharp & analgesics are used for relief
- 5 if uncontrolled with analgesics, either dull or sharp

26. *Lumbosacral* **Lumbosacral pain relieving factors**

- 0 if no lumbosacral pain
- 1 if stopping aggravating activity relieves pain

2 must sit to relieve the pain

3 only laying down relieves pain

4 must sit & forward flex to relieve pain

5 unable to relieve pain with change in position

27. *Lumbosacral* **Lumbosacral pain precipitating factors**

0 if no lumbosacral pain

1 if worse only after clearly overusing back

2 if worse after activities which used to be tolerable

3 if worse after standing or walking but not immediately

4 if worse simply upon standing or walking, or worse after laying down

5 constant uncomfortable pain

28. *Lumbosacral* **Lumbosacral trauma**

0 if no lumbosacral pain *Note: Known incident means a recalled activity leading to the pain

1 gradual onset of pain without known incident

2 if after known incident and client felt medical care was not necessary and no medical evaluation performed

3 if after known incident and client sought medical care > 24 hours after known incident

4 if after known incident and client sought medical care ≤ 24 hours after known incident

5 if no trauma or precipitating event but sudden onset severe pain

29. *Lumbosacral* **Lumbosacral paresthesia**

0 if no lumbosacral paresthesia

1 if localized to area of pain

2 if paresthetic in only one dermatome

3 if paresthetic to two ipsilateral dermatomes

4 if paresthetic in three ipsilateral dermatomes

5 if contralateral lower extremity or bilateral lower extremity paresthesia

To assist with use of the questionnaire, the following scoring guide is given. These are recommendations only. Therapists need to use clinical experience and professional judgment when deciding the need for referral. Pathology may have already been screened for and ruled out or in by the attending physician. Depending on the clients past medical history, some symptoms may be an expected result of pathology that is being treated according to the standard of care.

If the individual scored a 5 on any of the following questions, consider transfer to emergency medical care:

1	3	7	9	12	14	15	16	19	23	28
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If the individual scores a 5 on 2 or more of the following questions, refer to a physician immediately or emergency room.

8	10	22	24	25	26	27	29
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If the individual scored a 3 or higher on any of the following questions, refer to a physician with consult within 48 hours.

1	3	9	11	13	19
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If the individual scores a 3 or higher on 3 of the questions, refer to a physician with consult within 48 hours.

2	4	7	8	10	12	14	15	16	17	18	22	23	26	27	29
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APPENDIX 2

Sex	Age	Pain	General health	Time (weeks)	Questions and score that prompted referral	Referral	Non-musculoskeletal DX	Diagnostic testing
F	68	Mod	Good	8+	22. <i>Lumbosacral/ Lumbosacral daytime pain-4</i>	Refer to ER	Y	Urinalysis= + blood, pelvic MRI with mass L2/3 thecal sac, colonoscopy — severe diverticulitis sigmoid colon. Referral to nephrologist and neurosurgeon
M	71	Severe	Fair	8+	27. <i>Lumbosacral/ Lumbosacral pain precipitating factors-5</i> 28. <i>Lumbosacral/ Lumbosacral trauma-5</i> 22. <i>Lumbosacral/ Lumbosacral daytime pain-4</i> 26. <i>Lumbosacral/ Lumbosacral pain relieving factors-5</i> 27. <i>Lumbosacral/ Lumbosacral pain precipitating factors-5</i>	Refer within 48 hours	N	MRI lumbar spine: severe stenosis lumbar spine with nerve encroachment
F	61	Severe	Poor	8+	2. <i>Constitutional Weight loss-4</i> 4. <i>Constitutional Fatigue-4</i>	Refer within 48 hours	N	Renal CT negative. Pelvic CT negative. MRI lumbar spine old L4 compression fracture. X-ray Lumbar spine confirmed iliocostalis friction syndrome
M	65	Severe	Good	6–7	22. <i>Lumbosacral/ Lumbosacral daytime pain-4</i> 6. <i>Endocrine Diabetes mellitus-4</i> 22. <i>Lumbosacral/ Lumbosacral daytime pain-4</i> 25. <i>Lumbosacral/ Lumbosacral quality of pain-4</i> 28. <i>Lumbosacral/ Lumbosacral trauma-5</i>	Refer to ER	Y	Pelvic X-ray negative Abdominal CT — hemorrhagic cyst right kidney
F	79	Severe	Good	1–2	22. <i>Lumbosacral/ Lumbosacral daytime pain-5</i> 26. <i>Lumbosacral/ Lumbosacral pain relieving factors-5</i> 27. <i>Lumbosacral/ Lumbosacral pain precipitating factors-5</i> 28. <i>Lumbosacral/ Lumbosacral trauma-5</i>	Refer immediately	Y	Shingles on inspection — rash not present at initial visit
M	30	Severe	Good	2–3	22. <i>Lumbosacral/ Lumbosacral daytime pain-4</i> 23. <i>Lumbosacral/ Lumbosacral nighttime pain-4</i> 26. <i>Lumbosacral/ Lumbosacral pain relieving factors-3</i> 27. <i>Lumbosacral/ Lumbosacral pain precipitating factors-4</i>	Refer within 48 hours	Y	Sacral and pubic fracture on CT and X-ray. MRI confirmed no internal organ damage. Referred to PT and returned to work within 8 weeks, no assistive device, pain 2/10 in pelvis

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