

Spine Update

The Biopsychosocial Model and Spine Care

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Study Design. Spine Update on the biopsychosocial model.

Objective. To review and discuss the strengths and weaknesses of the application of the model to spine care.

Summary of Background Data. The biopsychosocial model of illness has had (and will continue to have) a significant impact on spine care. It has changed—in a positive way—the ways in which we view spinal disease, treat patients, and assess outcomes. To date, however, little discussion has taken place regarding concerns over its implementation.

Methods. Using texts covering the general theory of the biopsychosocial model and the literature as the model is applied to spine care, a review was undertaken, evaluating the strengths and weaknesses of the theory's application to our field.

Results. Just as the biomedical model allowed, and continues to allow, significant medical advances via the objective study of pathoanatomic disease; the biopsychosocial model has afforded similar advances by placing the disease back into the patient and emphasizing illness experienced within the patient's unique biologic, psychological, social, and economic milieu. Thus, the strength of the model is its service as a clear reminder that clinical decisions about how to manage a patient with persistent low back pain living in difficult social conditions are more complex than those for patients who are not. Concerns regarding the model, however, are real and include its application as the primary mode to assess outcomes with a blind eye toward other potential factors; the medical/historical tendency to overweigh psychosocial factors when underlying pathology is not clearly defined; whether or not the theory underlying the model is falsifiable/scientific; whether it affords explanatory or predictive power; whether its implementation improves outcomes; and whether it contributes to the "medicalization" of patients with back pain.

Conclusion. The biopsychosocial model has been readily adapted to all aspects of spine care with many positive implications. There are, however, some concerns and negative implications and awareness of these should afford a better appreciation of when and where the model can be most usefully applied. **Spine 2008;33:219–223**

Spine care has been in a phase of rapid change and expansion over the past 30 to 40 years. Contemporaneously, multiple forces—both traditionally medical and extramedical—have emerged and altered the manner in

which we practice and care for our patients. Many of the positive and negative aspects of these "forces" are now being considered both practically and philosophically: what is the impact of the profit motive? How do consultancy agreements affect reported outcomes? How do we practice defensive medicine and what are its implications? What is the "outcome" of the outcomes movement and the problems with evidence-based medicine? The answers to these questions afford us a better understanding of these external forces that impact our practices and allow us to know their implications; while enabling us to recognize that we have some degree of control in determining what is acceptable and what is not.

An additional recent force, the biopsychosocial model of illness, has also had (and will have) significant implications in the way we evaluate and care for our patients. Although most of these implications are positive, to date, little attention has been paid to the concerns that arise with its implementation. In this Update, we aim to assess the importance, strengths, and weaknesses inherent in the adoption of the biopsychosocial model into our specialty.

The Rise of the Biomedical Model

Before the mid-19th century, medicine focused on the individual sufferer's unique manifestations of disease.¹ Symptoms were emphasized and prognosis remained uncertain—much of the literature and medical records of the time suggest a sense that each patient was a unique "case report." This changed, about the mid-1840s, with the emergence of pathologic anatomy as the fundamental science of medicine. Patients' similarity in underlying pathoanatomy was accompanied by, and could explain, a corresponding similarity in physical examination findings, symptoms/complaints, natural history, and response to treatments. Thus, the pathoanatomy could be envisioned outside of its embodiment in particular patients and imagined as an entity unto itself—the "disease." The disease *itself* could then be studied independently (the foundations of basic science medical research) with the aim being the development of medical interventions to prevent, halt, or reverse the process; or, with surgical interventions, to excise and/or reconstruct it—and patient outcomes would follow.

The subsequent and continued growth of this "biomedical model" of disease is tied to its success in facilitating the treatment of patients for multiple disease and illness states. Aiming chemical or mechanical treatments at underlying pathophysiology and pathoanatomy has, frankly, changed the (developed) world. Medical and

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surgical textbooks from a century ago are filled with chapters on polio, systemic tuberculosis, tertiary syphilis, and the crippling effects of primary, developmental, infectious, or traumatic disease of the hip and knee joints. Much that once haunted, the world is now relegated to case studies and those geographic areas lacking the infrastructure, finances, and/or the desire for the delivery of care.

The Rise of the Biopsychosocial Model

Despite leading to success in the treatment of many disease processes, however, some difficult and important medical problems have proven resistant to the biomedical model. They are difficult in that no *unique* underlying pathoanatomic/pathophysiologic lesion has been identified, and the outcomes of treatment are less than ideal. And they are important because they are common and costly. Although many examples exist (pelvic pain in women, temporomandibular joint disorders/facial pain, myofascial pain syndromes, some psychiatric illnesses, *etc.*), perhaps none is more important than our own—persistent low back pain. Such importance has been well documented and is measured in pain (literally for the patient, figuratively for the physicians and families), soaring disability rates, and costs measured in billions of dollars.²

Although the pathoanatomy and pathophysiology of degenerating discs have been, and continue to be, delineated; the pathoanatomic differences between those that are diseased (a source of pain, disability, *etc.*) and those that are just aging asymptotically have not been discovered, and a connection between such pathology and pain/disability is unclear. The tightly linked connection between clinical assessment, pathologic diagnosis, treatment aimed at the pathology, and outcomes is lacking.

