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CORR Insights®: Shoulder Activity Level is Associated with Type of Employment and Income in the Normative Population Without Shoulder Disorders

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Where Are We Now?

Although preventable illness, injury, disability, and death touch almost everyone, vital health outcomes vary among race, sex, socioeconomic status, military status, and geographic location [3]. Evidence-

based healthcare uses the best evidence to make patient-centered clinical decisions. Therefore, patients are a valuable, and arguably (when coupled with appropriate patient education) the authoritative source of information on outcomes such as health-related quality-of-life, functional status, symptom burden, and health behaviors [8, 9].

However, patient ratings of symptoms, function, or perceived disability is affected by multiple factors, including psychological status, social environment, and activity. Furthermore, patients' preoperative expectations of outcomes after orthopaedic surgical procedures have been shown to vary by diagnosis, age, sex, education, level

of function, and overall health status. For example, regarding improvement in sports activities, younger patients who underwent any type of shoulder surgery had higher expectations versus older patients [7]. While both shoulder pain and disability generally improve after well-indicated surgical intervention, there remains a lack of reliably identifiable risk factors for failure in either or both of these domains.

The patient level of activity can also affect the biological process of healing or success of surgical treatment as well as influencing the patient's perception of the outcome [1]. Moreover, low activity levels can falsely improve scores on many outcome measures—particularly for assessment of sports-related shoulder injuries [11]. Conversely, high activity levels have been correlated with decreased long-term outcomes—particularly implant survival in total joint arthroplasty [4]. These facts would belie that, at least theoretically, there is an ideal level of baseline, preoperative, and postoperative activity level of most orthopaedic conditions and treatments.

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Where Do We Need To Go?

Despite the fact that more than 30 shoulder outcome measures have been described, few measure the activity level (intensity, duration, frequency and type) [11]. The ambitious, but worthwhile, goal of removing or even eliminating barriers to health equity will involve the collective application knowledge of patient-reported, disease-specific, population-specific, and/or anatomically-specific outcomes in an evidence-based model. As much as the activity level and the patient's own goals determine the operative versus nonoperative treatment of ACL injuries, the preoperative/injury shoulder activity level will likely influence the treatment decision for shoulder afflictions. The work by Brophy and colleagues is an important step in this direction.

The Shoulder Activity Scale (SAS) has demonstrated validity and reliability in the evaluation of rotator cuff disease, glenohumeral arthritis, and shoulder instability with known normative data for healthy populations [1, 5, 6, 10]. However, much granularity of information still needs to be defined, as measuring patients' shoulder activity is challenging due to the heterogeneity of individual goals and function from young, competitive athletes to middle-aged manual laborers to elderly patients with rotator cuff dysfunction with or without

osteoarthritis. As a fairly new outcome measure, SAS does not enjoy widespread use in well-developed studies. Therefore, important factors such as the minimal clinically important difference (MCID) and any potential floor or ceiling effects for specific populations or disorders are still currently undefined [10]. Additionally, the scale does not measure a patient's level of activity at a particular point in time; rather the SAS reports the greatest level of activity during the previous year [1]. Subsequently, the SAS is not only susceptible to recall bias on the part of the patient, but the surgeon-researcher may assume that the goal is to resume the preinjury maximum level of activity—an assumption that not only may be false but infeasible. Furthermore, the psychometric properties of the sports module of the SAS have not been tested [1]. Finally, the use of this scale in specific subsets of patients with specific disorders/conditions has not been evaluated [1, 2].

How Do We Get There?

While one underlying premise of the scientific method is that “we don't always know what we don't know,” the goal of works similar to Brophy and colleagues is to identify gaps in our knowledge—what we know or what we think we know. Today, many

health outcomes disparities or inequalities are increasingly defined by the outcomes reported by the patients. Therefore, patient-reported outcomes (PROs) will necessarily remain a cornerstone of future studies. The best methods to obtain PROs are through direct questioning of the patient, as well as using survey methodologies and questionnaire-based studies.

Researchers should remain cognizant of the methodological requirements of such studies and limit bias to include: selection bias, response bias, and responder fatigue. Written questionnaires may bias against patients with low levels of literacy or require multiple versions of the survey in multiple languages, which necessitates the validation of the survey in that particular language. Methodologically-expedient options for survey data collection, such as electronically disseminated surveys, may artificially introduce a selection bias towards patients with access to technology, familiarity with the technology, or the means to have access to such technology. As with all projects, stakeholder buy-in is paramount. Researchers should balance the need to gather the minimum information necessary to answer the research question at hand, rather than yielding to the desire to gather as much information as possible. Efforts to increase response rates, such as remuneration of survey

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responders may decrease the cost-feasibility of the study, while also introducing an unintended confounding variable.

I believe that health outcomes equality is achievable. However, it will take collective effort and it will come about only through multiple, small steps. Future studies focused on shoulder activity level should focus of the currently identified knowledge gaps of MCID, potential floor and ceiling effects, and the potential prognostic value as applied to specific subset of populations with shoulder conditions/afflictions.

References

1. Brophy RH, Beauvais RL, Jones EC, Cordasco FA, Marx RG. Measurement of shoulder activity level. *Clin Orthop Relat Res.* 2005;439:101–108.
2. Brophy RH, Lin K, Smith MV. The role of activity level in orthopaedics: An important prognostic and outcome variable. *J Am Acad Orthop Surg.* 2014;22:430–436.
3. Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. CDC health disparities and inequalities report. Available at: <http://www.cdc.gov/mmwr/pdf/other/su6203.pdf>. Accessed July 18, 2016.
4. Dorey FJ, Amstutz HC. The need to account for patient activity when evaluating the results of total hip arthroplasty with survivorship analysis. *J Bone Joint Surg Am.* 2002;84A:709–710.
5. Henn RF, Ghomrawi H, Rutledge JR, Mazumdar M, Mancuso CA, Marx RG. Preoperative patient expectations of total shoulder arthroplasty. *J Bone Joint Surg Am.* 2011;93A:110–115.
6. Hepper CT, Smith MV, Stegner-May K, Brophy RH. Normative data of shoulder activity by age and sex. *Am J Sports Med.* 2013;41:1146–1151.
7. Mancuso CA, Altchek DW, Craig EV, Jones EC, Robbins L, Warren RF, Williams-Russo P. Patients' expectations of shoulder surgery. *J Shoulder Elbow Surg.* 2002;11:541–549.
8. National Quality Forum. Patient reported outcomes (PROs) in performance measurement. Available at: http://www.qualityforum.org/Publications/2012/12/Patient-Reported_Outcomes_in_Performance_Measurement.aspx. Accessed July 18, 2016.
9. Remmers C, Hibbard J, Mosen DM, Wagenfield M, Hoyer RE, Jones C. Is patient activation associated with future health outcomes and health-care utilization among patients with diabetes? *J Ambul Care Manage.* 2009;32:320–327.
10. Smith MV, Calfee RP, Baumgarten KM, Brophy RH, Wright RW. Upper extremity-specific measures of disability and outcomes in orthopaedic surgery. *J Bone Joint Surg Am.* 2010;94A:277–285.
11. Wright RW, Baumgarten KM. Shoulder outcome measures. *J Am Acad Orthop Surg.* 2010;18:436–444.