Adopted: 9/11

Yellow Flags for Developing Persistent Disabling Low Back Pain (Assessment & Management)

The following is based on a 2010 systematic review (Chou 2010) which included 20 trials consisting of 10,842 patients. Trials were conducted in primary care settings (1/3), workers' compensation clinics, and physical therapy or specialty clinics.

Yellow flags is a term loosely used to indicate items in a patient's history or clinical presentation that potentially may make them poorer responders to care. These items are primarily psychosocial factors, but can include functional status and pain severity. Detecting their presence may aid in establishing a prognosis and influence management decisions.

Probability of a Poor Outcome

Most patients with mechanical low back pain have a good prognosis, but some will continue to experience persistent disabling pain six months to a year after seeing a practitioner. Focusing on primary care patients, Von Korff (1996) challenged the then prevailing belief that 90% of low back pain resolved in approximately 3 weeks. His study suggested that the course of back pain is more complex, with frequent recurrences. About 33% of patients continued to experience moderate or intense pain, either intermittently or continuously. About 20% reported important functional limitations in the long term. Studies since then have demonstrated similar results. (Chou 2010)

In Chou's (2010) mixed pool of 10,842 low back pain patients, the number of cases with a poor outcome varied depending on what specific outcomes were used to measure success. For example, when work absenteeism or compensation status was used to follow patients in a primary care medical setting, 11% of the patients (range 2%-20%) had a poor outcome at 3 to 6 months. The failure rate continued to be 11% at 1 year (range 9%-13%). In studies conducted in primary care settings that focused on pain, functional status, or mixed outcomes, the prevalence (median proportion) of patients with a poor outcome was significantly higher. It was 26% (2%-48%) at 3 to 6 months and 21% (7%-42%) at 1 year.

When studies conducted in workers' compensation or referral settings were included with studies in primary care settings, the results were a bit worse. The median proportion of patients with poor work-related outcomes at 3 to 6 months was 19% (2%-42%) and at 1 year was 13% (9%-18%). In studies that focused on pain, functional status, or mixed outcomes, the median (range) proportion of patients with a poor outcome at 3 to 6 months was 35% (2%-48%). *These numbers essentially represent the pre-test probability that an average patient will suffer from persistent back pain.*

The question for the clinician is whether there are indicators identifying which patients may potentially be poor responders. Most of the yellow flags for a poorer prognosis are psychosocial in nature or measures of functional status (assessed by questionnaire). *Except for Waddell's signs, none derive directly from the physical examination.* The predictors identified in Chou's 2010 systematic review fell into three categories: stronger predictors, weaker predictors, and non-predictors.

Stronger Outcome Predictors

SUMMARY
- Nonorganic signs or generalized pain
- Maladaptive pain coping
  - Fear avoidance behavior
  - Catastrophizing
- Psychiatric comorbities
- Baseline physical function

High levels of maladaptive pain coping behaviors, indications of somatization, high levels of physical impairment, and high levels of psychiatric comorbidities were the most useful in predicting poor outcomes.

Predicators of persistent pain

Yellow flag	Outcome	LR (95% CI)*
Presence of **nonorganic signs** or more **generalized pain**	Worse outcome at 1 year Worse outcome at 3 months	LR 3.0 (1.7-4.6) LR 2.5 (1.8-3.4)
High levels of **maladaptive pain coping** behaviors	Worse outcome at 1 year Worse outcome at 3-6 months	LR 2.5 (2.2-2.8) LR 2.2 (1.5-4.9)
Presence of **psychiatric comorbidities**	Worse outcome at 1 year Worse outcome at 3-6 months	LR 2.2 (1.9-2.3) LR 1.9 (1.4-2.1)
High baseline **functional impairment**	Worse outcome at 1 year Worse outcome at 3-6 months	LR 2.1 (1.2-2.7) LR 1.4 (1.3-3.5)

* These likelihood ratios indicate the increase in odds that a patient will have poor outcome. An LR of 1.0 represents no change in odds.

Nonorganic Signs. Nonorganic signs refer to findings that suggest a strong psychological component to pain, or intentionally false or exaggerated pain symptoms. This particular interplay between psychological state and physical symptoms is called *somatization and may indicate a somatiform disorder*. Higher somatization scores predict failure to return to work at 3 months (LR, 2.5 [95% CI, 1.8-3.4]). Similarly, higher somatization scores or more generalized pain at baseline increases the likelihood of a worse outcome at 1 year with a 3.0 LR (1.7-4.6). Unfortunately, lower scores do not consistently increase the likelihood of treatment success (LR, 0.71 [0.31-0.76]). No study specifically reported LRs for Waddell signs, although these are the best known of the nonorganic signs. (For more information on Waddell signs, see Appendix I.) Suspicion of this disorder can be triggered by the patient's reporting pain in multiple unrelated regions of the body (the higher the number, the greater likelihood for somatization). Other clues may be gleaned from their demeanor: a pattern of referring to themselves as a patient (e.g., "I was Dr. Smith's patient," "I am a fibromyalgia patient") or appearing excessively doctor oriented (e.g., a pattern of doctor shopping, seemingly hypercritical of the health care profession).

