EUR MED PHYS 2004;40:1-8

The low back pain puzzle today

S. NEGRINI

ISICO (Italian Scientific Spine Institute), Milan, Italy

Low back pain (LBP) is a classic topic for rehabilitation specialists, even if it could be considered a little bit outdated. Mainly because of the evolutions of the National Health Service (HNS), many of us in these years have concentrated on the development of Rehabilitation Departments and have consequently increased their skills in in patient treatment, directing most of their efforts towards patients with severe disabilities; in this situation, the outpatient work, including the big number of people queuing in front of our offices' doors because of a simple LBP, appeared less important. Nevertheless, those people are still there and they need the correct answer, even if the external context (presumably, mainly the way of payment) could change in the future, because of the low-level disability involved.

Not long ago some physicians used to say that all patients with LBP had to be visited by specialists to prevent the increase of the problem: now everything has changed and the behavior is the other way round. Many have the idea of wasting time because of patients that, in their view, should be treated by general practitioners (GPs) and it seems to be difficult even to recognize that there are at least some important patients in that group of people, *i.e.* really disabled persons because of LBP: according to epidemiology (and the first paper of this issue of Europa Medicophysica[1]), 3-4% of all Italians!

Looking at this situation as rehabilitation specialists, this is a paradox, in times in which LBP is more and more recognized by all scientists and experts as a bio-psycho-social problem,[2-5] *i.e.* an impairment-disability-handicap problem, to use old fashioned words,[6] or, to be up-to-date, a health condition characterized by impairment, limitation of activities and restriction of participation.[7] Who should have an arsenal better than a rehabilitation specialist to treat these patients, both on cultural and therapeutic side?

The aim of this editorial is to critically look at today's world of LBP and to give some suggestions, some pieces of the entire puzzle. Presumably, today nobody is able to complete the puzzle, but some of the many pieces, in our view the more interesting from a rehabilita-tive and a scientific viewpoint, will be presented here. We will start with the changes (some have already been described in this introduction) and then we will try to paint some of the biggest problems we are facing today, summarized as clinical dilemmas (-what we know we don't know, and makes us feel uncertain), therapeutic paradigms (how we behave to show some degree of certainty, even if we don't know, or because we presume to know, or because someone said that he knew and taught us a behavior) and different perspectives (sometimes looking at the problem from the side of the others is useful).

Changes

In these years everything has changed on LBP. Just to give an example, let's think about bed rest:

Address reprint requests to: S. Negrini, ISICO, Via Carlo Crivelli 20, 20122 Milano. E-mail: stefano.negrini@isico.it

simply, for years it has been considered the very first treatment, while now it is looked at as the worst enemy.[8-10]

New exams have been developed and prescribed; coherently, new diagnoses have been found and new therapies have accordingly been proposed and applied. But, with time, in most cases, we had to retreat, because we discovered that we were wrong: CT and MRI scans with disc herniation diagnosis are only one of the possible examples.[11-13]

We treated for years and we obtained an increase in costs and disability.[14, 15] Now it seems that the real treatment is not treating, but taking care.[14, 16-19]

No doubt that many things have changed about LBP, its evaluation and its treatment.

The clinical dilemmas

In these years science has changed our ideas on LBP and today clinicians know that the LBP puzzle has plenty of pieces marked as dilemmas.

The diagnostic dilemma

Since years we have been taught that LBP is simply a symptom and we cannot treat a symptom without a diagnosis! This is theoretically true, but the everyday reality in LBP is that diagnoses in the medical world are specialty specific (*i.e.* same specialists have the tendency to propose similar diagnoses and consequently similar therapies), while even inside each specialty they are physician specific (many times it seems that diagnoses are proposed according to the therapies and not vice versa): no way that diagnoses could be, as it should, patient specific.[20] This has a clear cut reason in the literature, where since years it is recognized that in as much as 80% to 90% of LBP patients it is not possible to propose with some certainty (not to speak of reliability) a single diagnosis.[2, 19, 21-29]

This situation has led to incommunicability in the therapeutic world and to confusion.[23] Results are even worse, if looked from patients' perspective: there are no problems if pain resolves in a few days (acute cases: usually only one treating therapist), while they arise and continuously grow up as pain continues, in more complicated cases, and becomes chronic. In this cases patients are seen by many different physicians (and not physicians), each one proposing his single diagnosis, giving his single therapy, obtaining at best his single short-time result, normally with long-time recurrence of pain. The patient then falls in a vicious circle that includes: the idea of having not been understood by anybody at best, or that the problem has no solution at worst; fear of the situation and of the problem; depression and anxiety; all this inevitably leads to an increase of pain, disability and social consequences. It seems, looked in this way, that the medical world in some cases does not reduce the problem, but even increases it! This is why it has been strongly proposed to avoid diagnostic labels [23, 25-27, 30] that do not reduce the problem, but the other way round!

