Defense Health Agency

PROCEDURAL INSTRUCTION

NUMBER 6025.42
November 4, 2021

DAD-MA

SUBJECT: Routine Adult Transthoracic Echocardiogram (TTE) Standards for all Military Medical Treatment Facilities (MTFs)

References: See Enclosure 1

1. PURPOSE. This Defense Health Agency-Procedural Instruction (DHA-PI), based on the authority of References (a) and (b), and in accordance with the guidance of References (c) through (l):

a. Establishes the Defense Health Agency's (DHA) standards for performance of routine adult transthoracic echocardiograms (TTE) across military medical treatment facilities (MTF).

b. Describes elements and resources needed to standardize performance and interpretation of routine adult TTE across the Military Health System (MHS).

c. Describes standards in accordance with Section 744 of the National Defense Authorization Act for Fiscal Year 2021, "Military Health System Clinical Quality Management Program" (References (k) and (l)), in order to reduce unwarranted clinical variance throughout the MHS and to achieve the eventual goal of Intersocietal Accreditation Commission (IAC) accreditation for echocardiography programs with adequate resources, including minimum standards for personnel and equipment.

2. APPLICABILITY. This DHA-PI applies to DHA, DHA Components (activities under the authority, direction, and control of DHA); and the Military Departments (MILDEP).

3. POLICY IMPLEMENTATION. It is DHA's instruction, pursuant to References (a) through (i), that routine adult TTE standards will be implemented throughout the MHS as to maximize echocardiogram accuracy and increase quality of patient care. Full implementation will take no longer than 3 years from the effective date of this DHA-PI, or until all MTFs receive accreditation by the IAC.

4. RESPONSIBILITIES. See Enclosure 2.

5. PROCEDURES. This document outlines routine adult TTE program personnel and facility guidelines, routine adult TTE program patient and facility safety guidelines, routine adult TTE equipment setup, routine adult TTE program examination reports and records guidelines, routine adult TTE standard procedure, routine adult TTE report content, and routine adult TTE quality improvement (QI) guidelines. (See Enclosure 3).

6. PROPONENT AND WAIVERS. The proponent of this publication is the Deputy Assistant Director (DAD), Medical Affairs (MA). When Activities are unable to comply with this publication the activity may request a waiver that must include a justification, to include an analysis of the risk associated with not granting the waiver. The activity director or senior leader will submit the waiver request through their supervisory chain to the DAD-MA to determine if the waiver may be granted by the Director, DHA or their designee.

7. RELEASABILITY. **Cleared for public release.** This DHA-PI is available on the Internet from the Health.mil site at: https://health.mil/Reference-Center/Policies and is also available to authorized users from the DHA SharePoint site at: https://info.health.mil/cos/admin/pubs/SitePages/Home.aspx.

8. EFFECTIVE DATE. This DHA-PI:

a. Is effective upon signature.

b. Will expire 10 years from the date of signature if it has not been reissued or cancelled before this date in accordance with Reference (c).

/S/
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REFERENCES

(a) DoD Directive 5136.01, "Assistant Secretary of Defense for Health Affairs (ASD(HA))," September 30, 2013, as amended
(b) DoD Directive 5136.13, "Defense Health Agency (DHA)," September 30, 2013
(c) DHA-Procedural Instruction 5025.01, "Publication System," August 24, 2018
(d) Intersocietal Accreditation Commission (IAC), "IAC Standards and Guidelines for Adult Echocardiography Accreditation"[1]
(e) Journal of the American College of Cardiology, "ACC Core Cardiovascular Training Statement (COCATS 4) (Revision of COCATS 3)," 2015[2]
(f) DoD Manual 6025.18, "Implementation of the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule in DoD Health Care Programs," March 13, 2019
(g) DoD Instruction 6025.18, "Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule Compliance In DoD Health Care Programs," March 13, 2019
(h) DoD Instruction 8580.02, "Security of Individually Identifiable Health Information in DoD Health Care Programs," August 12, 2015
(i) DoD Instruction 5400.11, "DoD Privacy and Civil Liberties Programs," January 29, 2019, as amended
(j) Journal of the American Society of Echocardiography, "Guidelines for Performing a Comprehensive Transthoracic Echocardiographic Examination in Adults: Recommendations from the American Society of Echocardiography," January 2019[3]
(k) Public Law 116-283, Section 744, "William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021," January 1, 2021
(l) DHA-Procedural Manual 6025.13, "Clinical Quality Management in the Military Health System," August 29, 2019 (7 volumes and implementation guidance)
(m) DHA-Procedural Instruction 6025.28, "Standard Processes and Procedures for Communication of Laboratory and Radiology Results," February 21, 2020

[1] This reference can be found at https://www.intersocietal.org/echo/seeking/echo_standards.htm.
[2] This reference can be found as a pdf at: https://www.acc.org/~/media/non-clinical/files-pdfs-excel-ms-word-etc/guidelines/2015/031315_cocats4_unified_document.pdf
[3] This reference can be found as a pdf at: https://asecho.org/wp-content/uploads/2019/01/2019_Comprehensive-TTE.pdf

ENCLOSURE 2

RESPONSIBILITIES

1. DIRECTOR, DHA. The Director, DHA, will:

a. Ensure MTFs have the capabilities, including personnel, equipment, and information technology support, required to provide or coordinate routine adult standard echocardiogram procedures.

b. Oversee compliance with this issuance by the MTFs under the authority, direction, and control of DHA.

c. Coordinate with the MILDEPs to ensure MTFs under their authority, direction, and control comply with this issuance.