Maladaptive Pain Coping Behavior. Maladaptive pain coping behaviors include *fear avoidance* (avoidance of work, movement, or other activities due to fear that they will damage or worsen the back) and *catastrophizing* (pain coping characterized by excessively negative thoughts and statements about the future). Patients with high maladaptive coping behaviors, measured by a variety of scales, such as the Fear-Avoidance Beliefs Questionnaire (see CSPE protocol), were more likely to have worse outcomes at 3 to 6 months (LR, 2.2 [1.5-4.9]) and at 1 year (LR 2.5 [2.2-2.8]). Conversely, patients in the low category were less likely to have worse outcomes at 3 to 6 months (LR 0.46 [0.30-0.73]) and at 1 year (LR 0.39 [0.38-0.40]).

Presence of psychiatric comorbidities. The presence of psychiatric issues (e.g., clinical depression) increases the odds of the patient continuing to suffer from disabling pain at 1 year after the initial visit (LR 2.2 [95% 1.9-2.3]).

Baseline Function. Baseline *functional impairment* at work or activities of daily living as measured with the Roland Morris Disability Questionnaire (see CSPE protocol), the Oswestry Disability Index (see CSPE protocol), and various ordinal scales has been associated with poorer outcomes. Results using these various measures could be categorized into 3 levels of functional impairment: none or weak, moderate, and severe or extreme. The greater the functional impairment at baseline, the greater were the odds of an unfavorable outcome. A high impairment score carried a LR of 1.4 (1.3-3.5) predicting persistent pain and disability at 3 to 6 months and a LR of 2.1 (1.2-2.7) at 1 year compared to the lowest functional impairment at 3 to 6 months (LR 0.53 [0.18-1.07]) and at 1 year (LR 0.40 [0.10-0.52]). The Roland Morris Disability Questionnaire was the most frequently used measure of function. For many cases in our clinics, the Patient Specific Functional Scale (PSFS) may be a reasonable substitute.

Weaker Outcome Predictors

SUMMARY
- Low general health status
- High pain intensity
- Higher work dissatisfaction
- Receiving worker's compensation
- Presence of radiculopathy or leg pain

A number of other factors have been correlated with persistent pain, but they have even weaker likelihood ratios.

Predicators of persistent pain

Low general health status predicts poor outcome at 1 year at 3-6 months	LR 1.8 (1.1-2.0) LR 1.6 (1.1-1.7)
High pain intensity predicts worse outcomes at 3 to 6 months, but less strongly predictive at 1 year	LR 1.7 (1.1-3.7) LR 1.3 (1.2-2.0)
Higher work dissatisfaction predicts worse outcome at 1 year (but not at 3 months)	LR 1.5 (1.3-1.8)
Higher work physical demands predicts worse outcome at 1 year (but not at 3 months)	LR 1.4 (1.2-1.7)
Receiving worker's compensation predicts worse outcome at 1 year	LR 1.4 (1.2-1.8)
The presence of radiculopathy or leg pain predicts worse outcomes at 3-6 months and 1 year	LR 1.4 (1.1-1.7) at 1 year LR 1.4 (1.2-2.4).

On the positive side, low levels of fear avoidance behavior and high levels of physical function are the most useful indicators of successful recovery, although these, too, are only weakly predictive.

Predicators of recovery

Yellow Flag	Likelihood ratio*
Low levels of fear avoidance	LR 0.39 (0.38-0.40)
Low baseline functional impairment	LR 0.40 (0.10-0.52)

*These LRs reflect the *lowering* of the odds that the patient will have a poor outcome. An LR of 0.10 represents a large, favorable decrease in the odds; an LR of 0.30 denotes a small decrease in odds.

No Proven Effect on Prognosis

SUMMARY
- Age
- Sex
- Education level
- Smoking status
- Overweight
- Prior history of LBP

A number of risk factors that intuitively make sense and that have had some support in the literature in the past have not proven to be significant. **Age, sex, education level, smoking status** (described as either "ever smoked" or "current smoker"), and **overweight** (defined by body mass index, calculated as weight in kilograms divided by height in meters squared) consistently failed to predict worse outcomes, with LRs approaching 1 in most or all studies. A **history of previous or recurrent episodes of low back pain** also was not useful for predicting worse outcomes at 3 to 6 months or 1 year. (Chou 2010)

Limitations

Three caveats should be kept in mind.

1. The predictive power of individual yellow flags is small. For example, in a population of patients with an estimated 11% chance of being out of work at one year due to pain (e.g., a patient in a primary care setting), a high score on the Roland Morris Questionnaire (LR 2.1) would raise the pre-test probability from 11% to a post-test probability of 20%. If the pre-test test probability is at the higher end of the range at 33%, the post probability would still only increase to 51%.

2. The systematic review that most of these statistics are based on did not include studies where the data could not be translated into likelihood ratios, *so there may be other yellow flags of some importance not presented here (see following paragraphs).* For example, Foster et al. (2009) found in their study that the most predictive psychological obstacles to recovery were patients' perceptions that 1) their pain will last well into the future, 2) many of their symptoms were related to their back pain, 3) they had little control over the situation, and 4) they had little ability to perform normal activities of daily living despite the pain.

