

EDITORIAL COMMENT

Appropriate and Appropriate Use

What Do These Words Really Mean?*



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The word *appropriate* can be used as an adjective or verb, with very distinct and different meanings (1). As an adjective, appropriate means suitable or fitting for particular purpose, person, or occasion. Key synonyms are pertinent, proper, useful, correct, or good. As a verb, appropriate means to take something for one's own use.

We are privileged in medicine to be able to provide compassionate care to each of our patients. There is no doubt that our primary goal as physicians or health care providers should be to do what is absolutely appropriate and best for each individual patient. That is the appropriate use of our knowledge, skills, and diagnostic-therapeutic interventions. To this old clinician, that is what the term *appropriate use* really means. It is always about the patient (appropriate as an adjective), never about ourselves, especially in this time of "selfies," Twitter, and number of followers on social media (appropriate as a verb).

The push to decrease appropriately ordered tests in clinical medicine today comes from the fact that there has been a dramatic increase in health care spending on services that have not been directly shown to improve patient outcomes (2). Ordering imaging procedures in cardiovascular medicine, such as echocardiograms, when there may not be an appropriate indication or when the results would make no difference in the patient's care or outcome are easily cited as playing a role in the overuse of echocardiograms. With that background, the American College of Cardiology Foundation, as well as the American Society of Echocardiography, spearheaded efforts to

educate practitioners on the appropriate use of echocardiography (3).

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In this issue of the *Journal*, Bhatia et al. (4) continue their excellent work in using various educational interventions in an attempt to decrease the frequency of inappropriate or rarely appropriate (rA) transthoracic echocardiograms (TTEs), ordered in academic medical centers. The investigators are to be complimented for undertaking the first prospective, multicenter, investigator-blinded, randomized trial of appropriate use criteria (AUC)-based interventions aimed at decreasing the number of rA TTEs ordered. The investigators present the results of the Echo WISELY (Will Inappropriate Scenarios for Echocardiography Lessen significantly) trial.

The study involved 179 attending cardiologists and primary care physicians in ambulatory or outpatient settings in 8 hospitals in 2 countries: 7 in Canada and 1 in the United States. These were primarily academic hospitals or ambulatory clinics.

Nearly 15,000 TTEs were ordered over a 16-month period by the 179 physicians, who were randomized into an intervention group and a control group. The intervention group underwent initial educational sessions conducted by email, consisting of a 20-min video lecture that described the AUC for echocardiography and information on how to download the American Society app on AUC. They then received, by email, monthly audits and feedback showing them the number of appropriate, maybe appropriate, and rA TTE that they ordered, as well as the top 5 AUC-specific rA TTE they ordered. The intent was to determine whether the educational video and then the monthly audit feedback would decrease the number of rA TTEs that the intervention group ordered.

The results? At the end of the 16-month study period, the physicians in the intervention arm had ordered a significantly lower percentage of rA TTEs

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than the control group (8.8% vs. 10.1%, respectively). The investigators found the most effective parts of their intervention program were the monthly audits and feedbacks. These functioned like “report cards,” showing each physician’s results compared to those of their peers, as well as list of the most common rA TTEs—sounds like the “morning report” of old, held in front of the chief and your peers.

Again, although the investigators are to be complimented for extending their very important work in the field of AUC, there are some significant limitations to their findings, but also lessons learned that will be of benefit moving forward.

STUDY LIMITATIONS

1. Most importantly, there appears to be no lasting effect or sustainability of their educational intervention once the efforts ended. In fact, the investigators have clearly shown (5) that, once the AUC-based educational intervention was stopped, the number of inappropriate TTEs returned to pre-intervention levels; therefore, the lesson is that some simple ways to continue to educate those who ordered echocardiography on what constituted appropriate use needs to be developed and implemented. The key words are *simple* and *easy*.
2. The physicians, who were supposed to be very busy in an ambulatory setting ordered a very small number of studies (4.8 to 5.3 studies ordered per month by these physicians). It seems that educational efforts would be most effective if they were aimed at the very busiest clinicians or those who ordered the highest number of echoes in both outpatient clinics and inpatient settings.
3. Only a very small number of physicians (54 of the physicians in the intervention group) logged on to the Website monthly to check their results. This could be due to the fact that these physicians were extremely busy or, more likely, that they lost interest or might not have even wanted to know their outcomes. Again, some methods to keep the ordering physicians engaged and to change behaviors is critical. This may involve sharing the audits and feedback not only with the individuals but also among their colleagues, departments, and hospitals. These findings could also be tied to clinical outcomes and financial data.

