

Toward a cost - effective approach to acute low back pain

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This discussion consists of two main components. The first deals with the pertinent aspects of the emergency management of acute low back pain (LBP), the second most common symptom resulting in physician visits. Evidence has shown that standard diagnostic and treatment protocols of sorts do exist and are cost-effective in managing acute LBP. However, this report emphasizes the lack of consistency that exists among physicians in the investigative approach, diagnosis/classification, and treatment of activity-related acute LBP. The discussion substantiates the need for the *standardization* of such. To this end, in the second component of this discussion, a plausible small scale solution has been proposed in the form of a Multidisciplinary Back Clinic.

Acute LBP has been reported as the second leading symptom resulting in physician visits (1). At the Victoria General Hospital (VGH) emergency department in Halifax, NS (600+ beds), there were approximately 340 diagnoses of lumbar strain/sprain or backache (unspecified) over a 3 month interval (1 Jan 1995 - 31 March 1995). With this number corresponding to about three to four presentations per day, it is unlikely that an emergency physician would complete a shift without having to manage such a presentation. Even after a thorough history and physical examination, the physician may be resolved to the broad and unfortunate diagnosis of "mechanical back pain" where up to 85% lack a pathoanatomic cause (2). The literature on acute LBP may frustrate the physician because of the lack of standardization. For example, the literature is replete with various diagnostic terms: lumbar strain/sprain, lumbago, sciatica, discal hernia, discopathy, facet syndrome, lumbar myositis, ligamentitis, fibromyositis, fibrositis, fasciitis, myofasciitis, articular hypo/hypermobility, discarthrosis, and posterior branch syndrome.

Many patients exhibit pain severe

enough to warrant a prescription for work absence. However, the diagnostic approach, investigations performed, and length of prescribed work absence is inconsistent among emergency physicians. A recent sample of US emergency physicians showed poor performance in conforming to recommended guidelines (1). For example, over 1/3 of these emergency physicians would request an MRI (\$800+ Cdn.), and about 1/4 would request a CT scan (\$200+ Cdn.) for a patient presenting with acute LBP with sciatica of less than four days duration. According to the Quebec Task Force on Spinal Disorders (3), there is no scientific evidence for the use of these tests in this situation, at least until they have failed adequate conservative therapy and are considered surgical candidates on clinical grounds. Furthermore, for acute LBP without sciatica, bed rest would be prescribed by over 75% of these emergency physicians for a mean duration of 3.5 days; all of the latest literature clearly recommends a maximum of two days bed rest for this condition (3-6). In light of a very recent study by Malmivaara et al. (7), the recommendation of *any* bed rest may be questioned, since the control group (who continued ordinary activities) showed statistically significant better recovery than either bed rest or exercise groups.

With this magnitude of inconsistency among specialists, one can predict the diagnostic and therapeutic dilemma facing

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general practitioners (GPs) in this country - who bear the majority of the burden in managing LBP. Personal communication with Dr. Dobson, Administrator - Medical Service, Worker's Compensation Board (WCB), Nova Scotia, revealed that the WCB frequently receives claims for workers who have been prescribed at least three weeks work absence for acute LBP by their family physicians. Occasionally, patients receive two days off work from emergency physicians and then see their family doctor when it is time to return, receiving additional days or even weeks off.

Issues such as these provided the impetus for the following discussion which has two main components: (1) an address of the management of acute LBP presenting to the emergency department (2) the recommendation to establish a Multidisciplinary Back Clinic for the standardization of investigations, diagnosis, and management of activity-related acute mechanical back pain.

EMERGENCY ASPECTS

Obviously, the emergency physician's mandate when presented with a patient complaining of acute LBP (< 7 days) is to rule out serious and life-threatening disorders, to control pain and other associated symptoms, to diagnose if possible, and to obtain the appropriate consults when warranted. The various "combinations and permutations" as to how this can be achieved is beyond the scope of this discussion, which will focus on diagnosis of acute LBP and treatment of the most common problem, mechanical back pain.