2. DAD-MA. The DAD-MA will:

a. Monitor compliance with this DHA-PI.

b. Collaborate with the DAD for Healthcare Operations (HCO) to communicate this DHA-PI to Markets, Small Market and Stand-Alone Medical Treatment Facility Organizations (SSO), Defense Health Agency Regions (DHAR), and MTFs and ensure compliance with the instructions in this DHA-PI.

3. DAD-HCO. The DAD-HCO will:

a. Ensure Market Directors have sufficient resources to fulfill the requirements of this DHA-PI.

b. Collaborate with DAD-MA to communicate the information of this DHA-PI to the Markets and MTFs.

4. SECRETARIES OF THE MILDEPS. The Secretaries of the MILDEPs will assist DHA in implementation of this DHA-PI.

5. MARKET, SSO, AND DHAR DIRECTORS. The Market, SSO, and DHAR Directors will:

a. Communicate the contents of this issuance to MTF Directors within the Market.

b. Provide oversight of MTF activities within the Market to assure compliance with this DHA-PI.

6. MARKET, SSO, and DHAR CHIEF MEDICAL OFFICERS (CMO). The Market, SSO, and DHAR CMOs, in coordination with their Clinical Quality Management team, will:

a. Communicate regularly with subordinate MTF CMOs to ensure alignment and support of echocardiogram procedure standardization per this DHA-PI.

b. Support operations as outlined below.

7. MTF DIRECTORS. The MTF Directors will enable and support compliance of MTF personnel responsibilities outlined in Enclosure 3, paragraph 2.

ENCLOSURE 3

PROCEDURES

1. GENERAL

a. This DHA-PI establishes performance guidelines for routine adult TTE.

b. The IAC accredits imaging facilities to include specific echocardiography laboratories. IAC accreditation holds facilities to standards by which they may evaluate and demonstrate the level of patient care provided. If not accredited, MTFs should identify resource requirements and work toward IAC accreditation which will be required within 3 to 5 years of publication of this DHA-PI.

c. Upon compliance with this DHA-PI, facilities will have capabilities to perform quality exams as well as examine test appropriateness, technical quality review, report completeness, and timeliness of echocardiograms performed.

d. Requirements below are taken from the Intersocietal Accreditation for Echocardiography Laboratories and the American Society of Echocardiography (ASE), and are current at the time of publication. Future updates to Intersocietal Accreditation for Echocardiography Laboratories and ASE requirements should supersede these.

2. ROUTINE ADULT TTE PROGRAM PERSONNEL GUIDELINES

a. MTF Echocardiography Laboratory Medical Director. Desired requirements are as follows:

(1) Must be a licensed cardiologist, with appropriate credentials, privileged to practice as such at the MTF assigned.

(2) Must meet ONE of the following qualifications as established by the IAC (Reference (d)) as follows:

(a) National Board of Echocardiography (NBE) active Testamur or Diplomate status, and qualifying practice experience over previous 18 months: 450 TTE examinations/18 months.

(b) Level 2 or 3 Core Cardiology Training Statement echocardiography training (see Reference (e)), and qualifying practice experience over previous 24 months: 600 TTE examinations/24 months.

(c) Cumulative practice experience of at least 1,800 echocardiography examinations, and qualifying practice experience over past 36 months: 900 TTE examinations/36 months.

(3) Paragraphs 2a.(2a) through 2a.(2c) of this enclosure are not intended to address the privileging process (Reference (d)).

(4) Is responsible for:

(a) All clinical services provided within the echocardiography laboratory;

(b) Determination of quality and appropriateness of the care provided;

(c) Ensuring MTF laboratory has proper echocardiogram orders (e.g., ordered by a physician, physician assistant, or nurse practitioner) for all routine echocardiograms;

(d) Identifying validated capability requirements (e.g., standards, performance) to the appropriate Program Manager to ensure MTFs have proper echocardiography equipment (e.g., image acquisition, and post processing stations/software licenses) to follow all outlined procedures;

(e) Ensuring sonographers and interpreting physicians adhere to the standards outlined and supervision of their work;

(f) Verifying all sonographers have appropriate credentials and certifications, and/or the ability to obtain these credentials and certifications, as required by the IAC and ASE (Reference (j));

(g) Supervising the entire operations of facility or delegate specific operations to associated directors and the Technical Director;

(h) Documenting at least 30 hours of continuing medical education (CME) relevant to echocardiography over a period of 3 years (20 hours must be Category 1 American Medical Association (AMA) accredited continuing professional development (CPD) Section 1 Group Learning Activities and the other 10 echocardiography-related hours may be Non-Category 1 AMA);

(i) Serving as Technical Director and assuming responsibilities of Technical Director if assigned to an MTF with no sonographers.