   In reviewing prognostic factors, Weiser and Rossignol (2006) noted that patients with high expectations for recovery have better outcomes. In screening the psychosocial history, potentially significant factors are a history of failed treatments, substance abuse, disability compensation, and depression. The authors also state, "Patients with back pain and psychological distress may display anatomically 'inappropriate' signs of pain amplification."

   Another study identified a model which consisted of just 6 screening factors: history of low back pain, dissatisfaction with current employment or work status, widespread pain, radiating leg pain, restriction in two or more spinal movements, and sex. Statistical analysis resulted in the correct prediction of 74% of participants, dividing them into those with a good versus a poor prognosis. The model had a higher negative predictive value (77%) than positive predictive value (60%). The likelihood of persistent disabling low back pain increased with the number of factors reported: only 6% of the participants who reported fewer than three factors had a poor outcome compared with 70% of participants

who reported more than four." (Thomas 1999) This model has not yet been validated. Whereas Chou reported that pain severity had only a small increase in the probability of disabling pain at 6 months (+LR 1.70), Heymans (2010) reported that baseline pain severity may also influence functional recovery at 6 months. For each additional point on an 11 point pain scale, he found the odds of a poorer outcome increased (OR 1.72).

A 2011 systematic review assessed studies focused on a primary care setting. Similar to Chou's conclusion, it found some evidence to support a role for depression, psychological distress, and passive coping behaviors. Fear avoidance beliefs, likewise, had evidence to support its importance but remains controversial because other lines of evidence question its value. Unlike Chou's review, somatization was not found to be a prognostic factor. Interestingly, this review reports that the two most powerful predicators were the care provider's overall judgment and patients' own expectations (i.e., patients' sense of their own risk of persistent pain and their prediction about getting better or reporting back to work). At the very least, the presence of psychosocial yellow flags, even if they serve as "only momentary and partial indicators of more complex and dynamic distress" require a tailored management plan. (Ramond 2011)

3. These predictions do not take into consideration the nature of the low back problem (do some low back diagnoses have a better or worse natural history?) nor clearly distinguish the responses to different types of care (primary medical care is lumped together with generic physical therapy and with no specific information on manipulative therapy).

Screening Methods

The practitioner can screen patients for these various yellow flags either by direct observation and interview (based on the practitioner's subjective clinical assessment), by administering a structured questionnaire, or by combining both methods. Guidelines often recommend a 2-phase process supplementing questionnaires by a face-to-face interview. (Nicholas & Linton 2011) There are a number of validated questionnaires that can be used to assess functional status (e.g., Roland Morris) or specific psychosocial characteristics (e.g., the FABQ for fear avoidance behavior). There are also a number of broader questionnaires that have been developed to screen for a wide variety of yellow flags. However, according to Chou's 2010 systematic review, no instrument has been extensively validated. Some of the validation studies that have been done reported LRs similar to estimates for individual predictors, and most instruments include individual items that are not themselves predictive (such as sex, education level, or previous low back pain episodes). Recommended broad screening questionnaires include the Orebro Musculoskeletal Pain Screening Questionnaire (24 items), a shorter form of the Orebro developed for primary care settings (10 items), the STarT Back Screening also developed for primary care settings (9 items) (see Appendix II), and an instrument that can be used in a worker's compensation setting found as part of New Zealand Guidelines on Yellow Flags (see Appendix III). (Chou 2010, Nicholas &Linton 2011)

When to Screen

A patient's initial presentation for chiropractic care can occur at any phase of injury — acute, subacute, or chronic. Some patients in the acute phase may present with obvious yellow flags while others well into the chronic phase may have a straightforward musculoskeletal presentation uncomplicated by yellow flags.

To augment the yield from a standard history and physical, the practitioner has several options for additional screening: 1) Immediately take additional screening steps for patients who have already had disabling back pain for 4 weeks prior to presenting for care. 2) Take additional

screening steps only if the patient has not made satisfactory progress by the 4th week *of care*. 3) Take additional screening steps *at any point* in the course of treatment that patients display worrisome yellow flags or fail to make appropriate progress based on the nature and severity of their injury. For example, early screening may be triggered by an open display of fear of movement, passive coping behaviors, exaggerated response to physical exam procedures, elevated self-assessment scores, very low PSFS scores, or nonorganic signs and other illness behaviors.

Many authors have identified the fourth week following onset of LBP as a critical threshold in the prevention or management of disability. Liebensen (2007) suggests that the one-month mark may be a reasonable decision point for such an evaluation. Weiser and Rossignol (2006) in a best practices summary report strong evidence that a patient's risk for chronicity increases at four weeks for those patients who have not improved or have worsened based on a stagnant or worsening functional score. They assert that psychological and psychosocial factors are associated with delayed recovery and recommend obtaining psychological information at this time as well as identifying occupational barriers to returning to work.