HISTORY

The most effective tool in diagnosis is a complete history (6,8). The interview must contain a structured review of systems with particular attention given to any constitutional symptoms such as fever, chills, night sweats, weight loss. Other past medical diseases such as hypertension, coronary heart disease, angina, cancer, peptic ulcer disease, pancreatitis, pyelonephritis, and renal calculi may be significant to the patient's current presentation. It is prudent to maintain the differential diagnosis (Table 1) in mind while taking the history, to "hone in" when characteristic features present themselves. For example, patients over 60 or who chronically use steroids are at increased risk of osteopenia, compression fractures, and infection (9). A history of urinary tract or abdominal symptoms suggests visceral disease. Bowel or urinary incontinence and impotence are significant symptoms that may indicate central disc herniation, epidural abscess, epidural hemorrhage, or spinal cord tumour (10). Fever, weight loss, history of cancer or TB, and IV drug abuse are ominous clues that may indicate serious illness such as osteomyelitis or bony metastases (9,11).

The most useful information may come from a complete history of the onset, duration, character, location,

Table 1: Differential Diagnosis of LBP (2)

Neoplasms

Benign bone and neural tumors: Meningioma, neurofibroma, ependymoma, osteoid osteoma, hemangioma, osteoblastoma

Malignant bone and neural tumors: Multiple myeloma, osteosarcoma, chordoma, plus metastases from breast, lung, prostate, kidney, uterus, ovary, thyroid, colon

Trauma

compression fracture, fracture dislocation, transverse process fracture, facet subluxation, ligamentous tear, muscle strain

Congenital

facet asymmetry, transitional vertebrae, spondylolysis, spondylolisthesis

Degenerative

osteoarthritis of spine or hip, herniated disc, spinal stenosis, nerve root entrapment

Metabolic

osteoporosis, alcoholic and diabetic neuropathy, Paget's disease, gout, hyperthyroidism

Inflammatory

ankylosing spondylitis, arachnoiditis, rheumatoid arthritis

Infections

TB, epidural/subdural abscess, disc space infection, osteomyelitis, syphilis, herpes zoster, meningitis, bacterial endocarditis, UTI, paraspinal muscle abscess

Vascular Disorders

aortic aneurysm, A-V malformation, aortoiliac arteriosclerosis

Psychosocial

depression, conversion reaction, malingering, narcotic addiction

Miscellaneous

visceral inflammation (eg. pancreatitis, pyelonephritis, cholecystitis, penetrating peptic ulcer), renal calculi, endometriosis, prostate disease, scoliosis, lymphoma, hernia, leg length inequality, sick cell anemia

and radiation of the patient's back pain. It should focus the differential and allow the presentation to be placed into one of the general diagnostic categories (Table 1). Pain of sudden onset and short duration (in the absence of any visceral signs or trauma) is frequently associated with facet joint disorders, whereas pain that gradually increases over weeks more often involves the discs. Facet or disc pain tends to be more severe in the back, buttocks, or posterior thigh, whereas pain from inflamed nerve roots radiates below the knee (12). Radicular pain associated with paraesthesia or loss of sensation down the posterior or lateral leg is strongly indicative of nerve root compression by herniated disc, tumour, abscess, or spondylolisthesis (12).

Factors that aggravate or alleviate pain should also help in diagnosis. It has been proposed that nonmechanical pain is generally continuous and not made worse by exercise; mechanical pain is usually worse with movement and relieved by rest (9). It has long been believed that pain aggravated by back extension is due to facet or ligamentous disease (13). Pain of a bulging or herniated disc is usually made worse by bending, rotation, coughing, or sneezing (9). Pain that is present even when the patient is immobile and that

cannot be relieved by any position should alert the physician to look for a more serious disorder (e.g. abdominal aneurysm, perforated viscus, tumour or infection of the spine). Patients < 40 with gradual onset back pain lasting more than 3 months, with morning stiffness that is relieved by exercise, may be presenting with ankylosing spondylitis (4,6,9).

PHYSICAL EXAM

The relatively old yet valuable article by Hall (13) suggests a logical approach to the physical exam for LBP (Fig. 1). His classification of back pain is teachable and clinically applicable: pain can arise from the musculoskeletal system (paraspinal ligaments and muscles, facet joints and capsules, body of vertebrae, annuli of discs), central nervous system (neural tumours, arachnoiditis, infection, herniated nucleus pulposis, bony osteophytes impinging on nerve root), or, it may be referred (hip joints, viscera). The full physical exam covers parts of the musculoskeletal system (MSS), central nervous system (CNS), and common sources of referred back pain and involves numerous examining positions (Table 2). The first question to be answered is (Fig. 1): Is the pain referred from another area? The previously taken history will help to expose the culprit system. An examination of the abdomen, costovertebral

Table 2: Assessment of Back Pain (After Ref. 13)

Position	MSS	CNS	Referred
standing	range of back movement	plantar flexor power	
kneeling sitting		ankle reflex dorsiflexor power	
bending over bed sitting on bed lying supine	palpation	knee reflex straight leg raising, power, sensory	abdominal exam, CVS
lying on rt.	left hip	abductor power	
lying on left lying prone		rt. hip abd. power femoral stretch test, saddle anesthesia, gluteus max. tone	rectal exam

angles, vascular status, pelvis (especially in women) and rectum should provide confidence that there is no significant visceral pathology. If there is significant pathology, further investigations may be necessary (e.g. intravenous pyelogram, ultrasound, abdominal series, etc.) and consultation obtained. After excluding visceral pathology, the exam focuses on the MSS and CNS.