The classification dilemma

If you look at a classic classification [31] you could find plenty of pathologies that could produce LBP. But these pathologies are thought to count only for a maximum of 10-15% of all cases.[22, 32, 33] When the Quebec Task Force [32] faced this problem in 1987, it developed a new classification that became a reference and, even if it was born to summarize the results of the literature, today it continues to be a clinically useful tool (mostly because not overcome by any other classification). But, as Donelson states in this issue of Europa Medicophysica,[34] classification is a crucial part of the approach to a pathological problem: without a classification or with a classification as the actual, that includes almost all cases in 3 categories, it is very difficult to derive significant conclusions from research. The proposal by Donelson and McKenzie [34-37] is interesting and there are some proves, but we need a wider consensus to proceed over.

The therapeutic dilemma

Everything and more! This was a slogan of the Italian RAI-TV, but it could be also the one of extraterrestrials coming down on Earth and looking for the very first time at the situation of therapies for LBP. A student facing this field is exactly in the same situation and if he has a little of critical sense (or common sense?) he turns back and drives his attention to other aspects of our specialty (and I presume that this could be one of the reasons why many specialists don't like to face LBP patients: because of the pathology, but also of the non-sense, at least scientifically speaking, of the undoubtedly too many therapeutic possibilities). All International Clinical Guidelines on LBP [16, 32, 38-41] list only some of

these multiple therapies: very few of them have any prove of efficacy, and only in some small categories of patients. Inevitably, things really do not go as proposed in all leaflets of all physical therapeutic modalities, from the oldest to the newest, but also in presentations of almost all kinesitherapic methods, manual therapies and so on: they propose to be the ultimate and definitive solution for LBP. Scientifically there are no data to support this hypothetical efficacy in all clinical situation,[16, 32, 38-41] while epidemiologically, after so many years the problem is still there, at least not changed, when not increased![14, 15]

Dilemmas: fantasy or scientificity?

The diagnostic dilemma has a provisional solution, *i.e.* not to propose a diagnosis and simply use that of LBP. The classification dilemma today has no definitive solutions. The therapeutic dilemma is crucial: we can answer to it with Italic fantasy or, according to the actual evidence, behaving scientifically (obviously with all personal interpretations of the evidence). It seems to me that this is the only answer on which it is possible to rely with confidence.

We will continue to have these dilemmas at least for many years, but research is going on and we have hope for the future. We also know that the tragedy of science is that it changes continuously as knowledge grows up. We have to act according to actual knowledge (that we need to know) and to wait for new useful answers.

The therapeutic paradigms

Even if there are dilemmas, as physicians we need to behave and give some answers to our patients. This means that we need to rely on something to propose therapies. Therapeutic paradigms are not the therapies in themselves, but the main ideas/concepts/background that drive a physician when he proposes a therapy. We can summarize almost all therapies in a small number of paradigms. But not all these pieces of the LBP puzzle are useful to reach a solution.

The symptomatic paradigm

If one is in pain and goes to the doctor, the first answer of the doctor is obviously trying to eliminate pain. Most therapies proposed to treat LBP have exactly this aim and follow this paradigm. The problem arises when pain is provoked by something that is not solved simply by eliminating the sensation. Anyway, this paradigm has scientific bases and answers.[42, 43]

The anatomical paradigm

Since we had our exam on anatomical pathology, we learned that all diseases have an anatomical background that, if solved, could give us a solution. Surgery is based on this paradigm: changing a piece, even replacing it, is for sure the top. Also acting with the hypothesis of eliminating problems of discs, facet joints, muscles, ligaments and so on, follows the same anatomical paradigm. Moreover, the same is true for aiming at restoring different muscular chains, re-equilibrating muscles, re-creating symmetry and other therapeutic ideas like these. The problem arises when pain has not a precise anatomical basis to be treated. Moreover, we must say that there are no definitive proves nor scientific bases on almost all anatomical theories for idiopathic LBP.[16, 32, 38-41]