(5) Smaller MTFs may work with a larger regional MTF that has a Medical Director if unable to meet the above requirements as a stand-alone facility (see paragraph 11 of this enclosure).

b. MTF Technical Director (Sonographer)

(1) A qualified Technical Director must be designated for the MTF. If the Technical Director is not on-site full time, or serves as a Technical Director in another MTF, an appropriately credentialed sonographer must be present in the MTF in the absence of the

Technical Director and assume the duties of the Technical Director. In a facility with no sonographers, the Medical Director serves as Technical Director and must assume responsibilities of Technical Director. Requirements below are taken from the Intersocietal Accreditation for Echocardiography Laboratories and ASE and are current at the time of publication (Reference (d)). Future updates to Intersocietal Accreditation for Echocardiography Laboratories and ASE requirements should supersede these.

(2) MTF Technical Director must meet one of the following criteria:

(a) Registered Diagnostic Cardiac Sonographer (RDCS) from American Registry of Diagnostic Medical Sonography (ARDMS);

(b) Registered Cardiac Sonographer (RCS) or Registered Congenital Cardiac Sonographer (RCCS) from Cardiovascular Credentialing International (CCI); or

(c) Advanced Cardiac Sonographer from CCI.

(3) The MTF Technical Director must document at least 15 hours of echocardiography-related CPD over a period of 3 years. Yearly accumulated CPD (5 hours per year) must be kept on file and available for submission upon request. The CPD requirement will be considered fulfilled if the credential status of the Technical Director is currently active as a RDCS from ARDMS; or RCS or RCCS from CCI.

(4) MTF Technical Director is responsible for:

(a) All MTF duties delegated by the Medical Director;

(b) Performance of echocardiograms within the MTF;

(c) Delegation, when warranted, of specific responsibilities to the technical and/or ancillary staff;

(d) Ensuring maintenance of facility equipment;

(e) Compliance of technical and/or ancillary staff to standards; and

(f) Ensure quality patient care and adequate technical training.

(5) Smaller MTFs may work with a larger regional MTF that has a Technical Director if unable to meet the above requirements as a stand-alone facility (see paragraph 11 of this enclosure).

c. MTF Cardiologists Interpreting Echocardiograms

(1) All MTF licensed cardiologists must meet one or more of the following initial qualifications. Requirements below are taken from the Intersocietal Accreditation for

Echocardiography Laboratories and ASE and are current at the time of publication. Future updates to Intersocietal Accreditation for Echocardiography Laboratories and ASE requirements should supersede these.Paragraphs 1(a) through 1(c) of this enclosure are not intended to address the privileging process (Reference (d)).

(a) National Board of Echocardiography active Testamur status or Diplomate status with qualifying practice experience over previous 12 months: 150 TTE examinations/12 months;

(b) Level 2 or 3 Core Cardiology Training Statement echocardiography training with qualifying practice experience over previous 12 months: 150 TTE examinations/12 months;

(c) Cumulative practice experience of at least 600 echocardiography examinations with qualifying practice experience over previous 12 months: 150 TTE examinations/12 months.

(2) Physicians must maintain ongoing performance/interpretation of an average number of echocardiography examinations per year: 150 TTE examinations/12 months.

(3) At least 15 hours of CME relevant to echocardiography over a period of 3 years. Yearly accumulated CME must be maintained and available when requested; 10 hours must be Category 1 AMA accredited. The other 5 echocardiography-related hours may be Non-Category 1 AMA.

(4) If there has been lapse in ongoing practice of echocardiography of more than 2 years, there must be documentation of: supervised review of interpretive and performance skills by the Medical Director, and 30 hours of echocardiography-related CME prior to resuming independent interpretation as a staff member.

d. MTF Sonographers

(1) Requirements below are taken from the Intersocietal Accreditation for Echocardiography Laboratories and ASE and are current at the time of publication (Reference (d)). Future updates to Intersocietal Accreditation for Echocardiography Laboratories and ASE requirements should supersede these.

(2) Sonographers are required to possess an appropriate credential in echocardiography:

(a) RDCS from ARDMS;

(b) RCS or RCCS from CCI; and/or

(c) Advanced Cardiac Sonographer from CCI.

(3) Provisional Staff

(a) New graduates of a cardiac ultrasound program who are employed in an accredited facility must obtain appropriate credential within 1 year from the date of graduation.

These individuals must be listed on the application as provisional sonographers who are eligible for credentialing, and must only work under appropriate supervision of a credentialed sonographer.

(b) Individuals employed in an accredited facility who are cross-training in echocardiography or working to fulfill clinical experience pre-requisites for a credentialing examination must obtain appropriate credential within 2 years from the start date of training. These individuals must be listed on the application as provisional sonographers who are eligible for credentialing, and must only work under appropriate supervision of a credentialed sonographer.

(4) Sonographer

(a) Reports to the Technical Director.

(b) Assumes responsibilities specified by Technical Director and, in general, is responsible for performance of clinical examinations and other tasks assigned.

(c) CPD requirements will be considered fulfilled if credential status of Sonographer member is currently active as a RDCS from ARDMS or RCS or RCCS from CCI. Fifteen of the CME hours must be echocardiography-related.