Pain arising solely from CNS is rare and implies diagnoses of cord tumour, abscess, or meningeal infection, all of which require further investigation (eg. CT scan, MRI, myelography, lumbar puncture) and referral.

The majority of patients will have symptoms from the MSS. As mentioned, pain worsened by flexion probably arises from intervertebral discs, whereas pain worse on extension is likely from posterior elements. If discogenic pain is probable, the next logical step is to determine whether nerve root irritation exists by tests such as straight leg raising (95% sensitive; 8) and direct popliteal pressure. Eliciting "cross over" pain is indicative of central disc herniation. If discogenic pain with signs of nerve root irritation exist, the most common sites involved (95%) are L4-L5 or L5-S1. The rest of the exam then focuses on neurologic tests at these levels (Table 3).

Fortunately, serious disease is relatively rare in those presenting with acute LBP. The physician must still, however, recognize those few yet emergent cases such as spinal fracture/dislocation/subluxation, aortic aneurysm / dissecting aneurysm, cauda equina syndrome (saddle anaesthesia, incontinence, bilateral lower extremity motor deficits; 8), acute pancreatitis, perforated viscus, and osteomyelitis. Unfortunately for the diagnostician, after completing the history and physical the majority of patients will fall into the ambiguous category of musculoskeletal or mechanical back pain. Frank (4) contends that the diagnosis of nonspecific low back pain should be made not by exclusion, but rather on positive grounds. This may avoid unnecessary and

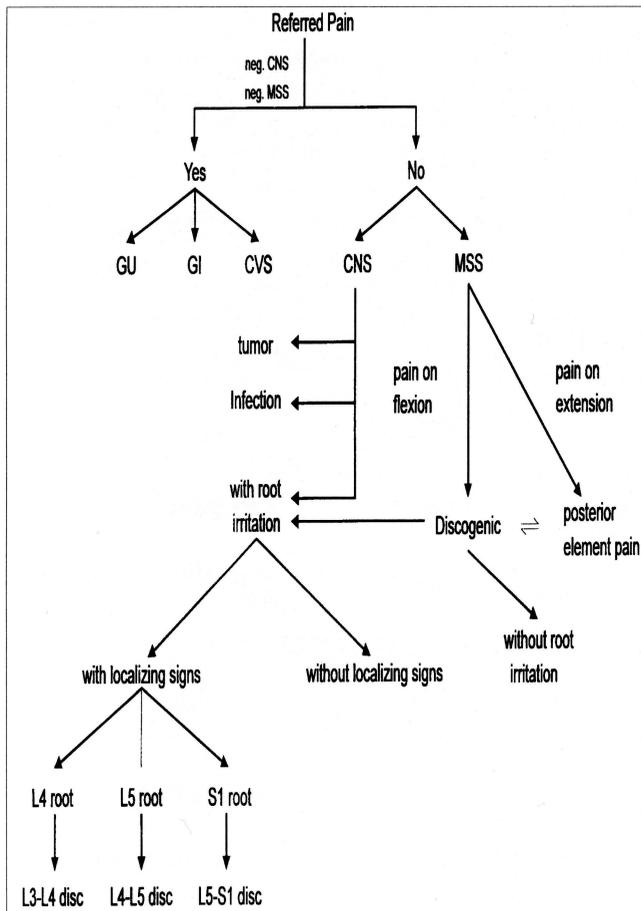


Figure 1: Logical Approach To Physical Exam (After Ref. 13).

costly investigations.