The functional paradigm

Sometimes (but not always) the anatomical paradigm is followed only to obtain the functional one. Function is made not only of anatomical parts, but also of neurological control. Some therapies find in this main idea their driving force. The problem arises when pain is not only physical, but includes emotional and relational matters too. From a scientific viewpoint, there are some proves of the importance of these functional elements in chronic LBP patients.[44-55] This topic will be considered also in a paper of this issue of Europa Medicophysica.[56]

The psychological paradigm

In the clinical everyday field of LBP this paradigm is evoked more as a justification for failing a treatment (or not even trying a therapy) than as a way to obtain results. Moreover, rarely patients even accept a direct psychological approach: this is the main problem with this paradigm. But another arises when the pain has also a clear-cut physical basis. This paradigm has scientific bases in sub-acute and chronic patients.[12, 57-60]

The educational paradigm

In the 70s, education has been a revolution in LBP treatment.[61, 62] Today it continues to be a widely applied solution, even if it has been criticized.[63, 64] It has recently evolved with the concept of cognitive-behavioral approach, whose utility has been scientifically demonstrated.[60, 65, 66]

Paradigmatic, eclectic, magical or scientific?

To solve the problem of paradigms, models have been proposed to approach at best the patients. In this issue of the journal, Maigne presents his new "3 circles" model,[67] opposed to the actually dominant bio-psycho-social model by Waddel.[4, 68, 69]

According to what we know today, presumably all patients require the symptomatic paradigm but, while it could be enough in acute patients, usually it is not for all others.[42] The opposite can be said for the educational paradigm: useful for all, but mainly for chronic and sub-acute patients.[64] Only some patients need the anatomical paradigm (usually those really requiring surgery, with a good indication), much more need the functional one [5, 70-75] and most (in sub-acute and chronic cases) have psychological needs.[60, 65, 66] So we, as treating physicians, need to be eclectic, choosing for each patient what he really requires. But this eclectism could be magical, based on assumptions, hypothesis and faith on good (or not) teachers; or it could be scientific, based on literature.

The contextual factors: different perspectives

The ICF defined the contextual factors [7] that contribute to determine the health condition of each single person. Also the characteristics of a clinical condition in a single socio-cultural environment can have contextual factors and particularly if this pathology is typical of a particular society, as it happens for LBP in western countries.[76]

The LBP puzzle becomes here a drama, whose author could be Pirandello, with many actors that speak different languages. But just taking a look at all these perspectives could be useful to better understand the complexity of the puzzle and presumably to find new solutions.

The GP perspective

GPs are, without any doubt, in front line against LBP. They are the first to see acute patients (apart from small numbers who directly go to First Aid Departments), they monitor sub-acute conditions, they have to face chronic situations almost daily. Today some of the main experts on LBP can be found between GPs,[15, 22, 33] in Italy too.[77] In this issue of Europa Medicophysica a paper synthesizes most studies performed in Italy with GPs.[77] The main problems that GPs have to face include a scholarly learned approach that is mainly biological (widely used FANS and exams), the little time they have to visit a huge number of patients, the difficult relationship with specialists many times overcoming their indications, the problem of managing difficult patients.[77] GPs' really represent the crossway of LBP and their perspective focuses on the big problem of management of these patients. Any intervention should take care of these aspects.

The specialist perspective

Specialists rarely love treating LBP patients. Usually they require too much time during visits, they do not answer well to simple straight-forward therapies, exams usually do not give immediate clues and results: in simple words, LBP (and LBP patients) seem not to be objective. LBP usually treated by specialist is chronic and in these patients there is plenty of psychological and social implications that drive treatments far away from simplicity and easy-going therapies. This is difficult to stand, and it is difficult to find correct answers, moreover in front of the multiple possibilities that the treatment world gives. This perspective should always be considered, because in patient's view being referred to a specialist and not having an answer increases the problem. It is important to find the correct specialist, not (only) according to specialty (even if, as already stated, the rehabilitation world should have most weapons to treat these patients), but also to individual knowledge in the field.

The therapist perspective

Who treats this problem? Today there is plenty of therapeutic figures and these are only partially inside the health professions (just think about pranotherapists, erborists and so on). We do not need to discuss for long this point, but it is a fact that there are

many believers in different theories and leaders (mainly from abroad); in some places, these believers are more than the thinkers by ourselves. In these situations therapies derive from theories and are not adapted according to the individual patients' needs. This perspective should always be considered and all physicians should be very cautious in their indications.