(d) Must document at least 15 hours of echocardiography-related CPD over a period of 3 years.

(e) Yearly accumulated CPD must be kept on file and available for submission upon request.

e. MTF Support Services. Nursing, clerical, and ancillary staffing will be sufficient to ensure safe and efficient patient care, and accurate record keeping.

3. ROUTINE ADULT TTE PROGRAM FACILITY GUIDELINES

a. Examination Areas. Examinations must be performed in a setting providing patient and sonographer safety, comfort, and privacy.

(1) All studies, regardless of location, must be performed with adequate room for patient positioning and equipment use.

(2) Patient privacy must be assured with use of either appropriate curtains or doors.

(3) A sink and antiseptic soap must be readily available and used for hand washing in accordance with MTF infection control policy.

(4) Post-Processing and Interpretation Areas are designated spaces provided for interpretation of the echocardiogram and preparation of reports; the designated spaces must be satisfactory for this purpose.

b. Storage. Space permitted for storage of records and supplies must be sufficient for MTF patient volume.

c. Instrument Maintenance. Instrumentation used for diagnostic testing must be maintained in good operating condition. Routine equipment maintenance and schedule is outlined in clinic/MTF standard operating procedures.

4. ROUTINE ADULT TTE PROGRAM PATIENT AND FACILITY SAFETY GUIDELINES

a. Patient and employee safety is ensured by written policies and procedures approved by the Market Director or MTF Medical Director.

b. Standard echocardiograms are considered safe to patients and sonographers. However, special echocardiographic procedures, such as transesophageal and stress echocardiograms pose potential risks to patient safety due to the semi-invasive nature, or physiologic stress placed on the patient's cardiovascular system. For this reason, procedures must have a local emergency procedure plan in accordance with the unit supervisor, and the following emergency supplies must be readily available for labs that perform transesophageal echocardiograms and stress echocardiograms, in addition to TTE:

(1) A fully equipped cardiac arrest cart (crash cart);

(2) A biphasic or monophasic defibrillator readily available;

(3) Equipment for starting and maintaining intravenous access; and

(4) Oxygen tanks or wall mounted oxygen sources with appropriate cannula and/or masks, and oropharyngeal suction equipment.

c. MTF must meet standards set forth by the Occupational Safety and Health Administration and The Joint Commission.

5. ROUTINE ADULT TTE EQUIPMENT SETUP. The sonographer or performing physician will:

a. Provide the patient the reasons for the procedure and communicate positioning during the procedure;

b. Inquire if the patient desires a same-sex chaperone, and have a visible print out posted in the room stating the patient has a right to a same-sex chaperone, if desired;

c. Use electronic medical record and modality work list functionality to ensure patient's identifiers match the selected study;

d. Attach patient to the 3-lead electrocardiogram on the echocardiogram machine;

e. Ensure patient's height, weight, body surface area, and blood pressure are entered into the patient record;

f. Position patient in the left lateral position, unless otherwise contraindicated;

g. For patients identified to benefit from ultrasound enhancement agents, physician, nurse, qualified sonographer, or qualified technician will place a peripheral intravenous (PIV) line and flush with normal saline (if a working PIV is already in place, it may be used);

h. Disconnect patient from electrocardiogram at completion of the study, and the PIV will be removed. In the absence of critical findings or other concerns identified during the examination, the patient is free to leave. Critical findings or concerns will be brought to the attention of the Medical Director or designated interpreting cardiologist for patient disposition.

6. ROUTINE ADULT TTE PROGRAM EXAMINATION REPORTS AND RECORDS GUIDELINES

a. Maintenance of Records. A system for recording and archiving echocardiographic data (e.g., images, measurements, post image acquisition processing, and final reports) obtained for diagnostic purposes must exist. The system must have data management capabilities to generate monthly, quarterly and annual reports on image volume, quality of study, and appropriate use criteria.

b. A record of images and interpretation must be made and retained in accordance with the associated National Archives and Records Administration records disposition schedules. Images and interpretation must be retrievable for comparison with new studies.

c. Studies must be archived in the original acquired format.

d. MTFs must ensure examinations can be archived digitally and a secure back-up system exists.

e. All interpretative reports will be readily available for review by the referring clinician in the electronic medical record.

f. The system for recording and archiving echocardiographic data (e.g., images, measurements, post image acquisition processing, and final reports) obtained for diagnostic purposes must be securely maintained in accordance with DoD policies (References (f) through (i)).

7. EXAMINATION INTERPRETATION AND REPORTS

a. All in-patient studies must be interpreted and reported within 24 hours of image acquisition if ordered as routine studies (Reference (d)). STAT or As soon As Possible studies must be interpreted in accordance with Reference (m) and Appendix 1. If the timing for interpretation is requested to be earlier than 12 hours, then the request must be discussed with the Medical Director or designated interpreting cardiologist to ensure timing and interpretation of the study.

b. All outpatient studies must be reported and interpreted by the end of the next business day following image acquisition if ordered as routine studies (Reference (d)). STAT or As soon As Possible studies must be interpreted in accordance with Reference (m) and Appendix 1. If the timing for interpretation is requested to be earlier than 24 hours, then the request will be discussed with the Medical Director or designated interpreting cardiologist to ensure timing of study and interpretation of the results to requesting clinician.

