

# The need for appropriate use criteria: the proof of the pudding

Patrizio Lancellotti<sup>1,2,\*</sup>, and Madalina Garbi<sup>3</sup>

<sup>1</sup>Department of Cardiology, Heart Valve Clinic, University of Liège Hospital, GIGA Cardiovascular Sciences, CHU Sart Tilman, CHU du Sart Tilman, 4000 Liège, Belgium;

<sup>2</sup>Department of Cardiovascular Research, Gruppo Villa Maria Care and Research, Anthea Hospital, Via Camillo Rosalba, 35, 70124 Bari, Italy; and <sup>3</sup>King's Health Partners, King's College Hospital NHS Foundation Trust, Princess Royal University Hospital, Farnborough Common, Orpington, BR6 8ND London, UK

Appropriateness criteria represent a physician-directed effort to define appropriate utilization of cardiac imaging procedures.<sup>1</sup> Despite multiple iterations of appropriate use criteria (AUC), there is currently no evidence regarding their incorporation and impact on echocardiography ordering in daily practice. This article by Fonseca *et al.*<sup>2</sup> used thematic analysis of the opinions of 17 doctors from an Australian tertiary hospital to identify determinants of appropriate use of echocardiography. The majority of the participants were trainees, including 1st year since graduation, and over 40% did not work within cardiology. There is no Australian AUC for the use of echocardiography, and only 23% of the participants had read the American AUC. The number of participants aware and following practice guidelines (e.g. for the management of heart valve disease or endocarditis) is not specified.

The use of echocardiography by the participants was assessed on hypothetical clinical cases and was found to be strongly discordant with the American AUC. There were inappropriate test requests and also failures to request appropriate tests, in clinical scenarios not only described in the American AUC but also supported by both European and American guidelines for the management of heart valve disease.

Thematic analysis identified factors that influence echocardiography requests, classified as personal, systemic, and related to guidelines and protocols. Personal factors were training and medical experience, management of patient's expectations, uncertainty, and relationships with colleagues as well as workload and mood impact on ordering behaviour. Systemic factors were service availability, availability of previous echocardiogram results, ease of access (distance, waiting time, and physical mobility), private sector (economic incentives and patients affording the cost), and health insurance cover of the test. The participants thought that appropriate use could be improved by education, electronic systems guiding the ordering process, audits, filtering of requests, and electronic records.

The number of participants is extremely low for important conclusions to be drawn regarding the robustness and the ability of the AUC to influence tests ordering behaviour; the attempt of the authors to draw such conclusions is a limitation of this study. Furthermore, the percentage of participants having even read the AUC is very small, and the study population has no direct incentive

to follow the American AUC for echocardiography. The validity of the AUC restricts to the environment (country or continent) they were developed within and for. Additionally, to influence the test ordering behaviour, AUC have to be reinforced through the system reimbursing both the test provider and the test ordering individual. Without incentives and motivation physicians may not consult the AUC, as is the case with this study population. The AUC cannot be exhaustive, however, include the large majority of clinical scenarios encountered in clinical practice, and with sufficient knowledge and experience, physicians will easily match the scenario of their respective patient with the AUC. Moreover, an 'unknown appropriateness' test is certainly never 'inappropriate' and can often be 'appropriate' in specific cases. The AUC adherence is not expected to be 100%, even in the settings of AUC development; however, in this study, the concordance with the American AUC for echocardiography is unusually low. Despite similar lack of adherence incentive, a UK study<sup>3</sup> found results comparable to the results reported by audits and studies performed in the USA<sup>4,5</sup>: only about 10% of tests are inappropriate.

The number of study participants is sufficient for a robust thematic analysis. The strength of this study is the replication of several themes identified as influencing the use of imaging tests, at the beginnings of the AUC development work.<sup>6–10</sup> The identification of these non-medical and non-scientific factors was the very reason for the development of AUC for the use of imaging. The aim of the AUC is to address both underuse and overuse<sup>3</sup> of imaging, both manifested in this study. Underuse may result in incomplete, incorrect, or, as in this study (failure to request a 12-month follow-up echocardiogram in moderate aortic stenosis), in delayed diagnosis. Overuse may result in exposure of individuals to unnecessary risk, delay diagnosis for other individuals waiting for the same test, or, as in this study (repeat echocardiogram at 12 months in mild mitral regurgitation with no change in clinical picture) in unnecessary cost for the patient.