This is bothersome to many in our field on two fronts: (1) despite this poor fit of persistent low back pain/degenerative disc disease to the biomedical model, many involved in spine care persist in acting *as if* the fit was tight as evidenced surgically by increasing fusion and arthroplasty rates; and nonsurgically by the proliferation of therapies, pain management techniques, and alternative treatments—despite less than ideal outcomes. (2) On close examination of the outcomes, they appear highly associated with biologic, psychological, and social issues that lie outside of the “degenerated disc.” Persisting low back pain in the presence of underlying disc degeneration develops far more frequently in patients who at the time of initial evaluation have a high level of fear avoidance, psychological distress, disputed compensation claims, involvement in litigation, and job dissatisfaction.³ Beyond this, only about 20% of patients with gross/destructive spinal pathology compared to 80% of those with isolated degenerated discs demonstrate psychological distress on psychometric testing or have disputed compensation claims.^{4,5} And these psychosocial factors correlate tightly with treatment failure⁶—more

than any specific known underlying pathophysiologic findings.

Accordingly, the biopsychosocial model of illness (initially proposed/formalized within psychiatry by Engel in 1977⁷), has been applied to persistent low back pain. The proponents of this model believe that the complex, multidimensional nature of persistent low back pain does not lend itself to the clean reductionist program of the biomedical model. Instead of pointing to the underlying pathophysiology in isolation, the patient’s unique biologic, psychological, and social factors—medical comorbidities, illness beliefs, coping strategies, emotional reactions, fear and depression, employment, and economic concerns—must carry equal, if not primary, weight. As a result, the clinician is presented with a set of biologic and psychosocial factors with which to explain why people persist with back pain and a set of alternative tools, addressing these factors, with which to treat patients.⁸

This biopsychosocial model has gained widespread acceptance within the spine care community and its implementation has had a significant impact on the ways in which spine care is delivered. Its acceptance is clear:

Gatchel⁹: “(The biopsychosocial model) is the most commonly used and heuristic approach to the understanding, assessment, and treatment of spinal pain/disability disorders.”

Waddell¹⁰: “It is now widely recognized that spinal pain and disability can *only* be understood and managed according to a biopsychosocial model.”

Its implementation is equally clear. The biopsychosocial model forms the basis of the World Health Organization’s International Classification of Functioning, Disability, and Health.⁹ Within spine care, our most widely used outcome measures (and the subsequent use of that which is measured to produce guidelines for evidence-based care, determine reimbursement rates, . . . *etc.*) are based on our consensus belief that the biopsychosocial model accounts for what matters in patient end results. The SF-36, SF-12, Sickness Impact Profile, Pain Disability Questionnaire (PDQ), Million VAS, Roland-Morris Disability Questionnaire, and others are focused on, and have gained “validity” and widespread use, based on their ability to measure biopsychosocial status/change.¹⁰ And they have nearly completely replaced older pathoanatomic measures of outcome. The SPORT trial,¹¹ for instance, will provide/has provided us valuable information on the outcomes of interventions aimed at disc herniations and stenosis using the SF-36 and ODI. And this information will likely direct the care of future patients (including providing “guidelines for care” and acceptable reimbursement based on DRGs) with these problems with relatively little regard for postoperative physical examination, MRIs, CT/myelograms, or other studies, which detect pathoanatomic and pathophysiologic outcomes—outcomes no longer highly valued as the biopsychosocial model has supplanted the traditional biomedical model of disease.

To summarize what has been discussed so far: during the last 30 to 40 years, there has been a significant conceptual shift from pathoanatomically grounded disease within the biomedical model; to contextually grounded illness within the biopsychosocial model. This shift is important because of its impact on the ways we assess outcomes and the ways these measured outcomes have been used/will be used to guide patient care.

Despite its importance/impact in our daily practices, however, remarkably little attention has been paid to possible concerns regarding the biopsychosocial model and their possible repercussions. These will be discussed in what follows.

