

## Editorial

# Risk Stratification: Perspectives of the Patient, Surgeon, and Health System

### Introduction

A recently submitted letter on risk stratification and risk adjustment in spine surgery was submitted by Dr. Michael Vitale. It brought up many questions that need to be addressed in this process, and I decided to present it as guest editorial rather than a letter.

John E Lonstein  
Editor-in-Chief



Recent efforts on the part of the Scoliosis Research Society (SRS) and others to determine risk factors for complications, surgical site infection, and mortality after spine surgery should be applauded [1,2]. A clearer understanding of preoperative risk is a necessary prerequisite and first step in optimizing care. As surgeons, we need help understanding “when to say no,” when to “slow the machine” and focus resources on preoperative optimization, and when to consider more “limited goals surgery.” Clearer and more accurate risk adjustment is also critical as big data is increasingly available in the public domain. Unless such data accurately adjusts for risk, such reporting will have the unintended consequence of hindering access of more complex patients to appropriate care. We have seen this in early efforts of cardiac surgery reporting [3,4]. Scoring efforts of hospitals and surgeons require a careful balance of transparency with sufficient validity and reliability [5].

Although administrative data can be used to provide some limited information regarding host factors, we must remember that most of these data sources were not created for this purpose and will have limited granularity in this regard. We must carefully seek a balance between what is easily measured and what is important to measure as Donabedian cautioned in his classic 1966 paper [6].

Moreover, risk stratification needs to extend beyond a focus on preoperative host factors and will need to ask hard questions regarding variability in the surgical intervention. We still have a long way to go before we can quantify how

much the relative risk of infection is driven by host factors like diabetes and obesity, systems factors like appropriate antibiotic administration and use of preoperative chlorhexidine gluconate, or technical factors such as time in the operating theater and blood loss, which likely serve as proxies of surgical skill. Finally, what about postoperative care and disposition?

Prior efforts have attempted to elucidate the role of the hospital and surgeon in complication rate and reoperation rate variations [7] and found that hospital effects accounted for 8.8% and surgeon effects account for 14.4% of variability in complications. Surgeon factors accounted for 54.5% of variation in hospital reoperation rates and 47.2% of variation in hospital complication rates. Prior studies have indicated wide variability in pediatric spine surgeon practices to prevent surgical site infection [8], correlations in hospital volume and operative mortality for high-risk surgery [9] leading to policy changes to eliminate low-volume surgery [10], and associations in variation of surgical outcomes and compliance with safety practices [11]. As a result, structural measures such as intensive care unit staffing and National Quality Forum–Endorsed Safe Practices have been developed by organizations like the Leapfrog Group to attempt to account for some of these differences when rating hospital quality [12]. However, further efforts are needed to determine whether these practices, in particular quality improvement interventions, impact risk stratification and the ability to predict health outcomes for patients.

While improved quantitative and prognostic stratification of risk is an essential prerequisite to the timely evolution of optimized delivery of care in spine surgery, these efforts must evolve in a sensible, rational manner to avoid unintended consequences which may be unfairly punitive to providers and patients.

Kevin Wang, BA  
Michael Vitale, MD, MPH\*  
*Department of Orthopedic Surgery*  
*Columbia University Medical Center, 3959 Broadway*  
*CHONY 8-N, New York, NY, 10032, USA*

\*Corresponding author. Department of Orthopedic Surgery  
Columbia University Medical Center  
3959 Broadway, CHONY 8-N, New York, NY 10032 USA.  
Tel.: (212) 305-5475;  
fax: (212) 305-8271.  
E-mail address: [mgv1@cumc.columbia.edu](mailto:mgv1@cumc.columbia.edu) (M. Vitale)

<http://dx.doi.org/10.1016/j.jspd.2015.11.003>

## References

- [1] McLeod L, Flynn J, Erickson M, et al. Variation in 60-day readmission for surgical-site infections (SSIs) and reoperation following spinal fusion operations for neuromuscular scoliosis. *J Pediatr Orthop*. 2015. [Epub ahead of Print]
- [2] Schoenfeld AJ, Ochoa LM, Bader JO, et al. Risk factors for immediate postoperative complications and mortality following spine surgery: a study of 3475 patients from the National Surgical Quality Improvement Program. *J Bone Joint Surg Am*. 2011;93:1577–82.
- [3] Green J, Wintfeld N. Report cards on cardiac surgeons—assessing New York State’s approach. *N Engl J Med*. 1995;332:1229–33.
- [4] Shahian DM, Normand SL, Torchiana DF, et al. Cardiac surgery report cards: comprehensive review and statistical critique. *Ann Thorac Surg*. 2001;72:2155–68.
- [5] Friedberg MW, Pronovost PJ, Shahian DM, et al. A methodological critique of the ProPublica surgeon scorecard. Available at: <http://www.rand.org/pubs/perspectives/PE170.html>. Published 2015. Accessed October 15, 2015.
- [6] Donabedian A. Evaluating the quality of medical care. *Milbank Mem Fund Q. Milbank Mem Fund*. 1966;44(3 suppl):166–206.
- [7] Martin BI, Mirza SK, Franklin GM, et al. Hospital and surgeon variation in complications and repeat surgery following incident lumbar fusion for common degenerative diagnoses. *Health Serv Res*. 2013;48:1–25.
- [8] Glotzbecker MP, Vitale MG, Shea KG, et al. Surgeon practices regarding infection prevention for pediatric spinal surgery. *J Pediatr Orthop*. 2013;33:694–9.
- [9] Finks JF, Osborne NH, Birkmeyer JD. Trends in hospital volume and operative mortality for high-risk surgery. *N Engl J Med*. 2011;364:2128–37.
- [10] Urbach DR. Pledging to Eliminate Low-Volume Surgery. *N Engl J Med*. 2015;373:1388–90.
- [11] Brooke BS, Dominici F, Pronovost PJ. Variations in surgical outcomes associated with hospital compliance with safety practices. *Surgery*. 2006;151:651–9.
- [12] Austin JM, D’Andrea G, Birkmeyer JD, et al. Safety in numbers: the development of Leapfrog’s composite patient safety score for U.S. hospitals. *J Patient Saf*. 2014;10:64–71.