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**Foreword: Patient Safety: Examining Every Aspect of Every System to Improve Outcomes**  
Ronald F. Martin  

**Preface: Captain of the Ship**  
Feibi Zheng  

**A Human Factors Approach to Surgical Patient Safety**  
Tara N. Cohen, Bruce L. Gewertz, and Daniel Shouhed  

This article explores the role of human factors engineering in patient safety in surgery. The authors discuss the history and evolution of human factors and the role of human factors in patient safety and provide a description of human factors methods used to study and improve patient safety.  

**Teamwork and Surgical Team-Based Training**  
Akemi L. Kawaguchi and Lillian S. Kao  

Effective teamwork, both in and out of the operating room, is an essential component of safe and efficient surgical performance. There are multiple available assessment tools for evaluating teamwork and important contributors to teamwork such as safety culture and nontechnical skills. Multiple types of interventions exist to improve and train providers on teamwork, and many have been demonstrated to improve not only teamwork but also patient outcomes. Teamwork strategies can be adapted to different contexts, based on provider needs and resources.  

**Processes to Create a Culture of Surgical Patient Safety**  
Claire B. Rosen and Rachel R. Kelz  

This article discusses the processes, interventions, and methods by which health care systems can change the culture of their workplace to promote safety. The importance of this culture shift is discussed, as well as an organizational approach, highlighting the importance of investment of time and resources to the cause. Efforts must include an educational focus on patient safety where a culture of patient safety is emphasized. This attitude along with several specific key interventions, including, measurement, teamwork, briefings, checklists, and developmental infrastructure, are discussed.  

**Effective Implementation and Utilization of Checklists in Surgical Patient Safety**  
Nikhil Panda and Alex B. Haynes  

The success of patient safety and quality improvement interventions depends, in part, on the effectiveness of implementation. Surgical safety checklists have been introduced into thousands of operating rooms across
6 continents since the debut of the original World Health Organization 19-item checklist in 2008. However, the effect of checklists on patient outcomes has varied. Here, we review 5 examples of large-scale efforts (eg, population level or across health systems) where surgical checklists were introduced into the operating room and the associated effects on patient outcomes. Each experience provides an opportunity to reflect on best practices that inform strategies for effective implementation.

Standardized Care Pathways as a Means to Improve Patient Safety
Elizabeth Lancaster and Elizabeth Wick

The literature overwhelmingly supports standardized, evidence-based care to improve patient safety in the surgical setting, including checklists and enhanced recovery programs. Although local culture, patient complexity, and hospital setting can represent barriers to implanting standardized practices, they can be overcome with thoughtful strategies.

Optimizing Safety for Surgical Patients Undergoing Interhospital Transfer
Angela Ingraham and Caroline E. Reinke

Interhospital transfers play a key role in ensuring that patients receive necessary care. However, patients who are transferred between hospitals are a vulnerable population, and outcomes of transferred patients are suboptimal. Despite the critical nature of interhospital transfers, only limited effort has been dedicated to standardization and improvement of the transfer process. Studying and adapting quality improvement efforts directed at other transitions of care, particularly those that cross between different facilities and care teams “such as the transition from hospital to home or extended care facilities” may improve the care of surgical patients transferred between acute care institutions.

Improving Postoperative Rescue Through a Multifaceted Approach
Amir A. Ghaferi and Emily E. Wells

This article provides a better understanding of how interactions and relationships within hospital microsystems affect rescue. Through structured engagement of clinical champions, these rescue improvement tools may decrease rates of secondary and tertiary complications and enhance staff culture, confidence, and competence. The proposed 3-prong approach sheds light on how health care organizations can better sense, cope with, and respond to the unexpected and changing demands presented by clinically deteriorating postsurgical patients. These interventions lay the groundwork for the further development, testing, and implementation of larger scale rescue-focused initiatives, which could have a direct, population-level impact on mortality.

Provision of Defect-Free Care: Implementation Science in Surgical Patient Safety
Alaina M. Lasinski, Prerna Ladha, and Vanessa P. Ho

Implementation science is the study of the translation of evidence-based practices to real-world clinical environments. Implementation is measured
with specific outcomes including acceptability, adoption, appropriateness, feasibility, fidelity, penetration, sustainability, and implementation cost. There are defined frameworks and models that outline implementation strategies and assist researchers in identifying barriers and facilitators to achieve implementation and conduct implementation research using methods such as qualitative analysis, parallel group, pre-/postintervention, interrupted time series, and cluster or stepped-wedge randomized trials. Deimplementation is the study of how to remove ineffective or unnecessary practices from the clinical setting and is an equally important component of implementation science.

**Evolution of Risk Calculators and the Dawn of Artificial Intelligence in Predicting Patient Complications**

Jerica L. Podrat, Fernando Ramirez Del Val, and Kevin Y. Pei

Risk calculators are an underused tool for surgeons and trainees when determining and communicating surgical risk. We summarize some of the more common risk calculators and discuss their evolution and limitations. We also describe artificial intelligence models, which have the potential to help clinicians better understand and use risk assessment.

**Safety of Surgical Telehealth in the Outpatient and Inpatient Setting**

Shawn Purnell and Feibi Zheng

New telehealth platforms and interventions have proliferated over the past decade and will be further spurred by the COVID-19 pandemic. Emerging literature examines the efficacy and safety of these interventions. Early pilot studies and trials demonstrate equivalent outcomes of telehealth interventions that seek to replace routine postoperative care in low-risk patients who have undergone low-risk surgeries. Studies are underway to evaluate interventions in higher-risk populations undergoing more complex procedures. Tele-ICU platforms demonstrate promise to provide specialized, high-acuity care to underserved areas and may also be used to augment compliance with evidence-based protocols.

**Administrative and Registry Databases for Patient Safety Tracking and Quality Improvement**

Brian C. Brajcich, Chelsea P. Fischer, and Clifford Y. Ko

Acquisition of data on clinical performance is essential to improve outcomes in surgery. Large, national datasets allow hospitals to monitor events involving patient safety, complications, and benchmark against peer hospitals and facilitate quality improvement (QI) development. Although clinical datasets are often preferable, administrative data also have potential for actionable QI. Hospitals should use whatever data resources may be available and be creative in combining data sources for the most clinically meaningful metrics. Although collection of data is essential in understanding the problems an individual hospital is facing, rigorous QI infrastructure is necessary to translate data to action and achieve sustained change.
Adverse surgical events are a major cause of morbidity, mortality, and disability worldwide. Serious reportable events, such as wrong site surgery, retained foreign bodies, and surgical fires, are preventable adverse events that have significant consequences. These “never events” are costly to the patient, health care systems, and society and have led to many efforts to reduce their occurrence. However, these costly events still occur, and more research is needed to obtain a better understanding of their causes and how to prevent them.

The focus on patient safety offers a new framework not only for delivering health care but also for training physicians. Medical school and surgical graduate medical education must transition to a more holistic approach by teaching technical and nontechnical skills. Formalized safety curricula can be developed by adopting recommended guidelines and content from national and international organizations, existing validated practices of training programs, frequent simulation exercises, and objective evaluation tools.