Concerns Regarding the Biopsychosocial Model

1. As noted, the rise of the biopsychosocial model has led to the inclusion of these factors in our most commonly used outcome assessment methods. Not surprisingly, then, with the increased use of these measures in spine care, more and more associations between outcomes and psychosocial factors have been found—the answers one gets are most tightly linked to the questions one asks. (A lesson often learned the hard way in the history of medicine!). It must be kept in mind that our currently used measures do not, and cannot, assess factors outside of those measured and it may be that these unmeasured (and unforeseen) factors are responsible for the successes/failures of interventions. The currently measured outcomes are about what we have chosen to include in our field of vision and may represent secondary/dependent outcomes of factors lying outside of that “visual” field, which may or may not turn out to be pathoanatomic/pathophysiologic in nature. Indeed, this has been discovered to be true for many disease processes, which have long been tied to epidemiologically derived general “risk factors” and has resulted in a considerable shift toward “life-course” epidemiology aimed at determining temporal, biologic influences, and away from the demonstration of more and more psychosocial snapshot associations.¹²

Outcomes assessment is not a done deal. Our patients’ and society’s opinions as to what count as *important* outcomes may vary and are evolutionary. Accordingly, the validity of measures in particular application and over time is subject to change and is in need of continual re-examination.

2. As noted, the rise of the biopsychosocial model’s application to spine problems is tied to the disconnection between our current understanding of spinal pathology and back pain/disability and the apparent connections between psychosocial factors and pain/disability. The history of medicine, however, is filled with tales of diseases with insufficiently understood etiologic pathology and poor outcomes of treatment being inappropriately correlated (in its worst forms, etiologically/causally) with psychosocial phenomena. This point has been clearly delineated by the epidemiologist Davey Smith¹³: Cholera was due to stress and “moral” factors, and the

plague in England of the 1500s was felt to be due to an underlying unhappiness of the victim. Asthma, Down syndrome, scurvy, and yellow fever all had similar stories. In our lifetimes, coronary artery disease was tied to Type A personalities/behaviors and peptic ulcers to psychosocial stress. Incomplete science and epidemiology (at an elementary stage) were to blame. And although it is clear that our science and epidemiology have evolved, taking the next step and declaring that, in the case of persisting spinal pain, psychosocial factors are primary is worrisome.

Davey Smith quotes Avery Jones in 1948:

There have not been any major advances in the treatment of gastroduodenal ulcer. A better appreciation of the natural history of the disease has directed the treatment away from the ulcer towards the individual as a whole The recognition of the psychological aspects of the disease has the virtue of therapeutic application. If the physician can listen to the unburdening of a tragic tale, often untold to other ears, he may relieve a nervous tension which has been reflected on the stomach. If the patient can learn to appreciate the inter-relation between mind and stomach, he may be able to minimize his symptoms

It is certainly interesting (and easy) to substitute much of the current-day biopsychosocial argument against the biomedical model of persistent low back pain into the quotation above. What is far more interesting, however, were the consequences of these beliefs. At Avery Jones’ center, 27 of 400 admissions for ulcers died under care directed by psychosocial care. And in retrospect, epidemiologists now believe that adequate information was available at that time to suggest an underlying infectious pathophysiologic source (which turned out to be the bacteria *H. pylori*), and treatment aimed at infection had been studied and recommended.

Although acknowledging the current shortcomings of the biomedical model of persistent back pain and degenerating discs, we must keep in mind that much of what history has taught us about disease suggests that simple pathoanatomically based biomedical theories of causation often work beautifully and that embracing contextual complexity may head us in a peripheral direction—diverting our field of vision to potentially secondary, reflected factors. We must continue to pursue pathoanatomic/pathophysiologic explanations for low back pain, explore life-course studies, which can biologically tie the two models, and keep an open mind to outcome measures and treatments, which have such explanations as a base.

3. The third concern regarding the biopsychosocial model is its scientific status. A key ingredient to scientific theories is that they are testable/falsifiable.¹⁴ From the perspective of the biomedical model, it could be hypothesized, for instance, that traumatic disruption of the outer ring of the disc (“anular tears”) may be the essential pathologic lesion responsible for low back pain. This theory could be tested and falsified (rejected by the medical scientific community) by the discovery of a high per-

centage of asymptomatic people with tears, symptomatic people with no evidence of tears, no clear subgroup between the two with isolated tears and pain, and failure of tear presence/absence to impact outcomes. We could reject this theory and move on to other possibilities.

It is unclear that the biopsychosocial model allows such testing/analysis.¹⁵ Given its contextual, holistic nature, it appears as though the hypothesis can always be made to work. A patient may be depressed, have poor coping skills, and be in litigation with worker's compensation. If he undergoes surgery and fails to do well, we failed to consider the "psychosocial" as opposed to the "bio." On the other hand, if he does well, his is more bio than psychosocial. All cases fit. Being an all-inclusive explanatory hypothesis provides an always-ready explanation, but comes at the price of our inability to prove the hypothesis wrong, which is at the heart of the medical/scientific method. More fruitful information is likely to be garnered by taking the exceptions to our theoretically expected outcomes seriously and searching for their sources.

