



Editorial

Patient Safety in Spinal Deformity Surgery: The Development of Standard Work Protocols, Moral Hazard in Decision Making, and the Need for Prospective Validation and Protocol Adoption



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Patient safety is a central consideration in informed decision making regarding the appropriate management of spinal deformity. Appropriate use of surgery and non-operative care is based upon a patient-specific evaluation of the risks of care strategies compared with the expected benefits of care [1]. Surgical intervention for the management of adult spinal deformity is associated with significant risk of complications, readmission, reoperation, and mortality [2-4]. Surgical management of adult spinal deformity has also been demonstrated to lead to significant and measurable improvements of domains of health status for patients, including pain, function, and disability [5,6]. In patients with more severe disability and older age, greater expected benefits of surgical intervention may validate a higher risk of perioperative complications [7,8]. Informed

decision making for physicians, surgeons, and patients requires careful consideration of expected risks and benefits of care, and patient-specific assessments based upon factors that have a significant predictive value regarding risk of care and outcome of care.

Appropriate use of surgery in the management of adult spinal deformity is based upon patient and procedural factors, many of which may be modifiable [9,10]. Appropriate use criteria is a strategy for informed choice and rationale decision making that is based upon an assessment of the expected risks of care compared with expected benefits of care. The stakeholders involved in decision making include the patient, the physician, the hospital or healthcare system, and the payer. The apparent risk and perceived benefits of care may vary significantly between stakeholders. For the patient, the balance of risk and benefit is most direct, and the patient is the person who is most directly affected by surgical complications, including mortality, and most directly influenced by the potential gains that surgery may yield regarding health-related quality of life. The balance of perceived risk and benefit for the payer, the hospital or healthcare system, and for the surgeon may vary significantly from the patient perspective. Specifically, considerations of cost, reimbursement, tort, and mission may lead to a dissociation of the perceived risks and benefits of care. This dissociation of perceived risk and benefit creates a potential for moral hazard in decision making, and may significantly distort the process leading to appropriate use of care. Payment reform and health system reform have the potential to share risk of care, and incentivize accountability for the outcomes of care, and thereby align all stakeholders in the process of choosing appropriate care for the individual patient.

Standard work protocols are health system reforms that apply LEAN methodology to improve quality and consistency of care. This edition of Spine Deformity publishes a two part systematic review that identifies patient and

procedural factors that are associated with complications, reoperations, and readmissions in adult deformity surgery. The factors identified provide the basis for health system reform through development of evidence-based standard work protocols. The authors identified 12 patient or procedural factors that may be modifiable, and they performed a systematic review of the literature to determine the level of evidence to support the inclusion of each factor into a standard work protocol. Overall, optimization of patient specific factors including preoperative hemoglobin, bone density, body mass index, nutritional status, smoking cessation, preoperative mental health status, frailty, vitamin D levels, and blood sugar management may be factors to include in a standard work protocol in preparing patients for adult spinal deformity surgery. Procedural factors including use of transexemic acid and optimized fluid management strategies may also be included in standard work protocols to optimize care for patients with adult spinal deformity. The development and implementation of a specific standard work protocol for generalized adoption by centers performing spinal deformity surgery remains a challenge and a priority. Prospective validation of a standard work protocol will be a useful contribution to health system reform in spinal deformity surgery.

The state of the art review in this issue of Spine Deformity is on Safety in Complex Spine Surgery. The authors provide a review of the literature regarding specific protocols for improving patient safety in complex spine surgery, and they propose the use of standard work protocols preoperatively, intraoperatively and post-operatively to improve patient safety. The spine safety protocols reviewed include the Northwestern High-Risk Spine Protocol and the Seattle Spine Team Protocol [11,12]. Both protocols involve multidisciplinary conferences to coordinate care, and protocols for the pre-operative, intraoperative, and post-operative management of patients. While both protocols demonstrate measurable improvement in patient safety, the efficacy of neither protocol has been validated in prospective study, and the adoption of either protocol has been limited by other major deformity centers. The development of standard work protocols that are based upon factors that are associated with complications and outcomes remains a priority for health system reform in spinal deformity surgery. The articles in this edition of Spine Deformity provide important information that will be useful in the development of standard work protocols to improve patient safety in complex spine surgery. The implementation and widespread adoption of standard work protocols will require validation of efficacy in prospective study, and alignment of the perceived risk and benefit of adult spinal deformity surgery among all stakeholders.

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