The patient perspective

What do patients want when they seek care for LBP? Curiously, this topic has never been researched and we have only recently evaluated it, through a research, still under way, in which a validated questionnaire was administered to a population of 592 patients in GPs offices. It resulted that, in case of LBP, patients' perspective is not simply abolishing the pain; in fact, patients' requests to their treating physicians were: to abolish pain (58.2%), to know the cause of pain (32.1%), to be able to perform regularly in daily life activities or profession (19.5%), to be relieved about the importance of the problem (12.9%), to be cared (10.4%). This is one part of the patients' perspective that should be carefully considered by care-givers.

The other part, that should not be ignored, includes the questions considered above: where to go, when you have LBP? Who treats this problem? Stefano Giovannoni, a GP, gave a very practical answer: the LBP specialist. And this should be the GP in acute cases, specialists, but only if he has developed the correct therapeutic arsenal, in chronic cases.

The scientist perspective

Research gave rise to changes, could solve dilemmas and propose new models against single paradigms. LBP is a field of abundant (and sometimes redundant) research; and LBP undoubtedly needs research and scientists. In these years a new branch of medicine has developed to face the increasing burden of research and to allow its conversion in everyday clinics: evidence based medicine (EBM). But there is the risk to convert EBM in a myth: I totally believe in EBM, but we must all remember that some even don't know what exactly are its bases and are diffident, and believe that EBM is born because of economics and not medicine. Moreover, EBM is only science and not the truth: this means that it simply fixes the actual situation, but changes will surely come. The application of EBM in LBP field is critical and the paper we present in this issue of Europa Medicophysica constitutes an example.[77] We all need to remember that physicians are skillful when they are able to help the 5% of difficult patients (obviously in addition to the other 95%) while, by statistical definition, science describes the 95% of patients, even when the difficult ones are considered. Medicine will always be a scientific art, where not casually the substantive is art.

The National Health System perspective

The burden of costs is heavily changing the HNS. In Rehabilitation Departments, activities are changing towards a higher specialization and in many instances this means looking to high degree disabilities, reducing the personnel and the engagement with minor ones. This is an obvious, even ethical change, that in some cases drives HNS resources far away from LBP. If it is a fact that this happens today, even if not in all hospitals, and even if LBP has been defined as 1 of the 11 priorities of the 1998-2001 Health National Plan:[78] presumably the answers should be given at other levels of the HNS, and surely there are other much more important problems than LBP (from a health, more than from a social or economic perspective). If this will continue in the future, presumably answers to LBP problems will be looked for much more easily outside the HNS than inside it.

The society perspective

Society is something different from the HNS. It means work givers, family, friends and so on. Wellness, ability and functioning are some of the most common requirements in these contexts. Not always reduction of costs and increase of quality of care occur together. These necessities are many times exactly the needs of our patients.

A question of perspectives

To correctly deal with LBP we need to know the various perspectives of the different actors involved. This is true independently of the original point of view: if you are a physician, or you are a HNS manager, or even if you are a patient, you need to know what the others think, what are their perspectives and consequently how they will behave according to the solution you are pursuing. I do understand that this seems to be much more a philosophical than a med-

ical matter, but this is the real world and LBP is such a wide problem that we cannot avoid these perspectives.

A solution, at least from the therapeutic viewpoint, is possible by creating a good multidisciplinary team: the problem is not so easy in a typical outpatient work, as it happens for LBP, where the different actors are sparse on the territory. Anyway, if the specialist speaks a language that is not similar to that of the GP and much more to that of the therapist, then the patient will loose his battle against his problem.

Conclusions

Changes challenge us, while clinical dilemmas fill in our brains. We are used to our everyday therapeutic paradigms, but we have to face all the others. We are rarely able to change our perspective: when we are forced to do it (as in these last years, with the economic approach that seems to compress our profession) the most frequent reactions include either fighting against the new perspective or fatalistically accepting it. The puzzle is today difficult to be solved, even if in this paper some solutions have been proposed with at least the aim of pooling together some pieces.

