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From the Editor

New anticoagulation guidelines…what's next? Implementation!

In the first issue of 2018, there is again a wide variety of articles ranging from original research, case studies, and the STS/SCA/AmSECT Clinical Practice Guidelines: Anticoagulation during cardiopulmonary bypass (CPB) (1). Although all of the articles offer insights into current practices used in perfusion, the article by Mazzone et al. (2) highlights the existence of an emerging bio-marker (microRNAs) for the "severity of cardiac, red cell, and renal injury" during CPB. MicroRNAs are small, non-coding RNA molecules that function as post-transcriptional regulators of gene expression capable of regulating complex biological processes such as the pathophysiological processes related to ischemia/reperfusion injury in different organs (3). MicroRNAs are released from injured cells and represent a molecular marker of ischemia/reperfusion injury in tissues. Although there is much more to learn about microRNAs and their clinical significance, the pilot study by Mazzone et al. (2) highlights the existence of a biomarker that may provide more answers regarding the pathophysiology of CPB.

The anticoagulation guidelines represent an important contribution to perfusion practice. The guidelines were developed by an Evidence-Based Workgroup consisting of members of the Society of Thoracic Surgeons, Society of Cardiovascular Anesthesiologists, and AmSECT. The task force reviewed 96 studies related to the practice and outcomes of anticoagulation during adult CPB. The studies were chosen based on their focus and quality of evidence. A discussion regarding the quality of evidence is available online (see links within guidelines) and is important reading for anyone interested in how guidelines are developed.

The aim of any evidence-based clinical guidelines is to improve the quality of care and ultimately patient outcomes. Although the development of the anticoagulation guidelines represents an important collaborative achievement, it is important to keep in mind that the guidelines represent only the first step in the process for translating the guidelines into practice. To obtain the improvements in clinical practice, the guidelines must be adopted and implemented. Despite the considerable investment in the development of clinical guidelines, the actual adoption of clinical guidelines is highly variable and is at best, suboptimal (4–8). Less than optimal adoption and implementation of guidelines means that the promise of the guidelines in improving patient care may not be achieved (6).

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There is a large body of research that has examined why clinical guidelines are not adopted and implemented. This research has revealed that the adoption and implementation process is complex, that the cognitive processes associated with adoption are not fully understood, and that there does not appear to be any implementation strategy that is effective in all environments or for all guidelines (4,5,8). In short, implementation strategies are not generalizable across environments.

So where does one start to develop an implementation strategy? Research suggests that a good place to start is to identify the barriers to implementation (4,6–10). Should be easy, right? Maybe not! Cabana et al. (4) identified 293 potential barriers to implementation for a variety of different clinical guidelines and environments. In addition to the large number of potential barriers, it appears that the barriers operate at different levels (user, patient, organization, social, and culture) (6). Finally, it appears that the ability to identify the impact of each barrier on implementation is difficult, making it difficult to identify the best strategy (9). All in all, implementation of clinical guidelines is a complex process!

Implementation research has identified three main categories of barriers: barriers to knowledge acquisition, barriers related to clinician attitudes, and barriers related to behavioral change. Barriers to knowledge acquisition include awareness and familiarity. These barriers are related to the volume of information, time available to stay informed, and access to guidelines that all clinicians face. The development and dissemination of the anticoagulation guidelines is a start to overcoming the knowledge barrier as the developers have summarized and updated the large body of anticoagulation study results. The barriers associated with attitude include lack of agreement with specific

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guidelines (i.e., too cookbook, too rigid), applicability to specific patients, lack of a clear cost-benefit ratio for guideline recommendations, lack of outcome expectancy (whether or not change will improve outcomes), lack of motivation to change, and external factors (4). The fact that the anticoagulation guidelines were developed by a collaborative effort and disseminated on three different fronts (perfusionists, surgeons, and anesthesiologists) may help to overcome the knowledge barrier and perhaps the attitude barrier. That still leaves the external barriers which are typically not under the clinician's control. External barriers include acquisition of resources, staffing, re-imbursement, increased costs, and time constraints (4). The external barriers may be difficult to change, but it is still important to identify these barriers.

As suggested by the body of research, identifying and understanding the barriers to implementation is a necessary first step to develop a successful implementation strategy. Another central element is to examine the barriers related to the key recommendations within a guideline versus the entire guideline (7). In this way, it may be possible to tailor strategies to individual recommendations. Whereas implementation of the entire guideline at one time might be a monumental task, incrementally implementing the key recommendations might be do-able. A third element to successful implementation strategies is to develop continuous educational or training opportunities to allow users the opportunity to build new skills (application of the information in a clinical setting) vs. just increasing knowledge. Continuous educational or training opportunities allow for practice and feedback, and thus learning. A fourth element is to determine how the implementation of a recommendation will change clinical behavior (10). This requires a way to measure the impact of a recommendation on the quality of care and patient outcomes. These measurement(s) can be then used for feedback on the progress of implementation within a clinical setting. Finally, the use of standing orders and/or the development of a protocol provide a mechanism for decreasing variability in performance between users (8).

There is a growing body of research into the implementation of clinical guidelines. Three take-home messages that I have taken from my perusal of this body of research are as follows: 1) clinical guidelines are not self-implementing. Just because a guideline is developed and disseminated does not mean that the guidelines will be adopted. 2) Implementation of clinical guidelines must be an active process that goes beyond the distribution of the guidelines. 3) Implementation strategies need to be customized to the institution, and possibly to each key recommendation.

Thank you to all who worked on the development of the anticoagulation guidelines. The guidelines represent a solid starting place for improving the management of anticoagulation in adult patients undergoing CPB, but more work is ahead for those who are tasked with implementing these guidelines.

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