4. The biopsychosocial model is based on the premise that illness is a complex synthesis of biologic, cognitive, psychological, and social factors. Ontological differences (these are really different "kinds" of things) make understanding the relative contribution of each factor to an individual patient's illness difficult (poor explanatory power), make predicting the illness characteristics, which might come forth in future patients, troublesome (poor predictive/prognostic power), and, as noted, make discussion about causation impossible. Philosophers have fretted for millennia over mind/body interaction and implementing models based on debatable premises must itself be subjected to debate.

5. The outcomes of treatments for persistent spinal pain based on the biopsychosocial model are just now being studied, and there is conflicting evidence to date of their effectiveness in decreasing pain and improving function. Two well-controlled trials^{16,17} have demonstrated effectiveness when biopsychosocial directed treatments are implemented in an intensive inpatient setting when compared with "usual forms" of outpatient rehabilitation. However, the improvements are modest, it is unclear whether they are lasting, and it is unclear whether they will justify the costs in light of contradictory evidence regarding their benefit when measuring vocational outcomes—a vital psychosocial measure. An additional recent study¹⁸ (albeit less methodologically sound) suggests that such interventions might be detrimental to outcomes by slowing the time to recovery. In the end, it is hoped that such interventions will prove of benefit for these difficult patient problems. That said, it is worth noting that demonstration of therapeutic effectiveness does not/cannot validate the underlying theory, especially as it pertains to etiology/causation. For example, Attention Deficit Hyperactivity Disorder in children can be effectively managed with modern treatments such as sedatives or via older treatments such as a yardstick to

the back of the hand. However, the disorder is clearly not due to an intrinsic deficiency of Ritalin or corporal punishment. Although the aim is, and rightly should be, the best outcomes for our patients; satisfactory outcomes provide us no deeper knowledge than "this seems to work for what we care to measure."

6. Another concern is the ubiquity of biopsychosocial "pathology." A recent study in nonpatients demonstrated that 49% of "healthy" people demonstrated biopsychosocial dysfunction on standardized questionnaires.¹⁹ Is the relationship of reported findings on our commonly used outcome measures to biopsychosocial pathology similar to the relationship between "black discs" and low back pain? The vital lesson learned from Boden's classic MRI studies²⁰ is that—as it pertains to causal and therapeutic inferences—we need more/better/different information than what is currently available if our tests cannot differentiate the normal from the pathologic.

7. A final concern regarding the biopsychosocial model is a more practical one. Does the model encourage the further medicalization of the patient and is such medicalization ultimately profit (and not outcome) driven? Proponents of the biomedical model have often been criticized for obtaining test after test—radiographs, MRI, discograms, EMG/NCT's—thereby instilling in the patient a belief that some underlying unique pathologic lesion exists.²¹ When none is found, the patient finds another physician, and another, until that physician *finally* recognizes the pathophysiologic problem and sets out to fix it by fusion or some other surgical intervention. Similarly, proponents of the biopsychosocial model engage multiple professionals. A recent study describes a biopsychosocial "healthcare team" composed of spine physicians, chiropractors, physiotherapists, dieticians, pharmacists, recreational therapists, vocational counselors, psychologists, psychiatrists, physiatrists, and pain management physicians.¹⁸ What Hadler has noted regarding the first scenario²¹ (regarding the biomedical model) applies to the second (regarding the biopsychosocial model) with equal force that persistent low back pain has become a problem (disease/illness) that suffering patients are desperate to get fixed and an eager, market-based (and, now, multidisciplinary) medical community is more than happy to treat.

■ Conclusion

The biopsychosocial model has been widely accepted within the spine care community, plays an important role in how we currently provide care for our patients, and will help to determine how we do so in the future. Just as the biomedical model allowed, and continues to allow, significant medical advances via the objective study of pathoanatomic disease; the biopsychosocial model has afforded similar advances by emphasizing illness experienced within the patient's biologic, psychological, social, and economic milieu. Thus, the strength of the model is its service as a clear reminder that a

patient with persistent low back pain living in difficult social conditions is more complex than patients who are not.

But this is not a new concept, or a concept that excludes the biomedical model, or a concept that provides insight into causality, or a concept (without clear evidence) that demands we establish multidisciplinary spine centers. Rather it is a concept that simply asks that we consider a patient's psychosocial context before implementing care. This is, of course, a reasonable and wise request, but it may not be one that needs to be imbedded within a theory or model. And while embracing the concept may ultimately help our patients (future RCTs will tell), its widespread implementation and impact when so imbedded in theory form requires that we should be well aware of, and carefully examine, potential implications and problems inherent in its acceptance.

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