

DOBUTamine Stress Echocardiogram

Site Applicability

SPH Cardiology Lab

Practice Level

Specialized:

- Registered Nurses who have completed a recognized post-graduate, critical care program can assist with a DOBUTamine Stress Echocardiogram (DSE). Nurses must have received additional orientation to assist with DSEs.
- Trained Sonographer
- Qualified Echocardiographer or Cardiology Fellow

Requirements

- Continuous cardiac monitoring must be performed during a DSE
- An echocardiographer or fellow is present during administration of vasoactive medications

Need to Know

A DOBUTamine Stress Echocardiogram (DSE) is a non-invasive diagnostic procedure that allows for dynamic assessment of cardiac structure and function through pharmacological simulation of exercise or stress conditions. DSE may be used in patients unable to exercise or when DSE is preferable to standard exercise stress echocardiogram. Atropine may be used in addition to DOBUTamine during DSE to achieve target heart rate. DSE's performed for low flow aortic stenosis (AS) have different test targets and endpoints for termination of test.

The critical care nurse is responsible for:

- a. Initial and on-going patient assessments
- b. Connecting patient to equipment
- c. Administration and titration of DOBUTamine as per prescriber's orders
- d. Administration of atropine as per prescriber's orders
- e. Administration of metoprolol as per prescriber's orders
- f. Monitoring ECG to identify any concerns

Critical care nurses are **not** responsible for:

- a. Diagnostic interpretation of 12-lead ECGs
- b. Review and interpretation of echocardiographic images
- c. Administration of 1st dose verapamil IV, if required

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- d. Determining test target for low flow aortic stenosis protocol
- e. Administration of contrast (to be addressed in future)

Safety Considerations

1. Ensure no allergy to contrast medium prior to contrast. Allergy to contrast should be identified in the event contrast is considered to obtain satisfactory echo images.
2. Contraindications to atropine should be identified in the event atropine is considered to augment heart rate.

Ischemia/Viability Protocols

Test target:

Increase heart rate to above 85% of predicted maximum heart rate for age (220-age).

Indications for termination of test (MD determined):

- Evidence of myocardial ischemia on ECG:
 - ST-segment elevation (more than 1.0 mm) in leads without preexisting Q waves
 - ST depression (more than 2 mm) when suspected ischemia
- Drop in systolic blood pressure more than 10 mm Hg and accompanied by any other evidence of ischemia or poor perfusion
- Moderate-to-severe angina
- Significant clinical symptoms/discomfort (e.g. marked headache, tremor, dizziness)
- Clinical signs of poor perfusion (cyanosis or pallor, ↓ LOC, cool, mottled periphery)
- Sustained or significant arrhythmia that interferes with normal maintenance of cardiac output
- Exaggerated hypertensive response systolic blood pressure more than 240/120 mm Hg
- Symptoms judged unacceptable by the supervising cardiologist
- Patient request to discontinue test

Low Flow Aortic Stenosis protocol:

Test target:

Increase flow over aortic valve by approximately 20% (determined by Echocardiographer)

Indications for termination of test (MD determined):

- Heart rate more than 100 beats/min or an increase in heart rate more than 20% if the baseline heart rate is equal or greater to 90 beats/min
- Systolic blood pressure less than 80 mmHg or more than 220 mmHg
- Ischemia detected by ECG (significant flat or down-sloping ST depression suggestive of ischemia)
- Complex ventricular arrhythmias or rapid new atrial arrhythmias

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- Chest discomfort
- Symptoms judged unacceptable by the supervising cardiologist
- Patient request to discontinue test

Equipment and Supplies

<ul style="list-style-type: none"> • Alaris CareFusion smart pump on IV pole • Alaris CareFusion smart pump IV tubing X 2 • IV infusion pump tubing primed with 500 mL NS • Y-connector • 10 mL NS flush syringes • 3-way stop cock • Positive pressure cap • Alcohol swabs 	<ul style="list-style-type: none"> • DOBUTamine pre-mixed solution 1mg/mL • Automatic VS machine (TANGO) • Continuous 12 lead ECG monitoring via CASE machine • atropine & metoprolol (or verapamil) vials with syringes and alcohol swabs arranged on counter • nitroglycerin spray • diphenhydrAMINE IV available • Emergency equipment
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Guideline

