Dissecting Surgeon Behavior
Leveraging the Theoretical Domains Framework to Facilitate Evidence-based Surgical Practice

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As a surgical community, we strive to provide the best quality of surgical care for our patients. We identify gaps within our practices and opportunities to improve outcomes. We create evidence-based practice recommendations to improve patient care. However, most times, we stop there, assuming such recommendations will be readily adopted, but more often than not they aren’t. Providers may be unaware of recommendations, struggle with overcoming local barriers to their implementation, or even disagree with the relevance to their patient populations. As such, the intended impact of guidelines is often suboptimal, failing to lead to measurable and sustainable behavior change. Nonetheless, health systems continue to spend millions of dollars implementing these quality improvement initiatives without systematic implementation strategies, placing these efforts at high risk of failure. Thus, the need for innovative, evidence-based implementation strategies designed to eliminate the differences between theoretical and actual practice is clear.

**IMPLEMENTATION SCIENCE**

Implementation science is defined as the study of methods to promote the integrations of research findings and evidence into healthcare policy and practice, and exists at the intersection of health services, translational and basic science research, and the intended stakeholders. Implementation is defined as “the use of strategies to adopt and integrate evidence-based health interventions and change practice patterns within specific settings.” Effective implementation bridges the gap between science and practice through the development of strategic interventions that take individual and organizational behaviors into account.

A variety of frameworks, models, and theories exist to guide implementation efforts, including the Knowledge to Action Framework, Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM), Precede-Proceed; Robust Implementation Sustainability Model (PRISM); and the Consolidated Framework for Implementation Research (CFIR). For the purpose of this paper, we focus on the Theoretical Domains Framework (TDF), given its ties to evidence-based behavior change techniques. Leveraging the TDF, we propose a stepwise approach to designing implementation interventions and strategies relevant for the surgical provider.

**Step 1—Identifying the Practice Gap: Who Needs to do What Differently?**

Identifying practice gaps is a familiar domain to many surgeons, falling broadly under the umbrella of health services research. A practice gap refers to differences between observed processes and outcomes compared with those achievable based on a current body of knowledge surrounding a problem. Practice gaps vary and may be local to a particular environment, or extend to a regional or national level.

Identifying and addressing practice gaps seems deceptively simple and extends beyond an extensive literature review to establish best practices. Take the extreme example of wrong site surgery. This is a never event with many preventative mechanisms in place (eg, site-side marking, time outs); yet it still occurs. Addressing practice gaps that result in such undesired outcomes requires a deep understanding of “why” the current practice patterns exist, their associated outcomes, and the best ways to support provider behaviors necessary to close the gap. The latter is difficult, especially without a behavioral framework like the TDF to guide inquiry, and highly dependent upon the clinical environment. Other factors outside of the control of the individual providers and local practices (eg, incentives, policy) also need to be considered.

**Step 2—Dissecting Motivation: What Will Prevent and Enable the Desired Behavior Change?**

Once a practice gap is identified, selection of potential interventions to address the gap is a critical, though often poorly informed next step. Providers are expected to change behavior without guidance to do so. Moreover, the reasons for resistance to uptake are not delineated a priori, resulting in a lost opportunity to effectively implement change.

The TDF is an excellent instrument to comprehensively understand and assess the facilitators and barriers of change at the individual level. The TDF is an integrative framework of 14 domains based on 35 theoretical models of human behavior. The domains fall under 3 major categories (capability, motivation, and opportunity) and vary in relevance to implementation interventions based on provider characteristics, practice recommendation, and the clinical environment. Provider behavior is assessed quantitatively, qualitatively, or most often by using mixed methods including stakeholder surveys or interviews according to the TDF domains: motivation (social/professional role and identity, beliefs about capabilities, optimism, beliefs about
consequences, reinforcement, intentions, goals and emotion), opportunity (environmental context and resources, social influences), and capability (physical skills, knowledge, memory, attention and decision processes, cognitive and interpersonal skills, and behavior regulation). The TDF allows us to identify and address the modifiable barriers, and also facilitators of the desired provider behavior change. In the case of wrong site surgery, such barriers and enablers to adhering to established preventative practices could include beliefs about consequence (eg, believing current practices are ineffective and do not prevent harm), knowledge (eg, not being aware of current preventative practices), or goals (eg, the preventative practice is not a priority in relation to other competing demands), and would inform evidence-based intervention.

