Translational behavioral pain management: new directions and new opportunities

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Pain is a common and very costly public health problem. Chronic pain conditions alone affect over 100 million adults in the USA [1]. The costs of pain conditions in terms of both direct medical care and decreased work productivity have been estimated as ranging from $560 to $635 billion [1]. These costs are enormous and exceed the economic costs associated with such major diseases such as cardiovascular disease ($309 billion), cancer ($243 billion), and respiratory diseases ($112 billion) [1]. Dollar estimates, however, fail to take account the personal costs of suffering from a pain condition. Pain, particularly when it persists, often leads to high levels of emotional suffering, a more sedentary and restricted lifestyle, and impaired relationships with one's partner, family, and friends [2].

Traditionally, pain has been understood and managed solely as a biological phenomenon [3]. Based on this view, efforts to manage pain have focused on understanding its etiology in terms of tissue pathology and then directing treatments (e.g., medications or surgery) to correct or ameliorate its underlying cause. Over the past 50 years, there has growing recognition of the limitations of approaching pain as solely a biological phenomenon [2]. Clinicians treating persons having pain conditions often find that the level of pain experienced is not proportionate to evidence of underlying disease activity or tissue damage. Furthermore, for many patients, medical and surgical treatments designed to correct the biological basis of their pain fail to eliminate or reduce pain [2, 3].

With recognition of the limitations of a purely biological approach to pain has come an increased interest in the biopsychosocial model of pain [3]. This model not only acknowledges that biological factors (e.g., infection, inflammation, and tissue damage) affect pain but also highlights the key role that psychological factors and social factors can play in the pain experience. Recent studies, many of them conducted by investigators in the field of behavioral medicine, have clearly demonstrated that psychological and social factors can affect pain [2, 3]. These factors include emotions (e.g., anxiety, anger, and depression), cognitions (e.g., pain beliefs and appraisals, self-efficacy, and pain catastrophizing), and the social context of pain (e.g., marital relationship, family environment, and work setting).

Furthermore, there is growing evidence from research studies that cognitive–behavioral and behavioral treatment protocols based on the biopsychosocial model are effective in managing chronic pain conditions [4, 5].

Innovative examples of translational research have begun to appear in the behavioral pain management literature. For example, virtual reality approaches developed and refined in the laboratories of computer scientists are beginning to be translated into clinical interventions for pain. The cover of this special issue, for example, displays a view of Snow World [6]–a snow-covered virtual environment developed by Hunter Hoffman that patients undergoing painful medical procedures can explore and interact with using a computer mouse while wearing wide field of view VR goggles and noise-canceling headphones. Patients can use the mouse to look around Snow World and throw snowballs at snowmen, igloos, robots, penguins, and wooly mammoths. The objects respond to being hit in various ways [freezing, shattering, making sounds (e.g., the mammoths trumpet angrily when hit), or by throwing snowballs back). Studies using a Snow World-based intervention have found that the use of this virtual environment is associated with a 35% to 50% reduction in acute pain experienced during painful medical procedures such as daily wound debridement in burn victims [6].

Although the results of research studies have led to a growing acceptance of the biopsychosocial model of pain, translation of the findings and methods used in these studies into clinical practice and health policy is only in its beginning stages. Given the magnitude of the problem of pain and the potential of biopsychosocial approaches in pain management, there is a clear need for translational behavioral medicine research in this area.

The purpose of this special issue is to highlight translational research currently being conducted in the area of behavioral pain management. The articles in the series are a mix of original research, case studies, reviews, and essays. Taken together, these articles underscore both the issues and opportunities in this emerging research area.

If we are to effectively disseminate behavioral treatments for pain into practice, we need to understand the mechanisms by which they work when applied in populations drawn from real-world

settings. The article by Burns et al. [7] addresses the key role that changes in pain catastrophizing play in explaining the effects of two theoretically different approaches in managing pain [cognitive–behavioral therapy (CBT) and pain education]. The population in this study is a particularly important one for translational research efforts since it consisted of rural, mainly African-American, low income people suffering from chronic pain. Because reductions in pain catastrophizing were related to improved treatment outcome in both the CBT group (expected by theory) and pain education (not expected), these authors argue for broadening the assessment of mechanisms in studies of pain management.

Cardosa et al. [8] provide outcome data on the effects of a 2-week CBT-based pain management in a group of Malaysian patients having chronic pain. This study is one of the first to demonstrate that behavioral interventions for pain developed in Europe and North America can be successfully tailored and applied in persons from a non-Western cultural background. Newton-John [9] presents a case study that nicely illustrates the challenges of treating chronic pain in the context of workers compensation, a situation commonly faced by behavioral medicine practitioners.

There is a particular need for new, behaviorally based practice tools to assist clinicians who are medically managing chronic pain patient in primary care settings. Cheatle et al. [10] describe new technologies that may be helpful in the medical treatment of primary care patients who are at risk for misuse or abuse of opioids. Midboe et al. [11] present administrative, data-based metrics developed in a Veteran's Administration health care setting that can be useful in assessing adherence to clinical practice guidelines for opioid treatments for chronic pain.

Dillworth et al. [12] review the relevance of new findings about the neurophysiology of pain for the use and design of hypnosis protocols for managing pain. Because it is a low-cost intervention with few side effects, hypnosis is particularly relevant to translational behavioral pain management efforts. Lumley et al. [13] review another low-cost intervention for pain, written or spoken disclosure of negative emotions, and pinpoint the need for translational studies identifying how and for whom this treatment approach should be tailored.

Rini et al. [14] review studies of newly developed, internet-based behavioral medicine interventions for pain. The potential of these approaches to expand the reach of behavioral interventions is high. The authors highlight the need to consider and address both the strengths and weaknesses of the internet as a treatment delivery format. Lieberman and Naylor [15] describe studies of another computer-based approach to pain management–interactive voice response technology. Particularly interesting is their discussion of how interactive voice response technology can be used as a relapse prevention strategy for patients receiving CBT for pain management.

Laboratory research is an essential component of efforts to translate findings from the "bench to the bedside." In a compelling essay, Van Damme [16] argues for the need to incorporate laboratory research methodologies into translational behavioral pain management research.

In another essay, Roth et al. [17] challenge the recent trend away from more behaviorally based multidisciplinary pain treatment towards procedure-focused interventional pain medicine. Their arguments, largely based on the biopsychosocial model and research emanating from this model, are provocative and underscore the importance of basing clinical practice upon empirical evidence of treatment effectiveness.

This special issue concludes with an essay by Blyth and Hoy [18] that addresses global public health issues in the treatment of a common chronic pain condition–musculoskeletal pain. The authors note that there is growing agreement that pain needs to be considered a health condition in its own right and highlight the implications of this for health policy in the areas of pain prevention and treatment.

Taken together, the articles in this special issue provide a broad overview of recent developments and issues in translational behavioral pain management. Although this area of research is relatively new, its importance is increasingly recognized. Along these lines, a recent Institute of Medicine report on pain (Relieving pain in America: a blueprint for transforming prevention, care, education, and research [1]) underscored the need for a cultural transformation in the way that pain is viewed and treated. Specifically, the report called for a move away from viewing pain as strictly a biological phenomenon to a more complex, biopsychosocial experience [1]. Researchers and clinicians interested in translational behavioral medicine can be and should be at the vanguard of this cultural transformation.

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