Effects on Management

Management of patients with yellow flags is best considered within the larger context of the management of all patients with LBP. Although some patients with yellow flags will be identified at the outset of care in the acute phase of management, in many cases yellow flags may not be obvious during initial doctor-patient interactions. The practitioner may choose not to routinely screen all patients with a formal instrument. However, appropriate education and early activation of *all* patients with mechanical low back pain may prevent chronic disability in those who are susceptible. Patients who do display yellow flags may benefit from more focused attention.

Weiser and Rossignol (2006) define the acute, subacute, and chronic phases of low back pain as up to four weeks from onset, 4 to 12 weeks, and more than 12 weeks, respectively.

ACUTE phase of care (for all patients with or without yellow flags), 0–4 weeks

Educate

- Reassure the patient that the condition is not serious and explain the generally favorable history of low back pain. Patients, however, should also be advised about the potential for recurrences which, too, are manageable.

- Communicate and re-enforce a positive expectation that the patient will return to work and normal activities of daily living.

> **Clinical tip:** These messages must not be limited to just the first visit or report of findings. They should be part of *every* office visit.

- Consider providing written educational materials. Several studies support the use of an educational booklet explaining the nature of mechanical low back pain in reducing length of convalescence.[1] Patients are more willing to comply with treatment recommendations and advice to remain active when they understand that, for example, severe pain does not necessarily equate with a serious condition.

[1] e.g., Burton AK, Waddell G, Tillotson KM, Summerton N. Information and advice to patients with back pain can have a positive effect: A randomized controlled trial of a novel education booklet in primary care. Spine, 1999. Dec 1;24(23):2484-91.

- Avoid needlessly attaching disease labels, especially when there is some doubt as to their significance or appropriateness (e.g., degenerative joint disease, osteoarthritis, fibromyalgia). Weiser and Rossignol (2006) found moderate evidence in the acute phase that assigning a medical label to patients without red flags increases the risk of chronicity. In some cases, however, practitioners may need to explain and contextualize the use of these labels if the patient has already been to another provider or if co-treating with another practitioner.

Avoid "over assessment"
- Refrain from ordering imaging or other studies without clear clinical indications.

Emphasize function
- Prescribe specifically stated frequency and duration of treatment with clearly defined functional (e.g., PSFS) rather than merely symptomatic goals (i.e., pain scales) and identify a time frame for end of care (e.g., "I expect recovery in 4-6 weeks.").
- Utilize patient perceived pain and disability (self-assessment) instruments to establish baseline outcome measures (OPS/VAS, PSFS, Oswestry, Roland Morris, etc.)

Re-activate
- Avoid or minimize bed rest. Brief bed rest periods can be appropriate if helpful for pain control, but bed rest is not a treatment for back pain and may actually prolong recovery.
- Recommend light-duty work if at all possible rather than temporary total disability and identify functional and time-dependent goals for return to full employment duties.
- Encourage normal activities to tolerance.
- Instruct patient in spine–sparing strategies (e.g., hip hinge, abdominal bracing) to enable patient with normal activities.
- Reassure the patient that some discomfort during activities is normal and does not indicate that they are re-injuring themselves.

> **Clinical Tip:** Phrases such as "hurt does not equal harm" when explained in a manner appropriate to the patient can be reassuring and can encourage early activation.

- Assess whether a formal in-home exercise program is appropriate. (See discussion on page 10.) If so, exercises should be specific to the individual's needs and within the patient's functional limitations.

SUBACUTE phase (for all patients with or without yellow flags), 4–12 weeks

If not done already, re-assess patients who do not achieve clinically meaningful improvement (CMI) by week 4 (e.g., approximately 30% improvement on self-assessment instruments) (Ostelo, Deyo, Stratford, Waddell et al, Spine, Jan. 2008). There may be cases where patients may need to be assessed even sooner if their response falls far below expectation.

A broad strategy would include

1) reevaluate for a missed clinical diagnosis (e.g., re-exam, possible x-rays);
2) assess patient compliance with the treatment program including biomechanical instruction/spine sparing strategies and compliance with home exercise program;
3) start the patient on a formal exercise program if one has not been already been prescribed;
4) explore potential barriers to recovery (including clinical, psychosocial, and work-related factors);
5) consider a formal assessment for the presence of yellow flags.

Sample Yellow Flag Screening Checklist

□ **Non Organic Signs.** Does the patient display non organic signs? (assess by direct observation or check for Waddell's signs)?*

□ **Fear Avoidance.** Does the patient demonstrate fear avoidance behaviors (assess by direct observation or FABQ)?*

□ **Catastrophizing:** Does the patient demonstrate catastrophizing behavior (assess by direct observation or a questionnaire such as the Pain Catastrophizing Scale)?*

□ **Depression:** Does the patient appear clinically depressed or demonstrate psychiatric co-morbidities (assess by observation or based on health history)*

□ **Return to Work Perception:** Assess the patient's job satisfaction with and whether they anticipate being able to go back to work.*

□ **Sense of Health Status:** Assess the patient's sense of their own health status* and whether they think they are likely to get better.

□ **Sleep Quality:** Assess the patient's quality of sleep (e.g., wake up feeling rested?).

□ **Functional impairment:** Does the patient have high functional impairment? (Consider administering the Roland Morris or Oswestry questionnaire to quantify.)

