



## Expertise Comments: Are we Conducting Research for Research?

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There are several challenges to pain management and practical research in non-surgical spine care. We can investigate specific interventions for pain control and their effectiveness in preventing pain or disability. However, are there any efficient and effective ways to improve clinically relevant research for pain management? Are there any communication issues between scientist and clinician?

Clinical research is imperative to maximize benefits for patient care with limited health care resources. The purpose of clinical outcomes research is not so much to justify what we have been doing, but to emphasize patient-oriented approaches. As the economy of the health care market is getting tightened, we need the best way to improve the quality of objective data to show effective and efficient approaches for specific non-surgical interventions by randomized controlled trials.

Non-surgical spine research, as well as other fields of clinical research, requires an extensive endeavor to enhance the quality of clinical intervention with a developed theory of interventions. Sensitive kinetic, kinematic and electromyography (EMG) measures are needed following the implementation of valid exercise protocols to control low back pain (LBP). In addition, the potential factors based on individual variations as well as pain/level of disability need to be compared following the specific interventions.

Recent reports [1-4] concluded that there is sufficient scientific evidence to recommend that patients who have LBP should perform exercise interventions to decrease pain and improve flexibility, [but] no specific technique or method is superior. In addition, the Philadelphia Panel also reported reasonable scientific evidence that strengthening exercises yield clinically important benefits for pain reduction and increased function. There is no apparent effectiveness of this intervention for functional enhancement of LBP according to the pooled meta-analysis [1,5,6].

It is common for unexpected results to arise during the research process and for unforeseen results to be misinterpreted in order to justify the results of the data, especially in non-surgical spine care. For example, the biomechanical principle of Fayette's law may not apply to the data for some cases of degenerative arthritis as a set of guiding principles used by practitioners. The dissemination of spine research findings in peer-reviewed journals is also relatively weak when the principle is not always applied in a way we expected. It would be beneficial to focus on clinical applications based on solid research designs with sensitive measures to understand interdisciplinary outcome barriers.

### The Communication Issues

We have an extensive background in non-surgical spine care, but we lack a definitive definition for "recurrent LBP." Recent systematic reviews indicated that the most common feature given as part of the definition of recurrent LBP was the frequency of previous episodes of LBP. Only 8% (3/36) of studies used previously recommended definitions for recurrent LBP. Large variations exist in the definitions of recurrent LBP used in the literature, making interpretation of prevalence rates and treatment outcomes very difficult [7].

According to other studies, there is a 24% to 87% rate of recurrence within one year in those who have recovered from an episode of LBP

[8,9]. Recurrent LBP is a common musculoskeletal dysfunction with poor coordination of balance performance and a lack of integrity of motion [10-12]. The coordination of trunk mobility during functional movements depends on flexibility and stability with optimal spinal range of motion. The functional approaches to treatment may provide a practical approach to the LBP problem by objective measures.

The source of pain is the dysfunction, which is either hypo- or hyper-mobility in the musculoskeletal system or impairment in the function of the neuromuscular system. However, we are often focused on the pain itself rather than on understanding the specific nature of the dysfunction, which is the source of pain in the musculoskeletal system. The characteristics of spine research relate to understanding the human movement systems. In movement science, the four systems include the neuromuscular, musculoskeletal, cardiopulmonary, and integumentary systems. The physiological organ systems interact to produce and support movement of the entire body.

There are several barriers to overcome in order for scientists and clinicians to communicate better with one another. We attempt to manage multiple clinical problems in non-surgical ways for patient care. However, the approach might ignore the validity or reliability of the data as well as its comprehensive analyses and might not consider the four systems of human motion. When we analyze the obtained data, we might not apply the data to patient care in practical ways. This struggle is a recurring theme in non-surgical spine research. We need to ask ourselves "SO WHAT?"

### A Valid and Reliable Quantitative Approach

There is growing scientific evidence supporting exercise programs as an effective means of achieving lasting relief from pain. However, the comprehensive effect of the intervention has to be investigated further with quantified measurement tools. For example, the center of pressure (COP) displacement may provide useful information as an index of standing postural stability as well as predict dynamic balance. However, the COP provides limited results with only two-dimensional quantities. The combined three-dimensional kinetic analyses from ground reaction force with specific sensitive thresholds as well as kinematic index analysis provide more accurate and meaningful data for the outcome measures [13,14].

Because the exercise interventions relate to changes in the motor control, which plays a key clinical role in the treatment of subjects with recurrent LBP, it is important to investigate the effects of intervention in

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terms of the musculoskeletal or the neurological link [12,15]. Although some therapeutic interventions have demonstrated benefits, researchers have not quantified or characterized the results yielded by specific non-surgical interventions. Furthermore, when specific exercises are the focus of intervention without considering the interactions of four systems, most clinical outcome studies provide conflicting results.

Kinematic assessment of the spine requires further measurements which can provide three-dimensional dynamic motion. This aberrant lumbo-pelvic motion might be directly related to trunk rotations and is the result of LBP or a contributing factor in recurrent LBP [13,16].

### Clinical Relevance for Findings

It is evident that research is needed to improve new knowledge and needs to be applied in clinical cases in order to understand the phenomena in both science and arts. Evidence-based practice represents the fundamental principle that the provision of quality care will depend on our ability to make choices that have been confirmed by sound scientific data, and that our decisions are based on the best evidence currently available.

Furthermore, it is also evident that the kinematic changes for the stability of the spine could be affected in subjects with LBP who exhibit proprioceptive deficits [17,18]. A trunk muscle imbalance may also contribute to unbalanced postural activity, which could prompt a decreased, uncoordinated bracing effect in subjects with LBP. As a result, possible kinematic rehabilitation training could be used in the prevention of falls in such subjects.

The one leg standing test has been utilized to quantitatively assess postural steadiness in a static position in order to investigate various balance disorders in subjects with recurrent LBP [13,14,19]. The standing stability index is the ratio between standing duration and requested duration. The normalized standing index was compared with the corresponding subjects' three dimensional rotational values. The stability index of the core spine significantly decreased, especially when visual feedback was blocked for subjects with recurrent LBP [13,16]. The interaction between visual feedback and trunk rotation indicated that core spine stability is critical in coordinating balance control. A trunk muscle imbalance may contribute to unbalanced postural activity, which could prompt a decreased, uncoordinated bracing effect in subjects with LBP. As a result, core spine training could be used in the prevention of postural instability [14]. Further investigation is required to evaluate stability and functional mobility of the spine following the intervention. Therefore, the kinetic and kinematic measurements would be comprehensive, objective outcomes since postural evaluation requires a process involving integrated motor function for impaired balance performance in subjects with LBP [13].

In conclusion, although wide ranges of non-surgical approaches have been developed, it is necessary to reexamine the conflicting evidence concerning the effectiveness of intervention for specific conditions. None of the available exercise interventions has emerged as the most commonly accepted treatment approach of choice for recurrent LBP. This problem may not be entirely the result of ambiguity of the effectiveness of the methods, but could be at least partially due to a lack of outcome measure indices that serve as a meaningful, commonly accepted gold standard by which to compare the effectiveness of the various methods. Let us think once again before we conduct pain management research. Are we putting the cart before the horse?

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### Conflict of Interest

The author does not have any financial or personal conflict of interest in relation to the submission of this paper, other people, or any organizations.

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