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Standardizing an evidence-based method for presurgical psychological evaluations

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Failed spinal surgeries are costly, necessitating a thorough consideration of the risks and benefits of surgery for all patients. Presurgical evaluations take into consideration many important factors known to predict postsurgical outcome. These evaluations rely on the assessment of risk factors including biological variables, medical treatment aspects, environmental aspects, and psychosocial dynamics.[1] Two systematic reviews of the literature[2,3] have identified a similar set of biopsychosocial risk factors that are predictive of spinal surgery outcome. The purpose of this translational science study was to combine the findings of these two studies, and to produce a standardized method of assessment based on the identified evidence-based risk factors.

METHODS

Data was collected from 108 sites in 36 states using the Battery for Health Improvement 2 (BHI 2). This data was stratified to match U.S. census data. Two main groups were utilized: A 527 member patient group, and a 725 member community group (Table 1). Presurgical evaluation norms were created for each of these groups based on the findings of the Celestin et al. (2009) and den Boer et al. (2006) systematic reviews, each of which independently reviewed the existing literature with the goal of determining the statistical significance of a multitude of predictors of surgical outcome across a large pool of past studies. While the two reviews used highly similar criteria for including studies into their analyses, one large difference in criteria did exist. The Celestin study chose to exclude all non-English studies, whereas the den Boer study included them. It should also be noted that several studies selected for inclusion did overlap between the two reviews. These studies were only counted once when combining the results.

The initial combination of predictors we selected was chosen based on the inclusionary criteria of the studies from which they were selected. Risk factors were only included in this study if in either review, over 50% of studies which tested the risk factors yielded positive results. If one review had significant findings for a variable and the other review did not, the variable was still included in our analyses. In two cases, function and age, this methodology resulted in the overall combined results of the two reviews to be below 50%, despite at first glance appearing to be above or at 50% in both reviews. This was due to counting studies only once even though they were included by both reviews. Another important note is that the Celestin study did not include job dissatisfaction or education in their variables for review. However, the den Boer study did with highly positive findings, making these two variables strong candidates for inclusion. Variables were excluded altogether if they were medical examination variables and no corresponding BHI item or scale existed, or if the required information was otherwise unobtainable.

Between the two reviews, a total of 14 predictor variables were identified, and out of these depression, anxiety, somatization, education, age, and job dissatisfaction directly corresponded with a BHI item or scale. The remaining eight variables were each paired off with a synonymous (or nearly synonymous) variable in the other review, and then these paired variables were combined into a single predictor variable and matched with a corresponding BHI scale. The end result was the inclusion of ten predictors of surgical outcome: Depression, anxiety, somatization, presurgical pain, function, coping, duration of problems, education, age, and job dissatisfaction (Table 2).

Two methods were used for creating normative scores, one utilizing the ten variables detailed above, and the other using only nine of the ten, excluding job dissatisfaction as a predictor. The reason for excluding job dissatisfaction was that some patients were not in the workforce, due to disability, retirement or choice. The combined scores were then calculated, being twice weighted in the following manner. The scores were assigned weights for scale elevations (e.g. depression > 84th percentile scored as 1 point, > 95th percentile scored as 2 points, and > 99th percentile scored as 3 points). Additionally, a strength of evidence bonus of 1 point was awarded when the research findings were unanimously positive or nearly so for an elevated risk factor.

RESULTS

The psychological category of predictor variables, which includes depression, anxiety, somatization, and coping, were by far the strongest predictors, as each yielded over 80% positive results from the collective studies included in the two reviews. In the case of four of the other variables (function, age, job dissatisfaction, and education), the current evidence is less conclusive, due to either a relatively small sample size or due to mixed results.

It is worth noting that while those in the patient sample had a higher level of risk factors present, the subjects in the community sample were not risk free (Table 3). A one week test-retest yielded a reliability of .96 for both measures (Table 4). These risk factors scores also significantly associated with patient satisfaction with care (subjective outcome), and with employment (objective outcome).

CONCLUSIONS

Using the BHI 2, it was possible to develop a standardized method of assessing surgical risk factors identified by a systematic review of the literature. This risk factor score was highly reliable. As patients scored more highly on this measure than did members of the community, this provides some preliminary support to the measure's validity.

TABLE 1

Demographic Characteristics of Community and Patient Samples

Group		U.S. Census %	Patient % (n=527)	Community % (n=725)
Race	White	75	82	75
	Black	12	7	12
	Asian	3	1	3
	Native American	1	3	1
	Hispanic	9	5	9
	Other	0	1	0
	Not reported	N/A	1	0
Education	Less than high school graduate	28	13	27
	High school graduate	32	26	32
	Some college or technical school	22	40	23
	College graduate or more	18	19	18
	Not reported	N/A	2	0
Age	18-24	17	14	13
	25-44	53	58	50
	45-65	30	29	37
Gender	Male	49	44	46
	Female	51	56	54

TABLE 2

Distribution of Studies with Significant Results for Potential Risk Factors in the Celestin and den Boer Studies

Risk Factor		Den Boer	Celestin	Combined (Overlapping studies counted only once)	Corresponding BHI Variable
Depression		3/7	13/16	15/18	Depression
Anxiety		4/5	7/8	9/10	Anxiety
Somatization		3/4	6/8	7/8	Somatic Complaints
Presurgical Pain	Presurgical Pain Intensity	N/A	7/14	9/18	Highest Pain
	Preoperative Pain Ratings	5/7	N/A		
Function	Activity Interference	N/A	7/14	7/15	Function
	Preoperative Disability	3/4	N/A		
Coping	Poor Coping	N/A	3/3	7/7	Symptom Dependency
	Passive Coping	4/4	N/A		
Duration of Problems	Duration of Pain	N/A	5/8	7/9	Duration of Injury
	Duration of Complaints	5/5	N/A		
Education		5/6	N/A	5/6	Education
Age		2/8	4/7	5/11	Age
Work Dissatisfaction		3/3	N/A	3/3	Job Dissatisfaction

TABLE 3

Two Sets of Norms Based on Celestin and den Boer's Evidence

Method		Group	
		Patient (n=527)	Community (n=725)
Weighted Scores	Mean	5.45	3.63
	SD	5.35	3.79
	Median	4	3
	Mode	1	2
Weighted Scores (Excluding Job Dissatisfaction)	Mean	5.14	3.52
	SD	5.11	3.71
	Median	3	2
	Mode	1	2

TABLE 4

Reliability

Method	Test-Retest Correlation
Weighted	.959
Weighted (Excluding Job Dissatisfaction)	.962

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