A review of 9 different screening instruments demonstrated that work status was best predicted by fear-avoidance beliefs about work and the patient's sense of the likelihood of be able to return to work; functional limitations were best predicted by fear avoidance behaviors and poor sleep; and pain was best predicted by initial baseline pain intensity, pain duration, and coping strategies. Depression and poor function were predictive of all three outcomes. (Nicolas & Linton 2011)

If yellow flags are present

Liebensen (2007) advises, "Those with 'yellow flags' should be more aggressively managed as early as possible." One study reported that the combination of education about pain, reassurances, gradual return to previously avoided activities and a home exercise program achieved better outcomes than a placebo intervention. (Nicholas & Linton 2011)

- Further management should place a greater emphasis on activity, reassurance, and focus on function compared to more routine cases.
- Continue to shift the focus from pain to function and identify targeted activities that are important to the patient (e.g., outcomes should focus on items identified by the patient on the PSFS rather than the oral pain scale). (Nicholas 2011) Instead of asking "how much do you hurt?" ask "what have you been doing?"
- It is recommended that even greater emphasis be placed on exploring patients beliefs about their pain and back condition, referring to these beliefs when explanations are given, and carefully checking to see if they understand. (Nicholas 2011)
- Consider referral for psychological evaluation and possible co-management by behavioral/cognitive therapist. Studies which included a psychologist or equivalent to

* Or, instead, consider administering a global questionnaire such as the New Zealand Questionnaire (see appendix).

address psychological risk factors tended to report better outcomes than those which relied on the treating practitioner. (Nicholas & Linton 2011)

> **Clinical tip:** Some patients may be resistant to this idea. One approach is to frame the referral in terms of *managing the stress* related to their musculoskeletal complaint.

- Begin to decrease and de-emphasize passive treatments, consider implementing a formal, more intensive exercise program. Despite understanding and agreeing to participate in a physical rehabilitation approach to care, some patients may show a consistent pattern of noncompliance with active care recommendations and an overreliance on passive therapy.

> **Clinical tip:** One strategy for enhancing a patient's resolve to actively pursue self-care is to make further care contingent on reaching specific, obtainable exercise goals. For example, a patient could be instructed to "Call for an appointment when you are able to perform 20 repetitive sit-ups, 20 squat and rise repetitions and 24 repetitions of the quadruped track." Or "Practice the exercises on this log sheet and come back to the clinic when you have practiced them every day for two weeks. Fill in the log sheet each day and bring it with you when you return and then we can help you by giving you more challenging exercises."

> **Clinical tip:** Compliance can be enhanced by providing clear and simple written descriptions of exercises, activities and goals. A calendar or log sheet can serve as a useful reminder. Completing an exercise log sheet can help susceptible people gain a sense of accomplishment and goal completion.

CHRONIC phase, > 12 weeks

There is strong evidence that the risk of permanent disability increases at three months (Weiser and Rossignol 2006). To some degree, such disability appears to be related to psychosocial factors. Research indicates the necessity of a multidisciplinary program at this point.

Discussion/ Rationale

The above recommendations on screening and management in the various phases of low back pain are based on a number of studies.

Poitras et al. in a 2008 report on the CLIP project, a clinical practice model for the management of low back pain in primary care, posed the question "What actions should be taken by primary care providers when an adult presents with LBP in the acute, subacute or persistent stages of the condition, in order to prevent or manage persistent disability?" Recommendations included assessing the patient's perceived disability and the probability of a return to usual activities in the fourth week if back pain related disability persists. The authors stated that the prognosis was progressively less favorable not only in relation to the duration of back pain but also for the level of perceived disability. If the probability of returning to usual activities is deemed low, the clinician should seek to identify barriers preventing the return to usual activities. These barriers (certain clinical, psychosocial, and work–related factors) were seen to be interrelated so that, when improvement in one area was obtained, improvements in other areas resulted. There is an emphasis on patient perceived disability as this has been demonstrated in the literature to be related to the barriers influencing return to usual activities. A perceived disability questionnaire

is recommended to be used at four week intervals. Also recommended for the subacute and chronic phases is a decrease in symptom–based treatment.

Reactivation

Liebenson states, "There is a growing body of evidence that it is more cost effective to prevent chronicity in those at risk for it rather than waiting to treat only those in whom it becomes fully apparent." (Liebenson 2007) Numerous studies have demonstrated the benefits of early activation in acute low back pain. Bed rest has been shown to prolong an episode (Dahm 2010, Cochrane Collaboration). Early activation can be appropriate even for patients with sciatica, although, interestingly, there appeared to be no disadvantage to bed rest compared with advice for continuing with normal activities in that patient population. (Dahm 2010) In at least one study, advice to continue ordinary activities as tolerated was superior to either bed rest or back–mobilizing exercises (Malmivaara 1995).