Today, in this LBP puzzle, what should be the characteristic of the pieces of rehabilitation specialists according to the actual scientific knowledge? We know that LBP is one of the many, different, small health problems typical of all human beings.[22, 33] LBP is not a diagnosis, is much more some kind of a syndrome, a common final way of many different, undistinguishable pathologies.[23, 25] No way to say if it is the disc or the joint, or muscles or ligaments; no way to know if it is inflammation, or blood congestion, or strain, or repetitive micro-trauma. At least today. We ignore almost all on the anatomic-pathological side, but we know a lot on what are the risk factors of the first episode [79] and, most important, of chronicization (that is the most awful end of the story).[22, 26, 57, 59] In this way, we know what to do and what to avoid.[22, 26, 33] We also know how to treat: we must first of all be good human beings approaching the suffering person in front of us, so to entirely face the problem in all its aspects: biological, psychological, social. This since the beginning (the acute phase, up to 2-4 weeks),[8-10, 79-81] but more and more as time passes (sub-acute phase, from 1 to 3-6 months),[5, 70, 71, 82] to avoid chronicity (*i.e.* the 5% of patients with higher disability, with almost no possibility of exiting from this condition—only 5% of resolution—that costs 70% of the entire costs for LBP).[1, 41] And when LBP is chronic, then we need to physically, psychologically and socially reactivate and rehabilitate: forgetting pain to treat the patient in its completeness.[5, 69-71, 73, 83]

Considering all this, rehabilitation specialists continue to have a major role to play in LBP, but we must well bear in mind that this role is full of difficulties, because of the complexity of the puzzle.

Apparently, the easiest issue should be to have a rehabilitative approach. But, looking critically at what happens in this field, it seems that we loose our know-how that we easily apply in other health conditions: we tend not to be functional, but symptomatic or anatomical; it looks like we are not psycho-social, even if here we frequently face people with big physical, but also psychological, impairments that limit their activities and participation; it seems that we forget our rehabilitative projects and programs, and simply go to straightforward diagnostic conclusions and therapeutic proposals. To effectively and efficiently treat LBP we simply and definitely must be rehabilitation specialists.

A typical complication is that it is necessary to create good teams, including all therapeutic and social partners we need to obtain a full recovery of the disabled low back pain sufferers. Creating teams is much more difficult in a typical outpatient setting as that of LBP, than in an in patient one; but it is unavoidable to obtain good results. Rehabilitation always implies working in team and LBP treatment is not an exception at all.

This field is full of dilemmas and it is characterized by a great majority of acute, auto-resolving cases: to deal with this situation we need to be scientifically well oriented. For years rehabilitation has been considered the Cinderella of scientific approaches, mainly because of the absence of instruments to evaluate treatments, but also because in the past we were not used to have such a behavior. Reality is rapidly changing and an evidence-based methodology is already in the arsenal of rehabilitation: this must totally be applied in the treatment of LBP too.

We must remember that acute patients will relieve by themselves in a few days or weeks: these are not really our patients. Our interest should fully go to the significant minority of chronic LBP sufferers, whose situation is rarely changeable in terms of pain, but almost always variable in terms of disability, increasing phys-

ical, psychological and social function, and quality of life. In between these 2 populations there are the sub-acute LBPs: here a preventive paradigm is determinant.

Low back pain is a difficult field, that requires a fully bio-psycho-social, rehabilitative approach. This means scientific knowledge, psychological and social attention, ability in creating partnership and quality of care. In LBP treatment, as in all other situations, it is not possible to delegate, to forget, to underestimate. Otherwise, we will continue to loose our fight against LBP: as physicians, as rehabilitation specialists, as patients, as society.

