# 2014 ESC/ESA guidelines on noncardiac surgery: Cardiovascular assessment and management

## Are the differences clinically relevant? The USA perspective

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### THE CLINICAL RYDER CUP

The Ryder Cup Championship is an annual golf match between two teams, one represented by professional golfers from the United States and the other represented by professional golfers from Europe. The teams are typically well balanced in terms of skills and experience, and the tournaments, which involve various types of matches, tend to be very evenly paired. Perhaps because of the game's roots as a gentleman's pastime, there has never been a brawl or even any serious verbal abuse, despite the intensity of the competition.

The guidelines for the application of noninvasive testing for the assessment of preoperative risk of noncardiac surgery have been ''independently'' prepared and published by a U.S. committee of skilled and experienced players representing the American College of Cardiology and American Heart Association (ACC/AHA) and by a team of similarly skilled and experienced players representing the European Society of Cardiology and European Society of Anaesthesiology (ESC/ESA). In this issue of the *Journal*, Velasco et al. have prepared a comparison of the latest revision of the US and European guidelines on perioperative cardiovascular evaluation and management of patients undergoing noncardiac surgery.[1] It is the intent of this editorial to point out some differences and similarities between the recommendations of the U.S. and European teams from the viewpoint of the U.S. side of the ''pond'', while a representative of the ESC will prepare another editorial from the viewpoint of the eastern shore of the ''pond''.[2] In the interest of transparency, it is of note that the ''U.S.'' team did include one Canadian while the ''European'' team included players from Israel, Kyrgyzstan, Lebanon, Libya, and Tunisia. No particular significance is attributed to those geographical extensions, although their aggregate impact is unknown.

As in the Ryder Cup, the rules of engagement of the editorials prohibit any pejorative comments about the team players or of the editorialists. So let the game begin!

The final recommendations of both organizations are contained in rather comprehensive, massive, and extensively referenced documents which, although intimidating by virtue of size and scope, represent an excellent summary of the available literature at the time of the writing. The readers are encouraged to spend time with one or the other document or the personally relevant parts of both documents. There is ample opportunity for personal education contained in the reviews and recommendations. Since this editorial is written for the *Journal*, my comments will be focused on the application of the noninvasive testing to the preoperative assessment of risk. This topic is largely discussed in pages 292-297 of the ACC/AHA document[3] and in pages 13–24 of the ESC/ESA document.[4]

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All guidelines use a proscribed method to assess the type and quality of the available literature to support conclusions and recommendations. The reader should be familiar with the schema, which is summarized in the guidelines, themselves. The strongest recommendation is categorized as Class IA, indicating that the treatment or procedure ''*should be performed*'' (Class I) and that the supporting evidence (class A) is derived from multiple randomized trials applied to multiple populations or from a strong meta-analysis. Interestingly, there is no class I indication for preoperative stress testing in the ACC/AHA guideline, while the European guideline only contains a single class I recommendation for preoperative stress testing. Even the class I recommendation is based on level C evidence, indicating that the evidence is based largely on expert consensus with only small studies or registry data to support it. Furthermore, the European recommendations include only two class II recommendations for stress imaging, both of which have only class C evidence to support them. As a result, one can consider the support for any stress imaging during preoperative risk assessment to be very soft, i.e., a very less-is-more approach to preoperative stress imaging in any situation other than the single class IC recommendation for stress imaging in the subgroup of patients with high surgical risk, poor functional capacity, and high clinical risk defined as $\geq$3 of the clinical risk factors in the Revised Cardiac Risk Index (RCRI), which include angina a/o previous MI, CHF, stroke or TIA, renal dysfunction with serum creatinine >2 mg/dL, and diabetes requiring insulin. This sends the message to the clinician that preoperative stress imaging is only appropriate in the subset of patients with high surgical and the highest clinical risk. In contrast, the ACC/AHA guideline does assign a class IIA recommendation for pharmacologic stress imaging when applied to patients with elevated risk and poor or unknown functional capacity (<4METS). There is a substantial difference in confidence about the appropriateness of testing in that scenario.

Primarily, both the ESC/ESA guideline and the ACC/AHA guideline begin with the separation of patients undergoing emergent/urgent surgery vs. elective surgery. Secondarily, both guidelines then consider the presence or absence of active or unstable cardiac conditions. With those two groups excluded from the rest of the pathway, the ESC/ESA guideline has retained three classes of 30-day surgical risk, i.e., low, Intermediate, and high to drive Step 3 of the guideline. Those levels are quantified as <1%, 1–5%, and >5% chance of cardiovascular death or nonfatal MI. The risk assessments of individual operations are provided in the guideline in its Table 3,[4] the basis for which can be found in the work of Glance et al.[5]. Surgical risk then drives the pathway. For low-risk surgery, there is no option for noninvasive testing regardless of functional capacity, other than the possibility of an electrocardiogram in order to monitor the perioperative ECG for any significant changes.

With low-risk surgery off the table, or perhaps on the table (surgical that is), the stepwise ESC/ESA guideline then addresses functional capacity. For subjects with $\geq$4 METS of functional capacity, those undergoing both intermediate- and high-risk surgeries are recommended to have risk factor modification for surgery and may have a baseline ECG for perioperative comparison similar to those patients undergoing low-risk surgery. However, there is no recommendation for any stress imaging protocols.