(1) Critical results and preliminary reports are discussed and outlined in Appendix 1 and must include a policy in place for communicating critical results, and reports tracking these critical results (Reference (m)).

(2) Findings of a STAT echocardiogram must be made available immediately by the interpreting physician.

(3) Sonographer worksheets, comments (verbal or written), or electronic summary of findings must not be provided to anyone other than the interpreting physician, unless needed for purposes described in Reference (l).

(4) Preliminary reports can only be issued by an interpreting physician and must be documented in the interpretation section to communicate any significant changes between preliminary and final reports.

(5) Demographics information must be sufficient to allow for identification and retrieval of previous studies on the same patient, and will include at a minimum:

(a) Date of the study;

(b) Name and/or identifier of MTF;

(c) Name and/or identifier of patient;

(d) Date of birth and/or age of patient;

(e) Indication for the study;

(f) Name or initials of performing sonographer or physician;

(g) Name of ordering physician and/or identifier;

(h) Name of interpreting physician and/ or identifier;

(i) Patient's height, weight; gender and Body Surface Area;

(j) Blood pressure - systolic and diastolic blood pressure must be obtained on or around the time of the study and displayed in the report;

(k) Ultrasound enhancement agent used (type and volume administered);

(l) A summary of results of the examination, including any pertinent positive and negative findings, particularly those relative to indication for examination.

(m) The final report must be completely typed, including printed name of the interpreting physician. The final report must be reviewed, signed, and dated manually or electronically by the interpreting physician. Electronic signatures must be password protected and indicate they are electronically recorded. A stamped signature or signing by non-physician staff is unacceptable.

(n) Additional information that is strongly encouraged include: image quality and appropriate use criteria score.

8. ROUTINE STANDARD ADULT TTE PROCEDURE

a. Standard Views. The following standard views and two-dimensional (2D), M-Mode, spectral Doppler, and Color Doppler measurements will be obtained. All cine images and measurements will be on 2-4 cardiac beat capture loops; consider an increase to 4-6 beat capture loops for irregular arrhythmias or a >10% heart rate variability. All full-volume images obtained for three-dimensional analysis or strain or strain rate imaging must have a minimum resolution of 45 frames per second to ensure adequate measurements.

b. Digital Views. The sonographer will obtain and digitally record the following views at a minimum. If unforeseen findings are noted, the sonographer will consult the interpreting cardiologist with any questions and to ensure completed evaluation of abnormalities. The sonographer will ensure views and measurements outlined below are performed in accordance with current ASE guidelines (Reference (j)) and accurately documented within the corresponding echocardiogram report and digitally transfer from the echocardiogram machine to the Cardiovascular Picture Archiving and Communication System. *All italics in the below section signify optional components of the digital views.*

(1) Parasternal long axis. *Optional: Increased depth view.*

(a) 2D imaging.

1. Measure ejection fraction (EF) calculations.

2. Measure left ventricular (LV) mass (LV septal diameter in diastole, LV internal dimension in diastole, LV posterior wall diameter in diastole) and LV dimensions (LV internal dimension in diastole and LV internal dimension in systole). LV outflow track diameter, measure aortic root. Sinotubular junction and mid-ascending as clinicaly indicated.

(b) Color Doppler of valves.

(2) Optional: M Mode of LV, M mode of mitral valve (MV) if concerned for systolic anterior motion of the MV. No measurements required.

(3) Right ventricular inflow tract View. 2D, color and spectral continuous wave Doppler (CW), measure tricuspid regurgitation (TR) if present.

(4) Optional: Right ventricular outflow tract (RVOT) View. 2D, color, CW measure pulmonary valve outflow maximum velocity, and obtain pulse wave Doppler (PW) in the proximal pulmonary artery.

(5) Parasternal short axis.

(a) 2D imaging at aortic valve (AV) level and RVOT.

(b) Zoom in on AV, add color Doppler.

(c) Pulmonic valve (PV) RVOT: 2D, color, CW measure pulmonary valve outflow maximum velocity, and *optional: obtain PW in the proximal pulmonary artery.*

(d) Tricuspid valve (TV) (if unable to get from PV from right ventricular inflow tract View). 2D, color and spectral CW, measure TR if present.

(e) Optional: 2D LV at MV level, color Doppler.

(f) 2D LV at the basal level.

(g) 2D LV at mid-level.

(h) 2D LV at apex.

(6) Apical 4 Chamber.

(a) 2D imaging of 4 chambers.

(b) Zoom in on LV (best practice per ASE chamber guidelines). Measure Simpson's, EF calculations, and LV volume. Measure LV volume in both systole and diastole in order to provide EF calculation.

(c) Measure left atrial/atrium (LA) volume and right atrial volume.

(d) Atrial and ventricular septa–color Doppler screening for defects.

(e) MV.

1. Color Doppler.

2. Spectral Doppler (CW) measure MV pressure gradient, P1/2 time, and mitral regurgitation if present.

3. Spectral Doppler (PW) above MV; measure E velocity, A velocity, and E/A ratio.

4. Obtain proximal isovelocity surface area (PISA) if moderate to severe mitral regurgitation present (required for quantification ASE regurgitation guidelines).