The reasoning behind underuse (elderly patient) or overuse (patient who can afford the cost), the general poor concordance with standard clinical practice and the factors influencing echocardiography requests identified by this study are a proof for the need of AUC in clinical practice: the proof of the pudding. Furthermore, as

The opinions expressed in this article are not necessarily those of the Editors of *EHJCI*, the European Heart Rhythm Association or the European Society of Cardiology.

\* Corresponding author. Tel: +32 (4) 366 71 94; Fax: +32 (4) 366 71 95. E-mail: plancellotti@chu.ulg.ac.be

Published on behalf of the European Society of Cardiology. All rights reserved. © The Author 2017. For permissions, please email: journals.permissions@oup.com.

envisaged by the study participants, besides AUC, an educational intervention involving feedback was recently demonstrated to improve the use of echocardiography.<sup>11</sup>

**Conflict of interest:** None declared.

## References

1. Steeds RP, Garbi M, Cardim N, Kasprzak JD, Sade E, Nihoyannopoulos P et al. EACVI appropriateness criteria for the use of transthoracic echocardiography in adults: a report of literature and current practice review. *Eur Heart J Cardiovasc Imaging* 2017;**18**:1191–204.
2. Fonseca R, Jose K, Marwick TH. Understanding decision-making in cardiac imaging: determinants of appropriate use. *Eur Heart J Cardiovasc Imaging* 2017;doi: 10.1093/ehjci/jex257.
3. Garbi M, Habib G, Plein S, Neglia D, Kitsiou A, Donal E et al. Appropriateness criteria for cardiovascular imaging use in clinical practice: a position statement of the ESC/EACVI taskforce. *Eur Heart J Cardiovasc Imaging* 2014;**15**:477–82.
4. Gurzun MM, Ionescu A. Appropriateness of use criteria for transthoracic echocardiography: are they relevant outside the USA? *Eur Heart J Cardiovasc Imaging* 2014;**15**:450–5.
5. Bailey SA, Mosteanu I, Tietjen PA, Petrini JR, Alexander J, Keller AM. The use of transthoracic echocardiography and adherence to appropriate use criteria at a regional hospital. *J Am Soc Echocardiogr* 2012;**25**:1015–22.
6. Gibbons RJ, Eckel RH, Jacobs AK; American Heart Association Science Advisory and Coordinating Committee. The utilization of cardiac imaging. *Circulation* 2006; **113**:1715–6.
7. Patel MR, Spertus JA, Brindis RG, Hendel RC, Douglas PS, Peterson ED et al. ACCF proposed method for evaluating the appropriateness of cardiovascular imaging. *J Am Coll Cardiol* 2005;**46**:1606–13.
8. Fitch K, Bernstein SJ, Aguilar MD, Burnand B, LaCalle JR, LáZaro P et al. *The RAND/UCLA Appropriateness Method User's Manual. Prepared for Directorate General XII, European Commission.* Santa Monica, CA: RAND; 2001.
9. Douglas PS, Garcia MJ, Haines DE, Lai WW, Manning WJ, Patel AR et al. ACCF/ ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR 2011 appropriate use criteria for echocardiography. *J Am Soc Echocardiogr* 2011;**24**:229–67.
10. Patil HR, Coggins TR, Kusnetzky LL, Main ML. Evaluation of appropriate use of transthoracic echocardiography in 1, 820 consecutive patients using the 2011 revised appropriate use criteria for echocardiography. *Am J Cardiol* 2012;**109**:1814–7.
11. Bhatia RS, Ivers NM, Yin XC, Myers D, Nesbitt GC, Edwards J et al. Improving the appropriate use of transthoracic echocardiography: the Echo WISELY Trial. *J Am Coll Cardiol* 2017;**70**:1135–44.