For patients undergoing intermediate- or high-risk surgery with poor functional capacity, the patients are then dichotomized according to their clinical risk. Those individuals with poor functional capacity who are undergoing intermediate-risk surgery and who have $\geq$1 of the clinical risk factors noted above may be considered for stress testing, while those undergoing high-risk surgery and who have $\leq$2 risk factors may be considered for a resting echocardiogram and biomarkers such as BNP or pro-BNP levels in addition to stress testing. In essence, the difference between the approaches to the intermediate- and high-risk surgical patients with poor functional capacity may be distinguished by as few as 1 clinical risk factor which then only results in the addition of an echocardiogram or a serum marker. This dichotomy seems counter-intuitive and, in fact, if one looks at Figure 1 in the paper by Glance et al.[5], it is apparent that the risk of mortality is very similar in intermediate- and high-risk surgical procedures until the clinical risk assessment; in that case, the American Society of Anesthesiologists' patient status assessment (ASA) becomes IV which indicates the presence of a severe systemic illness that is a constant threat to life. ASA IV patients certainly represent a small minority of the overall population undergoing elective surgery. So distinguishing intermediate- and high-risk surgery is of dubious value.

The updated AHA/ACC guideline recognized that problem and chose to combine the intermediate- and high-risk surgical groups into a single group of subjects with ''elevated risk'', i.e., any risk >1%. However, Step 3 in the ACC/AHA pathway requires not just the risk of the surgical procedure but a combined surgical/clinical risk assessment as provided by one or both of the two major risk indexes, the RCRI and the National Surgical Quality Improvement Program (NSQIP) risk indexes. This represents a major difference in the guidelines. To reiterate, the ESC/ESA guideline initially uses the risk of surgery, then the functional capacity of the patient,

and finally the number of clinical risk factors in its pathway. In contrast, the ACC/AHA guideline uses the combined surgical/clinical risk index first, and then the functional capacity in METS. One can envision a very different result for certain patients following the different guidelines. For example, take an 81-year-old individual undergoing knee replacement with known but stable CAD, a history of a remote TIA and abnormal renal function. In the ESC guideline, the risk of surgery is low, and although the clinical risk factors may be fine-tuned preoperatively and a preoperative ECG may be done, the patient would not be a candidate for any additional diagnostic evaluation. In the ACC/AHA guideline, a patient undergoing less than high-risk surgery with those clinical risk factors would have an estimated risk of 6.6% by RCRI and 1.53% by NSQIP, both indicating intermediate risk and would follow a different pathway that would then branch according to functional capacity, which if low would lead to pharmacological stress imaging. The ACC/AHA guideline may, therefore, be a bit more aggressive when it comes to preoperative stress testing.

Both guidelines use the results of stress imaging similarly, i.e., for low- or intermediate-risk results, patients should be managed medically and sent to noncardiac surgery without percutaneous or surgical revascularization. With a high-risk noninvasive test result, patients should undergo management similar to what they would receive in the absence of any need for noncardiac surgery.

At this point, both guidelines have recommended the use of either the RCRI or the NSQIP risk assessment tools for preoperative risk assessment. However, the indexes are very different and may provide both different quantitative risk assessments for the same clinical scenario. Furthermore, they assess patients for different risk outcomes. The RCRI predicts death, MI, heart block, and pulmonary edema, while the NSQIP index predicts death and nonfatal MI. The clinician has to sort these out as he or she uses the tools to assess any given patient.

At face value, the differences between the two guidelines seem potentially significant. They have different flows, with similar variables appearing at different points in the pathways potentially leading to different risk assessments as noted above. Whether or not there is a clinical difference in the surgical outcomes based on the use of one or the other guideline is and will likely remain unknown unless there is a large cohort-based, prospective trial comparing the two strategies. Both guidelines were written without bias but are based on an inadequate literature. Both guidelines rely heavily on expert consensus rather than rigorous trials yet both send similar overall messages to the clinician. In general, patients undergoing low-risk surgical procedures typically do not require noninvasive testing strategies unless they have high clinical risk that results in an overall intermediate or high surgical/clinical risk assessment. Use of the risk assessment tools is encouraged by both guidelines and the tools are readily available as computer or handheld device applications. Functional capacity is an important modifier in the risk assessment schemes of both guidelines, although it appears at different points in the pathways. Typically, only individuals with poor functional capacity and elevated clinical and/or surgical risk would be candidates for preoperative stress imaging studies. That said, only the clinician taking care of a patient can put the entire picture in focus because there are variables that are obvious at the bedside that do not even appear in the guidelines, such as age, frailty, previous anesthetic/surgical experiences, skill sets and experiences of the available surgeons, and of course patient preference.

The readers of the *Journal* will have to act as ''gatekeepers'' in this process, guiding the clinicians in the appropriateness of testing or lack thereof. Nuclear cardiologists, in particular, must be fluent with the nuances of the guidelines, whether they be U.S. based or European based. Unlike the traditional Ryder Cup, there are no winners and losers in the Clinical ''Ryder Cup'' because there are no data to prove the superiority of one vs. the other. There are differences that may be clinically significant in a particular setting. Regardless of those differences, both sets of guidelines inform better players capable of guideline-based dialogue with their referring physicians to help them navigate the often complicated path of preoperative risk assessment for noncardiac surgery.

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