SPECIAL ARTICLE

VALUE OF SONOGRAPHER CREDENTIALING

Relationship of Sonographer Credentialing to Intersocietal Accreditation Commission Echocardiography Case Study Image Quality

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Background: Cardiac sonographer credentialing may guarantee baseline content knowledge but does not directly evaluate clinical scanning skills. The aim of this study was to determine the relationship of sonographer credentialing status to clinical competence, as defined by image quality of case studies submitted for Intersocietal Accreditation Commission (IAC) adult transthoracic echocardiography laboratory accreditation.

Methods: In this study, data were retrieved retrospectively from the IAC Echocardiography application database for all adult echocardiography laboratories applying online from August 10, 2011, to December 12, 2013. Aortic stenosis (AS) and left ventricular (LV) regional dysfunction case studies were analyzed separately. Sonographers submitting case studies were coded as credentialed or noncredentialed. An image quality score (IQS) was calculated for each case study, reflecting review scores for examination components directly related to image quality and acquisition. The group of sonographers was divided into quartiles on the basis of annual procedure volume; mean case study IQS was compared between credentialed and noncredentialed sonographers.

Results: For all four quartiles of the LV cases and the lowest three volume quartiles of the AS cases, mean IQS was significantly higher for credentialed than noncredentialed sonographers. Mean IQS in the highest volume quartile for AS studies was not significantly different by credential status.

Conclusions: In the setting of IAC Echocardiography accreditation, credentialed sonographers achieved higher mean IQSs than noncredentialed sonographers in seven of eight comparisons. However, further research will be required to expand the scope of this inference beyond AS and LV regional dysfunction cases submitted for IAC adult transthoracic echocardiography laboratory accreditation. (J Am Soc Echocardiogr 2016;29:43-8.)

Keywords: Echocardiography laboratory accreditation, Intersocietal Accreditation Commission, Sonographer credentialing, Transthoracic echocardiography

The American Society of Echocardiography (ASE) views a professional sonographer as a "highly skilled and well-educated person."[1] This broad definition encompasses clinical competence (scanning skills), content knowledge gained through education and experience, and attainment of a sonography credential. Indeed, the ASE and the Society of Diagnostic Medical Sonography strongly recommend that all sonographers entering the field obtain nationally recognized credentials.[1-6] The ASE and the Society of Diagnostic Medical Sonography not only appear to view acquisition of a cardiac sonography credential as a guarantee of baseline content knowledge but also seem to imply that possession of a credential ensures clinical competency.[1-6] In addition, Medicare and third-party payers increasingly tie echocardiographic examination reimbursement to sonographer credentials, laboratory accreditation, or both.[7] However, sonographer credentialing examinations do not directly evaluate clinical scanning skills. Instead, prerequisites to qualify for examination appear intended to ensure that applicants possess baseline levels of clinical competence.[8-10]

To achieve Intersocietal Accreditation Commission (IAC) Echocardiography laboratory accreditation, a facility must demonstrate that sonographers possess minimum levels of training and experience.[7] Laboratories are also required to establish processes by which all sonographers will eventually become credentialed.[11] However, current qualification pathways allow noncredentialed sonographers (with the exception of the technical director) to perform echocardiographic examinations in accredited laboratories.

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This report is based on research published in the following dissertation: Bremer ML. Relationship of Sonographer Credentialing to IAC Echocardiography Case Study Image Quality [dissertation]. Winona: Saint Mary's University of Minnesota; 2014.

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0894-7317/$36.00

http://dx.doi.org/10.1016/j.echo.2015.09.002

Abbreviations

AS = Aortic stenosis

ASE = American Society of Echocardiography

IAC = Intersocietal Accreditation Commission

IQS = Image quality score

LV = Left ventricular

TTE = Transthoracic echocardiographic

IAC Echocardiography accreditation also evaluates cardiac sonographer clinical competency through the submission of representative echocardiography case studies.[7] According to ASE, basic skills required for clinical competence in echocardiography include knowledge of ultrasound physics and instrument settings, hemodynamics, and normal and abnormal cardiac anatomy and physiology.[2] Sonographers must appropriately assess patients' clinical histories, evaluate normal and abnormal findings, tailor echocardiographic examinations as required, and communicate pertinent results to interpreting physicians. For most studies, the cardiac sonographer bears sole responsibility for the technical quality and diagnostic content of the examination.