Written material

The best method for communicating this information to the patient remains unclear. Some studies have suggested that patient satisfaction and functional outcomes can be improved in the period immediately after the initial consultation when providers give simple advice to remain active together with the same information provided in written format. However, one study reported that while either a self-management booklet or verbal advice to do exercises for back pain was effective, providing advice in both forms was counterproductive (Little 2001). If written material is given to the patient, the content itself matters. Burton, Waddell, et al compared an educational booklet developed from evidence–based information and advice consistent with current clinical guidelines to a traditional booklet explaining biomedical concepts of spinal anatomy and injury with advice to avoid painful activities. Measured outcomes included patients' perceptions of pain, disability, fear avoidance beliefs about activities, and beliefs about the inevitable consequences of back trouble. There was no difference in reported pain at one year between the two booklets, but the group given the experimental booklet not only showed meaningful improvement on self–reported disability, but also demonstrated significantly greater improvement in their beliefs which was maintained at one year. (Burton 1999).

Exercise

With respect to exercise for uncomplicated acute low back pain, some published studies suggest that exercise is no better than usual care by a general practitioner (Faas 1993). The Cochrane Collaboration systematic review (van Tulder 2000) found strong evidence that exercise therapy was no more effective than inactive treatment during the acute phase of mechanical low back pain and concluded, "Exercise therapy appears to be slightly effective at decreasing pain and improving function in adults with chronic low-back pain, particularly in healthcare populations. In subacute low-back pain there is some evidence that a graded activity program improves absenteeism outcomes, though evidence for other types of exercise is unclear. In acute low-back pain, exercise therapy is as effective as either no treatment or other conservative treatments. (Hayden 2009)." Liebenson, on the other hand, points out that it is necessary to customize exercise to the unique functional needs of each patient to enhance outcomes. This was demonstrated in a 2004 study which used the Mackenzie approach to prescribe exercises according to each patient's directional preference (Long 2004). Other studies have also shown that individuals prescribed specific exercises do significantly better than others prescribed a general exercise program. (Erhard 1994, Fritz 2003). A 2010 Cochrane review also suggested that there is moderate quality evidence that exercise programs can prevent

recurrences of low back pain. (Koes 2010) For patients whose condition does not resolve with 4 weeks of care or who have already had symptoms for 4 weeks or longer, a formal exercise program should be implemented. For patients with simple, uncomplicated low back pain, any role of exercise prescription in the acute phase is left to the discretion of the practitioner.

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Appendix I: Waddell's (Nonorganic/Pain Behavioral) Signs

The presence of nonorganic signs or symptoms can suggest 1) the possibility of a poorer treatment response and 2) a change in emphasis in treatment approach. It is more controversial as to whether they are associated with significant psychological distress and abnormal illness behavior (either with or without a clinically significant underlying physical pathology or dysfunction).

The presence of three out of five of these signs is significantly correlated with disability* (Waddell 1980). The presence of only one or two of these *non*organic signs can be consistent with some organic diseases** or biomechanical dysfunction and further investigation may be warranted. It is believed that three or more signs are considered necessary to draw a clinical conclusion about pain behavior suggesting a poorer prognosis. The presence of nonorganic signs, on their own, should not be misinterpreted as faking or malingering, or used as a justification to refuse adequate or appropriate treatment**.** (Main 1998) However, relative to prognosis, Gaines (1999) observed that the presence of *even one* of Waddell's signs in patients with low back pain correlated with a fourfold increase in return to work delay. Fishbain in a 2003 structured evidenced based review concluded that the signs did not correlate well with psychological distress nor discriminated organic from nonorganic problems. There was consistent evidence that the signs were associated with poorer nonsurgical outcomes, greater functional impairment, and greater levels of pain.

According to Waddell, these signs cannot be reliably interpreted (regardless of the number which might be present) in patients with suspected serious pathology or widespread neurological conditions, patients over 60, and patients whose ethnicity might be associated with completely different cultural expressions of pain. (Waddell 2004)

There are four signs that are evaluated. Three of the four signs include two separate tests. If either of the two tests is positive, a positive sign is reported. The final score is documented as the total number of positive signs over four (e.g., 2/4). Wernecke et al. (1993) found that these behavioral signs could be improved by a physical rehabilitation program.

The signs are:

1) **Superficial or nonanatomic tenderness**.

- Superficial tenderness is defined as widespread sensitivity to light touch of the skin over the lumbar spine. This is evaluated by applying light touch over the lumbar skin in a manner that should NOT normally provoke pain.

- Non-anatomic is defined as tenderness to deep palpation over a wide area or not localized to one structure. Bone tenderness over a wide area, often extending to the thoracic spine, sacrum, or pelvis. This is characterized by a non-anatomical, wide area of pain, not localized to one structure or anatomical region, or inconsistent with a typical pain distribution due to an injury. The deep tenderness can extend from the occiput to the coccyx.

* Disability relates to the effects on the patient's work and activities of daily living. Disability *ratings* are very formal, medicolegal assessments that must be done by certified practitioners. Waddell's signs have been correlated with patient's disability in the general sense of the word, but they are not used in the formal rating system.

** Individual nonorganic findings could be accounted for by a true organic disease processes. Organic diseases are usually associated with a pathoanatomical lesion, such as infection, inflammatory disorders, cancers, degenerative disorders etc. For example, superficial or widespread sensitivity could be due to combined regional disease or primary fibromyalgia; significant symmetrical decrease in cervical rotation may be secondary to advanced cervical degeneration.