References

1. Dunn KM, Croft PR. Epidemiology and natural history of low back pain. Eur Medicophys 2004;40.
2. Waddell G. Biopsychosocial analysis of low back pain. Baillieres Clin Rheumatol 1992;6:523-57.
3. Nielson WR, Weir R. Biopsychosocial approaches to the treatment of chronic pain. Clin J Pain 2001;17 (4 Suppl):S114-27.
4. Waddell G. Volvo award in clinical sciences. A new clinical model for the treatment of low-back pain. Spine 1987;12:632-44.
5. Karjalainen K, Malmivaara A, van Tulder M, Roine R, Jauhiainen M, Hurri H *et al*. Multidisciplinary biopsychosocial rehabilitation for subacute low back pain among working age adults. Cochrane Database Syst Rev 2003 (2):CD002193.
6. Sanità OMd. ICIDH - Classificazione Internazionale della Menomazione, della Disabilità e dell'Handicap. Geneva, Switzerland: World Health Organization; 1980.
7. Sanità OMd. ICF - Classificazione Internazionale del Funzionamento, della Disabilità e della Salute. Geneva, Switzerland: World Health Organization; 2001.
8. Hagen KB, Hilde G, Jamtvedt G, Winnem MF. The Cochrane review of advice to stay active as a single treatment for low back pain and sciatica. Spine 2002;27:1736-41.
9. Hilde G, Hagen KB, Jamtvedt G, Winnem M. Advice to stay active as a single treatment for low back pain and sciatica. Cochrane Database Syst Rev 2002; (2):CD003632.
10. Hagen KB, Hilde G, Jamtvedt G, Winnem MF. The Cochrane review of bed rest for acute low back pain and sciatica. Spine 2000;25:2932-9.
11. Jarvik JG, Deyo RA. Diagnostic evaluation of low back pain with emphasis on imaging. Ann Intern Med 2002;137:586-97.
12. Boos N, Rieder R, Schade V, Spratt KF, Semmer N, Aebi M. Volvo Award in clinical sciences. The diagnostic accuracy of magnetic resonance imaging, work perception, and psychosocial factors in identifying symptomatic disc herniations. Spine 1995;20:2613-25.
13. Wiesel SW, Tsourmas N, Feffer HL, Citrin CM, Patronas N. A study of computer-assisted tomography. I. The incidence of positive CAT scans in an asymptomatic group of patients. Spine 1984;9:549-51.
14. Waddell G. Low back pain: a twentieth century health care enigma. Spine 1996;21:2820-5.
15. Deyo RA, Phillips WR. Low back pain. A primary care challenge. Spine 1996;21:2826-32.
16. Koes BW, van Tulder MW, Ostelo R, Kim Burton A, Waddell G. Clinical guidelines for the management of low back pain in primary care: an international comparison. Spine 2001;26:2504-13; discussion 13-4.
17. Waddell G, Burton AK. Occupational health guidelines for the management of low back pain at work: evidence review. Occup Med (Lond) 2001;51:124-35.
18. Deyo RA. Quality and its dimensions. Spine 2000;25:661.
19. Waddell G. Modern management of spinal disorders. J Manipulative Physiol Ther 1995;18:590-6.
20. Cherkin DC, Deyo RA, Wheeler K, Ciol MA. Physician views about treating low back pain. The results of a national survey. Spine 1995;20:1-9; discussion 9-10.
21. Deyo RA. Diagnostic evaluation of LBP: reaching a specific diagnosis is often impossible. Arch Intern Med 2002;162:1444-7; discussion 7-8.
22. Deyo RA. Low-back pain. Sci Am 1998;279:48-53.
23. Cedraschi C, Nordin M, Nachemson AL, Vischer TL. Health care providers should use a common language in relation to low back pain patients. Baillieres Clin Rheumatol 1998;12:1-15.
24. Deyo RA, Rainville J, Kent DL. What can the history and physical examination tell us about low back pain? JAMA 1992;268:760-5.
25. Nachemson A. Back pain: delimiting the problem in the next millennium. Int J Law Psychiatry 1999;22:473-90.
26. Nachemson AL. Low back pain in the year 2000-: "back" to the future. Bull Hosp Jt Dis 1996;55:119-21.
27. Nachemson AL. Newest knowledge of low back pain. A critical look. Clin Orthop 1992;8-20.
28. Nachemson AL. Advances in low-back pain. Clin Orthop 1985;266-78.
29. Waddell G. How patients react to low back pain. Acta Orthop Scand Suppl 1993;251:21-4.
30. Nachemson A. Chronic pain: the end of the welfare state? Qual Life Res 1994;3 Suppl 1:S11-7.
31. Nachemson AL, Andersson GB. Classification of low-back pain. Scand J Work Environ Health 1982;8:134-6.
32. Spitzer W, Leblanc F, Dupuis M, Abenhaim L, Belanger A, Bloch R *et al*. Scientific approach to the assessment and management of activity-related spinal disorders. A monograph for clinicians. Report of the Quebec Task Force on Spinal Disorders. Spine 1987;12 Suppl 1:S1-S59.
33. Deyo RA, Weinstein JN. Low back pain. N Engl J Med 2001;344:363-70.
34. Donelson R. Evidence-based low back pain classification: improving care at its foundation. Eur Medicophys 2004; 40.
35. Donelson R. Reliability of the McKenzie assessment. J Orthop Sports Phys Ther 2000;30:770-5.
36. Donelson R, Silva G, Murphy K. Centralization phenomenon. Its usefulness in evaluating and treating referred pain. Spine 1990;15:211-3.
37. Donelson RG. The reliability of centralized pain response. Arch Phys Med Rehabil 2000;81:999-1000.
38. Corporation W. Guidelines for the management of back injured employees. Adelaide, South Australia: WorkCover Corporation; 1993.
39. Nachemson A. Ont i ryggen - orsaker, diagnostik och behandling. Stockholm: SBU, 1991.
40. Bigos S, Bower O, Braeng G *et al*. Acute low back problems in adults. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human services, 1994.
41. Pain CCoB. Back Pain. London: HMSO; 1994.
42. Van Tulder MW, Scholten RJ, Koes BW, Deyo RA. Non-steroidal anti-inflammatory drugs for low back pain. Cochrane Database Syst Rev 2000; (2):CD000396.
43. Deyo RA. Drug therapy for back pain. Which drugs help which patients? Spine 1996;21:2840-9; discussion 2849-50.
44. Leinonen V, Kankaanpaa M, Luukkonen M, Hanninen O, Airaksinen O, Taimela S. Disc herniation-related back pain impairs feed-forward control of paraspinal muscles. Spine 2001;26:E367-72.
45. Leinonen V, Kankaanpaa M, Luukkonen M, Kansanen M, Hanninen