Table 3: Commonly Affected Nerve Roots (13)

Lumbar 4	Power:	quadriceps
	Sensation:	medial calf
	Reflexes:	knee reflex
Lumbar 5	Power:	foot dorsiflexor hip abductors
	Sensation:	lateral calf hallucis
	Reflexes:	hamstrings
Sacral 1	Power:	foot plantar flexors, gluteus maximus
	Sensation:	5th toe
	Reflexes:	ankle reflex

TESTS AND INVESTIGATIONS

Fortunately, most of the evaluation thus far requires no lab or radiologic tests. In fact, most feel that in the majority of patients with acute LBP, the physician can exclude serious underlying systemic illness, exclude the need for surgery, and make useful therapeutic decisions based on history and physical alone (3,8). Laboratory tests may be useful in those cases where underlying visceral pathology is suggested by history and physical. Useful tests include: CBC with differential, urinalysis, ESR, C-reactive protein, serum amylase, bilirubin, and alkaline phosphatase; these will aid in the diagnosis of diseases such as pancreatitis, cholecystitis, pyelonephritis, perforated viscus, osteomyelitis, and systemic illnesses such as infection or neoplasm (2,6). Some believe that the judicious use of ESR may be more useful than spinal X-ray (9).

For the vast majority of patients with the presumptive diagnosis of "mechanical" LBP, guidelines for investigative tests have been published by the Quebec Task Force (3) yet have not been followed (14). The Task Force extensively reviewed the literature up to 1987 and published matrices of diagnostic evaluations based on the scientific validity of each test. They found that "a history and physical alone are usually sufficient to identify the majority of patients for whom a specific therapy is required...diagnostic radiology is of limited value in the first evaluation of the majority of spinal disorders". Although the Quebec study (3) was published in 1987 and may be argued by some to be well outdated, this review of the literature has revealed that little has changed with regards to the recommendations for diagnostic investigations. In fact, the guidelines used as "standard" in the 1994 study on physician variation in diagnostic testing for low back pain by Cherkin *et al.* (14) were, indeed, those of the Quebec Study. Cherkin *et al.* concluded that "there is little consensus, either within or among specialties, on the use of diagnostic tests for patients with LBP. Many physicians are order-

Table 4: Criteria for use of Lumbar X-rays

- (1) age > 50
- (2) significant trauma
- (3) neuromotor deficits
- (4) suspicion of ankylosing spondylitis
- (5) unexplained weight loss
- (6) drug or alcohol abuse
- (7) history of cancer
- (8) use of corticosteroids
- (9) fever
- (10) failure to improve with conservative therapy
- (11) seeking litigation

ing imaging studies too early and for patients who do not have the appropriate clinical indications". Emergency physicians are also guilty as shown by Elam *et al.* (1) who reported the widespread inappropriate use of diagnostic tests by US emergency room physicians (ERPs). The ERPs in this report were a subsection of the whole physician population studied by Cherkin *et al.* (14).

Lumbar X-rays are by far the most common diagnostic test used, albeit indiscriminately. In the US, nearly 7 million lumbar spine series are performed annually (15) and are the largest source of gonadal irradiation. A single lumbar spine series results in gonadal doses equivalent to > 2000 chest films (2). Furthermore, the yield of useful findings is low. Lumbar spine films are found to be normal or reveal "incidental findings" unrelated to the primary symptom in almost 80% of patients for whom they are ordered (15). Therefore, selective application of lumbar series is both clinically justifiable and cost-effective. Table 4 shows a consensus on the criteria for proper use of lumbar X-ray (2-4,6,8,10,16). Deyo (16) has also demonstrated that by using these criteria in primary care, the clinician would be unlikely to miss important radiologic findings and would substantially increase the yield. Furthermore, in his sample of 2000 walk-in patients with low back pain, every cancer patient would have received X-rays by application of the above criteria (17).

CT scanning and MRI have largely replaced myelography for diagnosing disc herniation and spinal stenosis. However, if the test is to influence management, then surgery must be considered a serious option before performing the test; that is, it should be limited to patients with *persisting* neurologic abnormalities despite adequate (7 weeks) conservative therapy (3,6,8). Radionuclide bone scanning is best used for detecting suspected malignancy or osteomyelitis because it is positive earlier in the course of these disorders (18). The sensitivity of CT scan for spinal stenosis and disc herniation is 95%; however, the specificity has been reported as low as 68% (19). Wiesel *et al.* found that 36% of an asymptomatic population had abnormal CT scan results, a percentage which increased with age - up to 50% in those over 40 (20). This is disturbing in light of the study published by Elam *et al.* (1) reporting the use

of MRI by 1/3 and CT scan by 1/4 of ERPs for patients with acute LBP with sciatica < 4 days.