2) **Simulated pain provoking procedures.**

- **Axial compression (standing patient).** The patient is standing and light axial compression is applied to the top of the head resulting in exacerbation of low back pain. A modification is to apply the pressure to the shoulders to avoid cervical spine symptoms.

- *En block* **rotation**. The practitioner holds the patient's forearms against the sides of the patient's body while slowly rotating him/her to the left and right. The shoulders and pelvis move together ("en block") so that there is no actual spinal rotation. Nonetheless, the patient complains that the maneuver exacerbates the low back pain. Note: this maneuver *may* reasonably cause pain in patients with nerve root lesions.

3) **Distractions.**

Distracting the patient's attention with one test while another is performed. For example, the straight leg raise is performed both supine and sitting. The practitioner straightens the leg ostensibly to perform another procedure (e.g., Babinski or palpation of the dorsal pedal pulse), distracting the patient from the true purpose of the test. A difference of more than 40 degrees between the supine and "distracted" seated straight leg raising tests is significant. This finding is sometimes referred to as a positive "flip" sign as the patient is "flipped" from supine to sitting (or vise versa). Or the supine SLR causes pain but the patient can sit up with legs straight on the adjusting table with much more hip flexion (> 40 degrees difference). Additionally, simple observation may reveal that the patient has more range of motion and can perform a variety of activities relatively pain free while the same loads were painful when scrutinized during the physical exam.

4) **Regional disturbances.**

Symptoms involving a widespread region of neighboring parts such as the entire leg, or quarter or half the body.

- **Non-anatomic or non-myotomal weakness**. Motor disturbances that are not neurologically correlated. Examples include (but are not limited to) breakaway (giveway) weakness, multiple weakness in an extremity (rule out pain-induced vs. fear-induced weakness), and cogwheel or ratchet-like weakness.

- **Non-anatomic or non-dermatomal sensation**. Global or patchy altered sensory findings inconsistent with sensory nerve pathways or other pathophysiologic cause (e.g., peripheral neuropathy).

A Word on Overreaction.

Inappropriate overreaction in response to specific physical exam procedures was cited as part of Waddell's original signs, but he has since abandoned this observation as part of the physical examination because of observer bias and unreliability. In place, certain specific pain behaviors can be observed, most significantly, *during the patient history*. These behaviors include guarding, limping, rubbing the affected area for more than 3 seconds, grasping affected area for more than 3 seconds, grimacing, or sighing are all signs of illness behavior. (Waddell 2004)

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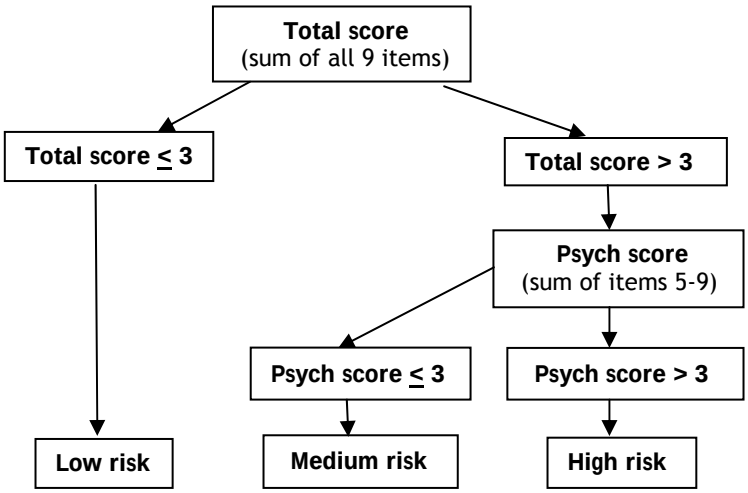
Appendix II: The STarT Back Screening Tool & Scoring System



Thinking about the **last 2 weeks**, check your response to the following questions:	**Disagree = 0**	**Agree = 1**
1. My back pain has **spread down my leg(s)** in the last 2 weeks.		
2. I have had pain in the **shoulder** or **neck** at some time in the last 2 weeks.		
3. I have only **walked short distances** because of my back pain.		
4. In the last 2 weeks, I have **dressed more slowly** than usual because of back pain.		
5. It's not really safe for a person with a condition like mine to be physically active.		
6. **Worrying thoughts** have been going through my mind a lot of the time.		
7. I feel that **my back pain is terrible** and **it's never going to get any better.**		
8. In general, I have **not enjoyed** all the things I used to enjoy.		

9. Overall, how **bothersome** has your back pain been in the **last 2 weeks**? (check one)				
Not at all = 0	Slightly = 0	Moderately = 0	Very much = 1	Extremely = 1

Total Score Result:	**Psych Subtotal (Items 5-9):**	**Risk Category:**

Appendix III: Acute Low Back Pain Screening Questionnaire

Name _____ **Chart #** _____ **Date of Birth** _____

Intern _____ **Clinician** _____ **Date** _____

Occupation _____ **Sex** ☐ Male ☐ Female

These questions and statements apply if you have aches or pains, such as back, shoulder or neck pain. Please read and answer each question carefully. Do not take too long to answer the questions. However, it is important that you answer every question. There is always a response for your particular situation.