Adult laboratory accreditation requires submission of transthoracic echocardiographic (TTE) cases representing two pathologic processes: (1) left ventricular (LV) regional dysfunction as demonstrated by regional wall motion abnormalities due to coronary artery disease or myocardial infarction and (2) native valvular aortic stenosis (AS). Assessment of LV function and regional wall motion is an essential component of all echocardiographic examinations.[12,13] Assessment of AS requires additional complex evaluation of valvular structure, function, and hemodynamics.[14] Indeed, Wiegers[15] noted that accurate assessment of the severity of AS is technically demanding. Review and scoring of the cases submitted for accreditation allows evaluation of the technical quality of a facility's echocardiographic examinations. Subsequently, the case review, as an assessment of technical skill, is heavily weighted in the accreditation decision.

Currently, the assumption that sonographer credentialing ensures clinical competency has received little, if any, attention in the literature. IAC accreditation provides an avenue by which this assumption may be tested, because specific clinical skills are evaluated for both credentialed and noncredentialed sonographers. The purpose of this study was to determine the relationship between IAC Echocardiography accreditation case study image quality score (IQS), which may be considered a measure of clinical competence, and credentialing status of the sonographers performing those cases. The study hypothesis was that credentialed sonographers have higher mean IAC Echocardiography accreditation case study IQSs than do noncredentialed sonographers for evaluation of both LV regional dysfunction (wall motion abnormalities) and AS.

METHODS

In this correlational study, data were retrieved retrospectively from the IAC Echocardiography application database. The IAC Echocardiography application database contains all data entered into the online application, as well as the ratings assigned by application reviewers for case submission evaluation. The secure IAC Echocardiography online application requires the completion of questions that gather laboratory demographic and operations data and allows reviewers to evaluate compliance with IAC Echocardiography standards.[16] During accreditation, case submissions, personnel qualifications and supervision, facility safety and resources, equipment, reports and records, administrative components, diagnostic testing modalities, and quality improvement processes are evaluated and rated.[11]

Content validity of the application database has been established through development of accreditation standards on the basis of published professional guidelines, peer-reviewed literature, and consensus by the Board of Directors, which is composed of experts from sponsoring organizations.[7] There are no similar instruments available for concurrent or predictive assessment of database validity. However, Nagueh *et al.*[17] recently used the IAC database to identify common deficiencies and explore predictors of delayed accreditation with regard to key quality measures defined by IAC Echocardiography and the professional echocardiography community. The key variable of image quality included the same components as the IQS, and predictors of accreditation delays included missing required views and incomplete Doppler evaluation of AS.

To evaluate database reliability, a reviewer reliability study was conducted in 2013 (W. Judd, personal communication, September 16, 2013). A representative adult TTE accreditation application containing four adult TTE case studies was created by the director of accreditation in the Echocardiography Division and was used as the control application. Three full-time IAC Echocardiography staff members scored the application independently and then met to compare ratings and resolve any differences. The outcome of this process was a single rating (the control rating), which became the foundation for establishing reviewer reliability. The control application materials and case studies were reviewed by 35 IAC Adult Echocardiography reviewers and scored using an online portal.

Reviewers' agreement was calculated by evaluating the percentage agreement of reviewer ratings with the control rating (W. Judd, personal communication, September 16, 2013). Most of the reviewers had between 85% and 90% agreement with the control rating. Overall, the rating accuracy was 92%, demonstrating very good consistency among reviewers. In addition, analysis of item agreement was performed; most items showed >80% agreement with the control rating, which supported use of individual imaging case review questions for this study.

Research approval for the present study was obtained from the Saint Mary's University of Minnesota Research Review Board and the IAC research director. Requested data were retrieved from the IAC Echocardiography application database in Ellicott City, Maryland, by IAC research staff members. Data were anonymized and summarized in Microsoft Excel (Microsoft Corporation, Redmond, WA) and SPSS (IBM, Armonk, NY) files.

All cases submitted from echocardiography laboratories applying online for IAC Echocardiography adult TTE accreditation from August 10, 2011, to December 12, 2013, were included. Only studies from laboratories with protocols meeting the required standards were included, because specific images missing from case studies may be related to an incomplete protocol rather than sonographer skill. Excluded from this group were cases from laboratories without sonographers ($n = 15$), cases that could not be evaluated by the case reviewers for technical reasons ($n = 62$), and cases in which the self-reported sonographer annual procedure volume exceeded a plausible upper limit of 5,000 studies per year ($n = 21$). Cases submitted incorrectly that did not demonstrate LV regional dysfunction (wall motion abnormalities) or AS ($n = 669$) were also excluded, because these cases are not evaluated by case reviewers.

Data on sonographer credentialing status and case study image quality, as scored by trained application reviewers, were extracted from the database for analysis. Although sonographer experience doubtless has a role in clinical competence, data identifying the length