A key but not really surprising finding of the study was that the most common rA TTEs ordered were those aimed at routine surveillance. The top 3 culprits consisted of: 1) routine surveillance of prosthetic heart valves that have been in place for <3 years, if

there was no known or suspected dysfunction (appropriate use criterion 48); 2) routine surveillance of ventricular function in patients with known coronary heart disease and no change in clinical status for cardiac examination (appropriate use criterion 11); and 3) routine surveillance carried out within a 1-year period in patients with moderate to severe valvular stenosis without a change in the clinical status or cardiac examination (appropriate use criterion 40) (1).

One editorial comment is required here about the terms “changes in clinical status or cardiac exam.” Although changes in symptoms or physical findings are important to take into consideration for the appropriate ordering of TTE, it is well known that patients are often the worst reporters of changes in their symptoms and in fact deny any changes. Think of the patients with aortic valve stenosis who will gradually decrease the level of exertion that makes them short of breath, thereby reporting, when questioned by their attending cardiologist or physician, that they are asymptomatic with exertion. Thus, a change in symptoms, although it sounds good in the AUC documents, may not in fact lead to appropriate ordering of an echocardiogram. This author does not have to tell you, the reader, that clinical skills, especially auscultation, have deteriorated over the last few decades. So, a clear or subtle change in physical findings may go unnoticed.

The appropriate use of a diagnostic-prognostic imaging procedure like echocardiography should be aimed at determining not only if the patient is symptomatic but, possibly more importantly, if the heart is symptomatic. Think of the case of primary mitral regurgitation, where a TTE may offer important prognostic information, such as changes in left ventricular end-systolic size or global longitudinal strain, findings that may well denote a change in ventricular function long before symptoms or decrease in left ventricular ejection fraction appear. These findings, then, are very appropriate in determining where the heart itself is becoming symptomatic, so there is a role for excellent clinical judgment in determining when an echocardiogram is clearly appropriate.

What should we do to make sure that echocardiograms are ordered when appropriate, as they can offer valuable diagnostic and prognostic information?

First, there clearly are inappropriate imaging tests ordered daily. Hence the actions of the American College of Cardiology Foundation and the American Society of Echocardiography are to be applauded for trying to educate health care providers on the appropriate ordering of echocardiograms. From the current paper and others, offering ordering

physicians or health care workers audits and feedback on their ordering activities compared to those of their peers can directly educate them as to the appropriateness of ordering specific echocardiograms in specific clinical situations, but these efforts need to be sustained.

Second, any intervention to try to educate or influence physicians as to what is an appropriate use of an echocardiogram should continue to focus on the top 3 to 5 rA echocardiograms being ordered, often for routine surveillance. These educational activities should be aimed at those physicians, nurse practitioners, physician assistants, or extenders, and even house staff, who order the highest volume of echoes in both inpatient and outpatient settings (point of care).

Third, we should be using natural language processing and automated analytical software that incorporates artificial intelligence (AI) and machine learning in our electronic medical records ordering-reporting systems. If companies such as Amazon can know what your online ordering history and preferences are, why can't similar AI machine-learning

algorithms be applied to the ordering of echocardiograms by individual physicians or health care providers? This could highlight and intervene so that only appropriate echocardiograms are considered. The use of AI and machine-learning algorithms can be used to notify those who are ordering an echocardiogram whether one has been done recently, show the results in a quick and very useful format, and question whether an echocardiogram, if performed at this time, will appropriately improve the patient's care. These same analytics can provide powerful feedback data, not only for individuals but also for the echocardiogram laboratories, clinics, and hospitals, data that will improve quality.

Therefore, the appropriate use of our skills and of any diagnostic test is to do what is best for each patient. It is always about the patient, never about you.

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