5. Tissue Doppler imaging; measure medial and lateral e'.

(f) Spectral Doppler (PW) of pulmonary veins; measure systolic and diastolic pulmonary venous waves (required for quantification ASE regurgitation guidelines).

(g) TV.

1. Color Doppler.

2. Spectral Doppler (CW), measure TR if present.

(h) Zoom in on right ventricular (RV), RV focused view.

1. Measure RV base, mid, and base to apex length. *Optional: If RV enlargement presents (Base (D1) > 41mm, Mid (D2) > 35 mm, Long axis (D3) > 86mm), obtain pulmonary flow/systemic flow, perform bubble study (at the discretion of the cardiologist, not needed if patient has known atrial septal defect/Patent Foramen Ovale).*

2. M-Mode across TV annulus; measure tricuspid annular plane systolic excursion (TAPSE).

3. Perform tissue Doppler imaging and measure S'.

(i) Optional: Apical 4 Chamber posterior angulation for coronary sinus.

(7) Apical 5 Chamber.

(a) 2D imaging.

(b) Color Doppler of left ventricular outflow tract (LVOT).

(c) Spectral Doppler (PW) of LVOT; measure LVOT velocity time integral, assess for LVOT gradient if finding suggestive.

(d) Spectral Doppler (CW) of AV, measure AV velocity time integral; if aortic stenosis is present or suspected, obtain multiple views for highest velocities. Measure aortic regurgitation (AR) half time pulmonary hypertension if AR is present. Measure acceleration time for prosthetic AVs.

(e) Optional: If moderate to severe AR present, zoom on AV and determine AR PISA and vena contracta as able, MV annular PW.

(f) Optional: RVOT, PV.

(8) Apical 2 Chamber.

(a) 2D imaging.

(b) Color Doppler of MV.

(c) LA volume.

(d) Measure LV systolic and diastolic volume for Biplane Simpson's EF from zoomed view.

(9) Apical 3 Chamber.

(a) 2D imaging.

(b) Color Doppler of AV and MV.

(c) Optional: If there is question of more than mild AV disease or a prosthetic valve repeat spectral Doppler (PW) of LVOT; CW of AV, measure acceleration time for prosthesis, if concern for severe AR, also look at PW in the aortic arch/descending aorta (AO) (supraclavicular) to look for diastolic aortic flow reversal as a marker of severe AR. Obtain PISA as able.

(10) Subcostal Views.

(a) 2D imaging: four chamber and structures not well visualized on prior views.

(b) Color Doppler at interatrial septum and interventricular septum.

(c) Inferior Vena Cava assessment with measurement with sniff.

(d) Hepatic veins (ASE recommended for intermediate Inferior Vena Cava measurements).

1. Color flow.

2. Spectral Doppler (PW) for flow reversal.

(11) Optional: Suprasternal notch (as needed; moderate or severe AR).

(a) Long axis view of aortic arch.

(b) Color Doppler in descending AO.

(c) Spectral Doppler (PW) in descending AO.

(12) Contrast is indicated for use when two contiguous segments are not visualized in any three of the apical views (poor endocardial border definition) as it provides greater accuracy in determining LV function.

(a) If contrast is used, there must be a written policy for use of contrast agents.

(b) If contrast is not able to be used, there must be a policy for alternative imaging.

9. ROUTINE ADULT TTE REPORT CONTENT

a. Overall Findings. The report must accurately reflect content and results of the study.

(1) The report must reflect measurements performed in the course of the examination and their interpretation.

(2) Report must comment on whether a given dimension is normal or abnormal.

(3) If any structure is not well visualized, this must be noted.

(4) Report text must be consistent with quantitative data.

(5) A report summary must be present and include any pertinent positive or negative findings, particularly those relative to the indication of the examination and documentation of any critical findings.

b. 2D, three-dimensional, and/or M-Mode numerical data must include, but is not limited to the following measurements:

(1) LV internal dimension and/or volume at end-diastole;

(2) LV internal dimension and/or volume at end-systole;

(3) LV posterobasal free wall thickness at end-diastole;

(4) Intraventricular septal thickness at end-diastole;

(5) Left atrial dimension at end-systole or indexed LA volume;

(6) Aortic root dimension at end-diastole or ascending AO.

c. Doppler evaluation must include, but is not limited to:

(1) Evaluation of peak and mean gradients (if stenotic);

(2) Valve area (if stenotic);

(3) Degree of regurgitation;

(4) RV systolic pressure valve reported when TR is present;

(5) Other significant pathology.

(6) Report text must include comments on:

(a) Left ventricle size, EF, presence or absence of regional wall motion abnormalities and diastolic function;

(b) Right ventricle (size and function);

(c) Right atrium;

(d) LA;

(e) MV;

(f) AV;

(g) TV;

(h) PV;

(i) Pericardium;

(j) AO.