Step 3—Changing Surgeon Behavior: How do we Best Intervene?

Once barriers are identified, evidence-based behavioral change techniques that correspond to specific TDF domains are used to design implementation interventions that account for and intervene upon the identified barriers. Broadly, barriers that fall under the umbrella of capability, respond best to modeling, environmental restructuring, or restrictions. Those that fall under opportunity, often respond to education, persuasion, and incentives. While those that fall under the category of motivation respond toenablement, training, and coercion. Thus, providing audit and feedback reports, 1 of the most commonly used implementation interventions may be completely irrelevant to closing practice gaps, such as in the case of wrong site surgery, if “knowledge” or “goals” domains are driving provider behavior. This is a critical step to give the desired practice change the best chance of successful implementation.

CURRENT EXAMPLES AND FUTURE DIRECTIONS

While implementation science is an emerging field in surgery, there are areas relevant to surgery that have been explored. Examples, summarized in our Fig. 1, include hand washing, opioid prescriptions after surgery, and overuse of imaging to stage patients with prostate cancer.

Hand Washing

Compliance with hand hygiene on hospital floors is estimated at less than 75%. Physician noncompliance is often cited as the highest among healthcare workers. Traditional interventions have rarely resulted in the desired sustained behavioral change. Without understanding individual barriers, any policy or intervention aimed at changing behavior around hand hygiene may miss the mark despite significant implementation efforts. For instance, the optimal intervention would differ for a surgeon who believed hand sanitizer alone prevented the spread of *Clostridium difficile*, versus if an environmental constraint, such as lack of accessible sinks, was identified as the primary barrier to hand hygiene. One intervention requires “education,” whereas the other requires “changing the environment and resources.” Based on repetitive failed interventions, a few hospitals have leveraged the TDF to design implementation interventions for hand hygiene. Preliminary data support that interventions developed in the context of this framework improve hand hygiene compliance and decrease healthcare-associated infections.

Opioid Prescriptions

Opioid addiction is at epidemic proportions. New persistent opioid use after surgery, whether minor or major, is at 7%. The need to intervene is clear, but complex. Intervention design must account for multifaceted provider motivations to maximize the potential to successfully address this problem. Anecdotal provider concerns range from patient dissatisfaction, resulting in poor provider reviews to loss of autonomy. Such beliefs fall under the TDF domains of “beliefs about consequences” and “social professional role and identity”; the interventions to effectively address each of these barrier domains are quite different. Whereas theory-informed pilot interventions for healthcare providers prescribing opioids are under evaluation, using the TDF to guide evidence-based implementation
interventions has the propensity to curb prescribing habits, ultimately reducing the opioid epidemic burden.8,9

**Prostate Cancer Imaging**

Guidelines for imaging to stage prostate cancer exist; yet they have been plagued by poor compliance. To address this practice gap, and inform interventions to improve guideline adherence, a qualitative study using the TDF was conducted.10 This study identified physicians as the primary decision makers regarding staging, and recommended physician-specific interventions based on identified barriers including: clinical suspicion or years of experience (“beliefs about capabilities”). Additionally, physicians reported that medicolegal concerns, fear of missing associated diagnoses (“beliefs about consequences”), influence from colleagues who image frequently (“social influences”), and the facility where they practice influenced imaging rates (“environmental context”).10 Implementation interventions were then tailored to address these domains and are currently under study.

**CONCLUSIONS**

Successfully addressing practice gaps hinges on effective, evidence-based implementation strategies. We propose that using the TDF to characterize barriers to and enablers of surgeon behavior change are applicable to a wide range of practice gaps in surgery, for example, adherence to protocols for venous thromboembolism prophylaxis or catheter removal, implementation of new techniques into practice, and compliance with surgical guidelines, to name a few. By dissecting and addressing behaviors in an evidence-based, stepwise fashion, strategic implementation interventions may facilitate measurable and sustained surgical practice change.

**REFERENCES**


