

Why Re-think Injury Rehabilitation?

Alan R. Needle, PhD, ATC, CSCS; Adam B. Rosen, PhD, ATC

From Appalachian State University, Boone, North Carolina (ARN); and University of Nebraska at Omaha, Omaha, Nebraska (ABR).

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Correspondence: Alan R. Needle, PhD, ATC, CSCS, Department of Health & Exercise Science, Appalachian State University, ASU Box 32071, Boone, NC 28608. Email: needlear@appstate.edu
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The past decade has been an exciting time for those studying and treating musculoskeletal injuries. Our knowledge of these injuries has grown, new treatment techniques and technologies are constantly emerging, and innovation is becoming increasingly prominent across athletic training and sports health care settings.^{1,2} Many of these innovations come from fundamental changes in how we understand injury paradigms and the role of the central nervous system changes post-injury.¹ In the preparation of this special issue, we discussed novel interventions that focus on the central nervous system and those incorporating cognitive loading, motor learning strategies, and virtual reality, and we threw out the question, “Do we need to re-think injury rehabilitation?”

The treatment that most clinicians implement, forming the status quo in injury rehabilitation, is impairment-based rehabilitation.³ That is, we utilize clinical assessment techniques to identify impairments (eg, strength deficit, motion restriction, and balance impairment), we select interventions designed to address each of those impairments (eg, isotonic strengthening, stretching or joint mobilizations, and single-limb balance for the previous examples, respectively), and reassess to confirm the deficit is corrected. Therefore,

following resolution of acute injury and restoration of the injured structure, the focus of treatment efforts is toward activity and participation-based restrictions. This approach is intuitive, justifiable to patients, and easy to incorporate in education programs for professional trainees.

Yet, practicing clinicians and their patients face an ongoing dilemma as it relates to high rates of reinjury. Across many injury models, the largest risk factor for injury is a history of that injury. Ankle sprains reoccur at a rate of 50% to 80%, anterior cruciate ligament tears leave individuals with a nearly 30% risk of a second injury, and non-specific low back pain will reoccur in 25% to 80% of individuals. These persistent reinjury rates remain present despite rehabilitation efforts by athletic trainers, physical therapists, and other health care professionals.

From a motor learning perspective, the problem seems to be rooted in the concept of transfer, where individuals present with excellent functional performance and minimal observable risk factors in the clinical setting; however, patients often revert to movement strategies that put them at risk when placed in the unconstrained real world and playing field.^{1,4} This is supported by emerging etiological models that have described changes within the central nervous system that demon-

strate atypical neural activation during movement tasks.⁴ Specifically, more planning and visual resources seem to be recruited to execute simple movement tasks that would require minimal brain activation. Therefore, patients seem to present well in the clinic using this atypical activation, but then revert to poor motion patterns when navigating unconstrained activity.

To summarize, it has been proposed that abnormal neural activation may be contributing to high injury rates, and current rehabilitation interventions may not be effective in preventing this. Therefore, the need to “re-think” injury rehabilitation may be warranted. As such, featured throughout this special issue are interventions and their efficacy for curbing re-injury risk. However, an additional challenge must be addressed and that is whether these interventions can be implemented clinically.⁵

RESOLVING THE RESEARCH-CLINICIAN-PATIENT GAP

Implementation of these interventions requires two key components: establishing a causal link between neural impairment and movement planning with injury recurrence, and, potentially more challenging, convincing the patient of the importance of these interventions. Most patients, particularly those with high levels of physical activity, have primary complaints related to the activity and participation domains of the International Classification of Function, apart from pain.⁶ However, to incorporate many of these new interventions requires a focus toward correcting aspects of the body structure and function domain, beyond pain. Therefore, what clinical considerations need to be accounted for to better implement

these interventions that can improve patient outcomes? Although we do not claim to have a definitive answer and welcome subsequent discourse on this topic, a multifactorial approach must be considered to resolve the research-clinician-patient gap we have described.

Beginning with the research component of these barriers, future investigations need to implement not only clinically realistic interventions but study those interventions within actual clinical settings. The efficacy of these interventions only become meaningful if they are translated into the clinic. A general limitation of the available research in this area is the exploration of a single intervention within a limited time frame (eg, single-session interventions). However, it is imperative to understand how targeted interventions interact with ongoing rehabilitation plans, such that the body structure and function domain can be addressed concurrently with activity and participation domains. Articles in this issue from McGrath et al and Song and Wikstrom demonstrate altered planning and sensory weighting strategies linking physiologic aberrations to clinical function. Further, there needs to be continued attempts to link these interventions to outcome measures across multiple levels: mechanistic, performance, and patient outcomes. Doing so will not only provide more encouraging evidence to clinicians to incorporate these treatments, but act to further expand etiological knowledge of these injuries.

As research continues to develop, additional efforts need to be made for clinicians to adopt these techniques. Primarily, educational programs that not only explain the efficacy of these interventions, but also provide

hands-on laboratory demonstrations and practical solutions to implement these techniques are necessary to lead to clinician adoption of these techniques. Accordingly, as certain techniques reported in the literature require technical innovations (eg, virtual reality, novel biofeedback), educational interventions and concurrent research need to work on expanding the availability of these technologies and at a cost that is reasonable for most clinics. Within this special issue, articles by Sherman et al and Gokeler et al offer the development of these theoretical approaches to aid clinicians in decision-making abilities.

Finally, the last component necessary for this implementation is getting the patient to buy into the efficacy of techniques that may not address their primary concerns and may seem less efficient to them. Although we would like to suggest clinician-to-patient education—describing the efficacy, mechanisms, and why these treatments are needed—would be sufficient to resolve this gap, speaking with our clinical collaborators, this may not be accurate. Rather, the key to this intervention would be doing so in ways that address activity and participation domains. For example, if modifying instructional feedback or focus of attention (as described by Taylor and Golden and Raisbeck et al within this special issue), doing so in a sport- or activity-specific manner would be desired. If using electrical stimulation techniques, bringing in functional tasks whenever possible would be necessary. But, of course, this limitation goes back to the research limitations of needing to determine the ability for these treatments to be flexible to individual patients.

In closing, we would like to reiterate the excitement of today’s

state of musculoskeletal rehabilitation and this special issue. So many new interventions aimed at improving patient outcomes by addressing mechanistic evidence are emerging, and our knowledge is growing with every new published investigation. Yet, challenges remain. We encourage you, as you digest this issue, to consider whether you should re-think injury rehabilitation, but more importantly, consider the barriers to your ability to implement these interventions and convince

your patients to re-think their own rehabilitation.

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