10. ECHOCARDIOGRAM QI GUIDELINES

a. QI Program. MTFs must have a written QI program for all imaging procedures, which must include measures outlined below, but may not be limited to evaluation and review of:

(1) Test appropriateness;

(2) Technical quality and, if applicable, safety of the imaging;

(3) Interpretive quality review;

(4) Report completeness and timeliness.

b. QI Oversight. The Medical Director, staff and/or appointed QI Committee must provide oversight to the QI program including, but not limited to, review of reports of QI evaluations and corrective actions taken to address any deficiencies.

c. QI Measures. MTFs must have a process in place to evaluate QI measures outlined below. A minimum of two cases per modality (TTE) per quarter must be evaluated. The same cases may be used for all measures.

(1) Test Appropriateness. A minimum of two cases per modality (TTE) per quarter must be evaluated for appropriateness of the test performed and categorized as:

(a) Appropriate/usually appropriate;

(b) May be appropriate; or

(c) Rarely appropriate/usually not appropriate.

(2) Technical Quality Review (Sonographer Performance Variability). The MTF must evaluate technical quality of images and, if applicable, safety of the procedure. A minimum of two cases per modality (TTE) per quarter must be reviewed for image quality, completeness of the study, and adherence to MTF protocol, to be reviewed in QI meetings. Cases must represent as many sonographers as possible. Discrepancies in acquisition quality and variability must be reconciled to achieve uniform examination quality. Review must include, but is not limited to, evaluation of:

(a) Clinical images for clarity of images and/or evaluation of suboptimal images or artifact;

(b) Completeness of the study; and

(c) Adherence to MTF imaging acquisition protocols.

(3) Interpretive Quality Review (Physician Interpretation Variability). The MTF must evaluate quality and accuracy of interpretation based on acquired images. A minimum of two cases per modality (TTE) per quarter must be evaluated for quality and accuracy of the interpretation based on acquired images. Cases must represent as many physicians as possible. Differences in interpretation must be reconciled to achieve uniform examination interpretation.

(4) Final Report Completeness and Timeliness. The MTF must evaluate the final report for completeness and timeliness as required in these standards. A minimum of two cases per modality (TTE) per quarter must be evaluated for completeness and timeliness of the final report. Reports must represent as many physicians as possible.

d. QI Meetings. The MTF must have a minimum of two QI meetings per year, one of which is to review results of QI analyses and any additional QI-related topics. All staff must participate in at least one meeting per year.

e. QI Documentation and Record Retention. QI documentation must be maintained and available for all appropriate personnel to review. QI documentation must include, but is not limited to:

(1) Data for all QI meetings;

(2) Minutes from QI meetings; and

(3) Participant list (may include remote participation and/or review of minutes).

11. CERTIFICATION AT MULTIPLE SITES/SMALL ECHOCARDIOGRAPHY LABORATORIES. Small sites may choose to pursue certification under a larger regional laboratory. See criteria below. When testing is performed at more than one physical facility, the facility may be eligible to apply for a single accreditation as a multiple site facility.

a. All facilities have the same Medical Director.

b. All facilities have the same Technical Director.

c. Identical testing protocols are used at all sites.

d. Identical diagnostic criteria are used at all sites.

e. QI must be evaluated for each site for all areas of testing performed at the site.

f. Equipment of similar quality and capability must be used at all sites.

APPENDIX 1

CRITICAL RESULTS AND PRELIMINARY REPORTING PROTOCOL

1. DHA ECHOCARDIOGRAPHY PRELIMINARY REPORT AND CRITICAL RESULTS POLICY

2. REFERENCES

a. The IAC Standards for Echocardiography Accreditation; Part A, Section 3A, 3.2A, 3.2.1A, 3.2.2A, 3.2.3.

b. Patel, Ayan, Sugeng, Lissa, et al. Communication and Documentation of Critical Results from the Echocardiography Laboratory: A Call to Action. Journal of the American Society of Echocardiography. June 2018, Volume 31, Issue 6, 743-745.

3. PURPOSE. This policy defines the procedures for the communication to the requesting/ referring provider of critical results and/or significant changes from the preliminary findings or final report.

4. POLICY. Interpreting physicians will communicate significant differences between preliminary findings and the final report to the ordering/referring providers. Interpreting providers will communicate urgent, significant, and important nonurgent findings as outlined in the table below.

5. PROCEDURE

a. Preliminary findings and final echocardiogram reports will only be provided by the interpreting physicians.

b. Sonographers will not communicate any preliminary findings to anyone other than the interpreting physicians.

c. If a preliminary report provided by an interpreting physician to an ordering/referring provider differs significantly from the final report, the interpreting physician who finalizes the report will contact the ordering/referring provider to relay these changes. The amended report will clearly indicate this is a revised report that replaces the preliminary report.

d. The interpreting physician will ensure the correct report is uploaded into the electronic medical record.

e. Interpreting physicians will make every reasonable attempt to communicate critical results in 'real time' even before the final report is available for review. See table below for a list of critical findings requiring immediate notification to the ordering provider or patient care team.

f. Interpreting physicians will prioritize the reading of STAT echocardiogram requests and make the findings immediately available to the ordering/referring provider.

g. Interpreting physicians will document on the final report the time, date, and name of the provider notified for all STAT or urgent/significant results.