TREATMENT

Indications for hospital admission or surgical intervention include (2): central disc herniation; cauda equina syndrome; muscle weakness that is progressive or fails to improve with conservative therapy; reflex loss or persistent disabling sciatica; unstable fractures; traumatic dislocations or subluxations; acute spinal trauma with neurologic deficits; spinal infection or meningitis; spinal cord tumours; acute pancreatitis; acute cholecystitis; penetrating peptic ulcer; perforated viscus; aortic aneurysm.

In the absence of the above, treatment prescribed by the emergency physician for acute "mechanical" back pain must be conservative and directed toward relieving symptoms, especially since most acute LBP is self-limited and settles within two weeks, 75% of workers will return to work within one month (3), and 90% return within three months (21). The Quebec Task Force has reviewed the scientific validity for the plethora of therapies now used for mechanical or activity-related low back pain (3). For acute LBP without sciatica, only bed rest < two days and 'back schools' have demonstrated usefulness by randomized controlled trials. Bed rest for > two days has proved useful for acute LBP with sciatica. Systemic antispasmodic drugs, systemic anti-inflammatories, and systemic analgesics have proved to be efficacious by non-randomized controlled trials. By following this evidence, VGH ERPs have found that for *severe* acute mechanical LBP, intravenous ketorolac tromethamine (30 mg) followed by discharge oral nonsteroidal anti-inflammatories (NSAIDs) provides excellent pain relief (Dr. John Ross, personal communication). All other existing therapies (of which there are too many to list) lack scientific evidence for use. The controversy over physiotherapy continues since, in a recent review of its effectiveness in patients with LBP, only 1 of 4 randomized controlled trials showed a positive effect of exercise therapy (22). Yet, it has been shown that patients with LBP continue to represent 25% of outpatient discharges from physical therapy clinics (23). Malmivaara et al. (7) would argue that, "among patients with acute low back pain, continuing ordinary activities within the limits permitted by the pain leads to more rapid recovery than either bed rest (two days) or back-mobilizing exercises". After three and 12 weeks, control patients reported statistically significant better recovery according to duration of pain, pain intensity, lumbar flexion, ability to work, Oswestry back-disability index, and number of days absent from work. Furthermore, recovery was reported to be slowest among bed rest patients.

With so few *proven* therapies available for acute mechanical LBP, why are so many different therapies still recommended by physicians? Do clinicians not realize

their responsibility to keep up with the literature? Perhaps there is a great tendency to ascribe clinical efficacy to a particular treatment modality when, in fact, patient improvement is due to the favorable natural history of most episodes. This statement must be qualified, however. Although most episodes of acute mechanical LBP do resolve relatively quickly, it affects mainly people in their most productive years so that the cost of LBP is staggering. According to the Quebec WCB (3), in 1981 the total compensation cost for spinal disorders (70% of which were lumbar region disorders) was \$150 million. This represented a disproportionate 28.5% of the *total* compensation costs for all injuries. Furthermore, 75% of the total compensation cost for spinal disorders was due to the 7.4% who were absent from work for > 6 months. Therefore, proper early management of acute LBP based on the latest conclusive scientific evidence is critical in reducing the likelihood of chronic symptoms, disability, and cost. For this reason and others (lack of standard clinical data obtained; lack of a standard classification of LBP; inconsistency among physicians regarding investigation protocols plus lack of adherence to existing guidelines; and lack of standardized diagnostic and treatment protocols), it is suggested that emergency and other primary care physicians, after fulfilling their mandate of ruling out serious disease and controlling symptoms, should rapidly refer activity-related acute LBP patients requiring time off to a Multidisciplinary Back Clinic experienced in practising literature-based medicine.

FUTURE DIRECTIONS

With a multidisciplinary back clinic, the greatest savings would undoubtedly be achieved in those injured at work and seeking compensation. Sander and Meyers (24) investigated the influence of compensation on recovery from work-related back pain in railroad workers. After matching for type of injury, the mean work loss after injury was 14.2 months for patients injured on the job versus 4.9 months for those injured off the job. Employee age, type of injury, and severity of injury were similar in the two groups. Since the Canada Health Act prohibits preferential medical treatment, any person with activity-related acute LBP (whether injured at work or otherwise) presenting to emergency rooms or local GPs should be referred to 'the clinic' for early assessment and proper treatment. In this manner, both the WCB and Provincial medical insurance boards would save money, while providing scientifically valid and efficient treatment. At the very least, what are now common anecdotes as described earlier by Dr. Dobson whereby workers receive three weeks or more off-work for acute activity-related mechanical LBP, or, where they receive two days off from emergency physicians then additional weeks off from their GPs, would become a rarity being necessary only in the most severe cases. Obviously, the clinic would not be endorsed by all physi-

cians. Many GPs may view the clinic as preventing them from doing their jobs. Yet, other GPs may revel at the opportunity to allow an outside, objective authority handle what often becomes a difficult situation: a family doctor attempting to promote early return to work in patients unwilling or unable to do so.