O, Airaksinen O *et al*. Lumbar paraspinal muscle function, perception of lumbar position, and postural control in disc herniation-related back pain. Spine 2003;28:842-8.
46. Leinonen V, Maatta S, Taimela S, Herno A, Kankaanpaa M, Partanen J *et al*. Paraspinal muscle denervation, paradoxically good lumbar endurance, and an abnormal flexion-extension cycle in lumbar spinal stenosis. Spine 2003;28:324-31.
47. Leinonen V, Maatta S, Taimela S, Herno A, Kankaanpaa M, Partanen J *et al*. Impaired lumbar movement perception in association with postural stability and motor- and somatosensory-evoked potentials in lumbar spinal stenosis. Spine 2002;27:975-83.
48. Luoto S, Aalto H, Taimela S, Hurri H, Pyykko I, Alaranta H. One-footed and externally disturbed two-footed postural control in patients with chronic low back pain and healthy control subjects. A controlled study with follow-up. Spine 1998;23:2081-9; discussion 2089-90.
49. Luoto S, Taimela S, Alaranta H, Hurri H. Psychomotor speed in chronic low-back pain patients and healthy controls: construct validity and clinical significance of the measure. Percept Mot Skills 1998;87 (3 Pt 2):1283-96.
50. Luoto S, Taimela S, Hurri H, Aalto H, Pyykko I, Alaranta H. Psychomotor speed and postural control in chronic low back pain patients. A controlled follow-up study. Spine 1996;21:2621-7.
51. Luoto S, Taimela S, Hurri H, Alaranta H. Mechanisms explaining the association between low back trouble and deficits in information processing. A controlled study with follow-up. Spine 1999; 24:255-61.
52. Arokoski JP, Kankaanpaa M, Valta T, Juvonen I, Partanen J, Taimela S *et al*. Back and hip extensor muscle function during therapeutic exercises. Arch Phys Med Rehabil 1999;80:842-50.
53. Taimela S, Harkapaa K. Strength, mobility, their changes, and pain reduction in active functional restoration for chronic low back disorders. J Spinal Disord 1996;9:306-12.
54. Taimela S, Osterman K, Alaranta H, Soukka A, Kujala UM. Long psychomotor reaction time in patients with chronic low-back pain: preliminary report. Arch Phys Med Rehabil 1993;74:1161-4.
55. Taimela S, Kujala UM. Reaction times with reference to musculoskeletal complaints in adolescence. Percept Mot Skills 1992;75 (3 Pt 2):1075-82.
56. Taimela S, Negrini S, Paroli C. Functional rehabilitation of low back disorders. Eur Medicophys 2004;40.
57. Deyo RA, Diehl AK. Psychosocial predictors of disability in patients with low back pain. J Rheumatol 1988;15:1557-64.
58. Fritz JM, George SZ, Delitto A. The role of fear-avoidance beliefs in acute low back pain: relationships with current and future disability and work status. Pain 2001;94:7-15.
59. Linton SJ. A review of psychological risk factors in back and neck pain. Spine 2000;25:1148-56.
60. Van Tulder MW, Ostelo R, Vlaeyen JW, Linton SJ, Morley SJ, Assendelft WJ. Behavioral treatment for chronic low back pain: a systematic review within the framework of the Cochrane Back Review Group. Spine 2000;25:2688-99.
61. Dwyer AP. Backache and its prevention. Clin Orthop 1987;222; 35-43.
62. Linton SJ, Kamwendo K. Low back schools. A critical review. Phys Ther 1987;67:1375-83.
63. Hall H, Hadler NM. Controversy. Low back school. Education or exercise? Spine 1995;20:1097-8.
64. van Tulder MW, Esmail R, Bombardier C, Koes BW. Back schools for non-specific low back pain. Cochrane Database Syst Rev 2000; (2):CD000261.