Director of Echocardiography:	Date:

Technical Director Signature:	Date:

6. COMMUNICATION AND DOCUMENTATION OF ECHOCARDIOGRAPHIC RESULTS. DHA adopts a similar matrix to the Yale-New Haven guidance on communication of urgent/significant results in the echocardiography laboratory. (See Reference 2b in this appendix). The categories of findings are adjusted to the MHS categories (critical, urgent, and non-urgent) (Reference (m)).

Table: List of Findings Requiring Notification

A. Critical findings (direct verbal notification immediately after findings identified [in minutes], immediate clinical action required, and documentation in the electronic health record (EHR))*	**B. Urgent or Significant findings (non-life threatening)** (direct personal notification promptly at time of interpretation via phone or secure messaging, with documentation in the EHR)**	**C. Important nonurgent findings** (nonurgent direct personal notification in days and documentation in the EHR)***
Acute aortic dissection/hematoma/ leaking aortic aneurysm	New aortic aneurysm > 5.5cm or change of > 1cm from last evaluation; previously unknown chronic arterial dissection or intramural hematoma	Aortic aneurysm <5 cm
Evidence of cardiac tamponade	New large pericardial effusion without tamponade	Dynamic outflow obstruction with systolic anterior motion.
New wall motion abnormality concerning for acute myocardial infarction	New severe RV dysfunction	New right ventricular systolic pressure > 60mmHg
Mechanical complication	New LVEF < 40%	New cardiomyopathy (LVEF 40-

of myocardial infarction		50%)
Acute severe valvular regurgitation	Newly recognized progression of chronic valvular disease resulting in severe regurgitation or stenosis	Decrease in LVEF to < 53% or decrease in global longitudinal strain by more than 15% in patients receiving chemotherapy
Suspected acute pulmonary embolism	New intracardiac mass or thrombus without high risk features	New congenital heart disease diagnosis
New intracardiac mass or thrombus with high risk features	New prosthetic valve dysfunction resulting in moderate or greater valvular stenosis or regurgitation including paravalvular regurgitation	
Prosthetic valve dehiscence or thrombus	Abnormal stress echocardiographic findings (not high risk)	
High risk exercise findings on stress echocardiography		
Findings concerning for endocarditis		
Results of studies appropriately ordered as STAT		

*Communication should occur within minutes after study interpreted. Requires prompt escalation if no immediate response from ordering provider.
**Communication should occur within hours.
***Communication should occur same day (for hospitalized patients) or within days (for out-of-hospital patients)

APPENDIX 2

BIBLIOGRAPHY

The below citations are included for readers who may desire additional information on echocardiogram processes, procedures, and guidelines. As these citations have not been referred to directly within the text of this document, they are being included here for the reader's information only.

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GLOSSARY

PART I. ABBREVIATIONS AND ACRONYMS

2D	two-dimensional
AMA	American Medical Association
AO	aorta
AR	aortic regurgitation
ARDMS	American Registry of Diagnostic Medical Sonography
ASE	American Society of Echocardiography
AV	aortic valve
CCI	Cardiovascular Credentialing International
CME	continuing medical education
CMO	Chief Medical Officer
CPD	continuing professional development
CW	continuous wave Doppler
DAD	Deputy Assistant Director
DHA	Defense Health Agency
DHA-PI	Defense Health Agency Procedural Instruction
DHAR	Defense Health Agency Region
EF	ejection fraction
EHR	electronic health record
HCO	Healthcare Operations
IAC	Intersocietal Accreditation Commission
LA	left atrial/atrium
LV	left ventricular
LVOT	left ventricular outflow tract
MA	Medical Affairs
MHS	Military Health System
MILDEP	Military Department
MTF	military medical treatment facility
MV	mitral valve
PISA	proximal isovelocity surface area
PIV	peripheral intravenous
PSO	Publication System Office
PV	pulmonic valve

PW	pulse wave Doppler
QI	quality improvement
RCCS	Registered Congenital Cardiac Sonographer
RCS	Registered Cardiac Sonographer
RDCS	Registered Diagnostic Cardiac Sonographer
RV	right ventricular
RVOT	right ventricular outflow tract
SSO	Small Market and Stand-Alone Medical Treatment Facility Organization
TAPSE	tricuspid annular plane systolic excursion
TR	tricuspid regurgitation
TTE	transthoracic echocardiogram
TV	tricuspid valve
VTI	velocity time integral

PART II. DEFINITIONS

Complete Doppler study. One that examines every cardiac valve, and the atrial and ventricular septa for antegrade and/or retrograde flow. In addition, a complete Doppler study provides functional hemodynamic data.

Complete imaging study. One that examines all of the cardiac chambers and valves and the great vessels from multiple views, then uses the available information to completely define any recognized abnormalities.

Limited study. Generally only performed when the patient has undergone a complete recent examination and there is no clinical reason to suspect any changes outside the specific area of interest. A limited study generally examines a single area of the heart or answers a single clinical question.

Poor endocardial border definition. The inability to detect two or more contiguous segments in any of the three apical views.

TTE. An examination that examines all of the cardiac chambers, valves, and great vessels from multiple imaging planes and uses the information to completely define any recognized abnormalities.

Zoom. Preprocessing zoom, method of increasing the resolution of a particular echocardiographic region of interest.