The mandate of the clinic would be to focus resources to maximize the number of workers returning to work early and to minimize the number whose LBP keeps them idle for prolonged periods, especially > 6 months. Since research shows that these workers are unlikely to ever return (3,10). This may be achieved by:

- (i) Educating patients and bringing them to the understanding that the goal of treatment is the return to maximal function (i.e. return to work) not necessarily to be "pain free". This will hopefully discourage the playing of the "passive recipient" role and encourage the patient to take responsibility for his/her own therapy.
- (ii) Gathering clinical data at all times in the clinical course of LBP in *standardized* format such as that proposed by the Quebec Study (3). This will allow proper follow-up evaluation and facilitate clear communication among allied health professionals.
- (iii) Developing a *standardized* classification scheme for LBP (such as that used by the Quebec Task Force (3)) which will enable the use of *standardized* diagnostic and treatment protocols based on scientific validity. The potential savings from the judicious use of diagnostic imaging studies alone would be enormous. For example, Schroth et al. (25) report a study assessing the utilization of diagnostic and therapeutic services for the management of acute LBP in a primary care setting. The conclusion was that 26% of plain lumbar X-rays, 60% of CT and MRI scans, and 82% of specialty referrals were inappropriate according to guidelines from the literature. Impressive evidence already exists in the literature for the efficacy of standardized diagnostic and treatment protocols. Wiesel et al. (26) applied standard diagnostic and treatment protocols to two groups of industrial workers: 5300 employees at PEPCO for two years and 14000 US Postal Service workers for one year. The results in both groups demonstrated significant and continuous reductions in the number of incidents, days lost from work, low back surgery, and financial cost. The number of LBP patients at PEPCO decreased 29% the first year and 44% the second; days lost from work decreased 51% the first year and by 89% the second; low back surgery dropped 88% and 76% respectively. The ten year outcome reported a cumulative saving of \$4.1 million (27). However, following standard treatment protocols

would not necessarily lead to success in all LBP patients. Since the disproportionate cost accrued by those few with long term disability is staggering, it would be prudent that the clinic identify potential treatment failures in order to focus resources toward aggressive, multidisciplinary intervention. The literature now indicates significant progress in the ability to predict clinical outcome in patients with LBP. In 1991, Burton and Tillotson (28) developed multivariable mathematical models which use information from the presenting clinical interview and results of clinical tests to identify discrete outcome groups at 1 month, 3 months, and 1 year. Nonrecovery and satisfactory improvement were predicted with 76% to 100% success rate. Use of such technology by Multidisciplinary Back Clinics would dramatically aid in reducing the prescription of inappropriate or unnecessary treatment as well as identifying the need for early, aggressive, multidisciplinary treatment protocols.

- (iv) The clinic would act as a liaison between patients and employers. While maintaining the best interests of the patients, the clinic would incorporate, where necessary, the use of valuable programs such as return to light duty, back schools, and work hardening to facilitate the return to work productivity.
- (v) Finally, the clinic would provide comprehensive standardized data to Provincial medical insurance boards and WCBs so that appropriate cost/benefit and cost/effectiveness analyses could be performed. After an adequate trial period, if the Provincial medical insurance board and WCB identify significant potential savings, then the clinic could possibly be expanded to manage other prevalent and disabling musculoskeletal disorders.

SUMMARY

Acute LBP is the second most common reason for physician visits. Serious disease is relatively rare and can be identified by a proper history and physical examination without the use of expensive and unnecessary diagnostic imaging studies. Most episodes of acute LBP are self-limited mechanical LBP which settles within two weeks. Therefore, treatment must be conservative. However, due to the lack of consistency among physicians regarding investigative approach, diagnosis/classification, and treatment of acute LBP (despite the existence of standard protocols in the literature), it is recommended that acute LBP

patients be rapidly referred to a Multidisciplinary Back Clinic experienced in practising literature-based medicine. Through multidisciplinary intervention, this would ensure proper early management of acute LBP, maximize the number returning to work early, and minimize the number whose LBP keeps them idle for > 6 months - who account for 75% of LBP costs.

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