1. Where do you have pain? Check each appropriate box. ☐ neck ☐ shoulders ☐ upper back ☐ lower back ☐ leg	
2. How many days of work have you missed because of pain during the past 18 months? Check one. ☐ 0 days [1] ☐ 1-2 days [2] ☐ 3-7 days [3] ☐ 8-14 days [4 ☐ 15-30 days [5] ☐ 1 month [6] ☐ 2 months [7] ☐ 3-6 months [8] ☐ 6-12 months [9] ☐ over 1 year [10]	
3. How long have you had your current pain problem? Check one. ☐ 0 days [1] ☐ 1-2 days [2] ☐ 3-7 days [3] ☐ 8-14 days [4 ☐ 15-30 days [5] ☐ 1 month [6] ☐ 2 months [7] ☐ 3-6 months [8] ☐ 6-12 months [9] ☐ over 1 year [10]	
4. Is your work heavy or monotonous? Circle the best choice. ◄ 1 2 3 4 5 6 7 8 9 10 ► *Not at all* *Extremely*	
5. How would you rate the pain you have had during the past week? Circle one. ◄ 1 2 3 4 5 6 7 8 9 10 ► *No pain* *Pain as bad as it could be*	
6. In the past 3 months, on average, how bad was your pain? Circle one. ◄ 1 2 3 4 5 6 7 8 9 10 ► *No pain* *Pain as bad as it could be*	
7. How often would you say that you have experienced pain episodes, on average, during the past 3 months? Circle one. ◄ 1 2 3 4 5 6 7 8 9 10 ► *Never* *Always*	
8. Based on all the things you do to cope, or deal with your pain, on an average day, how much are you able to decrease it? Circle one. ◄ 1 2 3 4 5 6 7 8 9 10 ► *Can't decrease* *Can decrease it completely*	10 - x
9. How tense or anxious have you felt in the past week? Circle one. ◄ 1 2 3 4 5 6 7 8 9 10 ► *Absolutely calm and relaxed* *As tense as I've ever felt it*	
10. How much have you been bothered by feeling depressed in the past week? Circle one. ◄ 1 2 3 4 5 6 7 8 9 10 ► *Not at all* *Extremely*	
11. In your view, how large is the risk that your current pain may become persistent? Circle one. ◄ 1 2 3 4 5 6 7 8 9 10 ► *No risk* *Very large risk*	

CONTINUED ON NEXT PAGE…

12. In your estimation, what are the chances that you will be working in 6 months? Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *No chance* *Very large chance*	10 - x
13. If you take into consideration your work routines, management, salary, promotion possibilities and work mates, how satisfied are you with your job? Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Not at all satisfied* *Completely satisfied*	10 - x
Here are some of the things which other people have told us about their back pain. For each statement, please circle one number from 0 to 10 to say how much physical activities (such as bending, lifting, walking or driving) would affect your back.	…
14. Physical activities make my pain worse. Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Completely disagree* *Completely agree*	
15. An increase in pain is an indication that I should stop what I am doing until the pain decreases. Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Completely disagree* *Completely agree*	
16. I should not do my normal work with my present pain. Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Completely disagree* *Completely agree*	
Here is a list of five activities. Please circle the one number that best describes your current ability to participate in each of these activities.	…
17. I can do light work for an hour. Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Can't do it because of pain problem* *Can do it without pain being a problem*	10 - x
18. I can walk for an hour. Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Can't do it because of pain problem* *Can do it without pain being a problem*	10 - x
19. I can do ordinary household chores. Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Can't do it because of pain problem* *Can do it without pain being a problem*	10 - x
20. I can go shopping. Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Can't do it because of pain problem* *Can do it without pain being a problem*	10 - x
21. I can sleep at night. Circle one. ⮜ 1 2 3 4 5 6 7 8 9 10 ⮞ *Can't do it because of pain problem* *Can do it without pain being a problem*	10 - x
SUM	

Acute Low Back Pain Screening Questionnaire — to Predict Risk Of Long-Term Work Loss
(Linton & Halldén, 1996)

Scoring Instructions – Acute Pain Screening Questionnaire

>> For question 1, count the number of pain sites and multiply by 2.

>> For questions 3, 4, 5, 6, 7, 9, 10, 11, 14, 15 and 16 the score is the number that has been ticked or circled.

>> For questions 8, 12, 13, 17, 18, 19, 20 and 21 the score is 10 minus the number that has been ticked or circled.

>> Write the score in the shaded box beside each item – questions 1 to 21.

>> Add them up, and write the sum in the box provided – this is the total score.

Note: The scoring method is built into the questionnaire.

Interpretation of Scores – Acute Pain Screening Questionnaire

QUESTIONNAIRE SCORES GREATER THAN 105 INDICATE THAT THE PATIENT IS AT RISK.

This score produces:

>> 75% correct identification of those not needing modification to ongoing management.

>> 86% correct identification of those who will have between 1 and 30 days off work.

>> 83% correct identification of those who will have more than 30 days off work.