65. Van Tulder MW, Ostelo RW, Vlaeyen JW, Linton SJ, Morley SJ, Assendelft WJ. Behavioural treatment for chronic low back pain. Cochrane Database Syst Rev 2000; (2):CD002014.
66. Van Tulder MW, Ostelo R, Vlaeyen JW, Linton SJ, Morley SJ, Assendelft WJ. Behavioral treatment for chronic low back pain: a systematic review within the framework of the Cochrane Back Review Group. Spine 2001;26:270-81.
67. Maigne J. Towards a model of back pain. The three circles of pain. Eur Medicophys 2004;40.
68. Waddell G. Occupational low-back pain, illness behavior, and disability. Spine 1991;16:683-5.
69. Waddell G, Main CJ, Morris EW, Di Paola M, Gray IC. Chronic low-back pain, psychologic distress, and illness behavior. Spine 1984;9:209-13.
70. Karjalainen K, Malmivaara A, van Tulder M, Roine R, Jauhiainen M, Hurri H *et al*. Multidisciplinary biopsychosocial rehabilitation for subacute low back pain in working-age adults: a systematic review within the framework of the Cochrane Collaboration Back Review Group. Spine 2001;26:262-9.
71. Karjalainen K, Malmivaara A, van Tulder M, Roine R, Jauhiainen M, Hurri H *et al*. Multidisciplinary biopsychosocial rehabilitation for subacute low back pain among working age adults. Cochrane Database Syst Rev 2000; (3):CD002193.
72. Guzman J, Esmail R, Karjalainen K, Malmivaara A, Irvin E, Bombardier C. Multidisciplinary bio-psycho-social rehabilitation for chronic low back pain. Cochrane Database Syst Rev 2002; (1):CD000963.
73. Schonstein E, Kenny DT, Keating J, Koes BW. Work conditioning, work hardening and functional restoration for workers with back and neck pain. Cochrane Database Syst Rev 2003; (1):CD001822.
74. Van Tulder M, Malmivaara A, Esmail R, Koes B. Exercise therapy for low back pain: a systematic review within the framework of the cochrane collaboration back review group. Spine 2000;25:2784-96.
75. Van Tulder MW, Malmivaara A, Esmail R, Koes BW. Exercise therapy for low back pain. Cochrane Database Syst Rev 2000; (2):CD000335.
76. Waddell G. Low back disability. A syndrome of Western civilization. Neurosurg Clin N Am 1991;2:719-38.
77. Negrini S, Monticone M, Chirchiglia S, Fabiani L, Gattinoni F, Giorgianni R *et al*. Experiences in Italy in the development and application of clinical guidelines for low back pain. Eur Medicophys 2004;40.
78. Italiana R. Piano Sanitario Nazionale 1998-2000. Gazzetta Ufficiale della Repubblica Italiana 1998 (288).
79. Deyo RA. Acute low back pain: a new paradigm for management. BMJ 1996;313:1343-4.
80. Burton AK, Waddell G, Burtt R, Blair S. Patient educational material in the management of low back pain in primary care. Bull Hosp Jt Dis 1996;55:138-41.
81. 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 educational booklet in primary care. Spine 1999;24:2484-91.
82. Lindstrom I, Ohlund C, Eek C, Wallin L, Peterson LE, Fordyce WE *et al*. The effect of graded activity on patients with subacute low back pain: a randomized prospective clinical study with an operant-conditioning behavioral approach. Phys Ther 1992;72:279-90; discussion 291-3.
83. Kankaanpaa M, Taimela S, Airaksinen O, Hanninen O. The efficacy of active rehabilitation in chronic low back pain. Effect on pain intensity, self-experienced disability, and lumbar fatigability. Spine 1999;24:1034-42.