RN Procedure:	Sonographer Procedure	Assessment/Rationale
1. Perform safety check of emergency supplies at bedside: <ul style="list-style-type: none"> Oxygen flow regulator, mask/tubing Suction equipment Emergency cart Nitrospray 		Administration of DOBUTamine may cause arrhythmias or chest discomfort. Ensure advanced cardiac life support equipment is readily available.
2. Confirm patient by asking full name and date of birth (two client identifiers) and determine any medication allergies, including allergy to contrast medium. Confirm allergies documented in Cerner		Ensures correct patient. Ensure no allergy to contrast medium.
3. Enter order for IV insert into Cerner. Check patient board for performing sonographer to identify right vs left hand preference.	Mark on patient board right vs left hand preference.	Ensures timely IV access and facilitates multidisciplinary use of space.
4. Provide patient teaching and ensure procedure understood.		Reduces patient's discomfort, prepares them for test, and ensures patient is informed of test.
5. Prepare patient for procedure: <ul style="list-style-type: none"> Change into blue gown open to front Apply ECG leads (V2-V6 should be placed 2 intercostal spaces lower than normal) Complete pre-procedure history and documentation as required 		<ul style="list-style-type: none"> Information required to obtain patient's target heart rate and determine patient does not have any contraindications to DSE Inform physician if patient has asthma or has had a beta-blocked in the last 24 hours

RN Procedure:	Sonographer Procedure	Assessment/Rationale
<p>6. Prepare equipment for procedure:</p> <ul style="list-style-type: none"> • Confirm appropriate power plan prescribed in Cerner Enter patient information and program CASE machine (select Dobutamine Stress Echo and populate location; calculate and program maximum predicted heart rate, and select target heart rate; populate medical history, reason for exam, and personnel involved) • Ensure TANGO is connected to CASE • Prime CareFusion IV tubing with 500mL NS with Y connector tubing • Prime CareFusion IV tubing with DOBUTamine 1mg/mL and attach to NS via Y connector • Program pump appropriately – channel off after programming • Remove metoprolol and atropine from medication cart and have accessible for procedure (may use verapamil if patient has asthma) • Retrieve cable from CASE to connect to ECHO machine • Ensure stretcher is perpendicular to wall 	<p>Bring Echo machine from the department to the concerned area. Start Echo machine and enter patient demographics. Connect cable from CASE to ECHO machine.</p>	<p>Facilitates completion of test and setting patient up in lab in a timely manner. CASE must be programmed to specific DOBUTamine protocol.</p> <p>Ensures correct patient weight, concentration and dosage of DOBUTamine as per 7 rights of medication administration.</p> <p>Facilitates multidisciplinary use of space, connectivity of echo images with the CASE.</p>

RN Procedure:	Sonographer Procedure	Assessment/Rationale
7. Bring patient into testing area: <ul style="list-style-type: none"> Connect patient to CASE and TANGO Connect patient to IV NS TKVO with Y-connector to DOBUTamine infusion with DOBUTamine infusion OFF via 3-way stop cock. 	Apply 12 lead ECG leads if not yet in place and connect patient to monitoring.	Facilitates completion of test in a timely manner and ensures patient data and imaging stored together. Facilitates administration of emergency medications or contrast, if needed.
8. Assess and document: <ul style="list-style-type: none"> Baseline 12 lead (ST segment monitoring and cardiac rhythm) Baseline blood pressure and heart rate Print baseline 12 lead Notify physician that patient is prepped 		Notify physician of any abnormalities or significant changes from previous 12 lead ECGs if available.
9. Observe while baseline echocardiography images are obtained by echo technician	Begin obtaining baseline Echo imaging. Ensure baseline images satisfactory to supervising MD.	Supervising MD must ensure baseline images are satisfactory or determine need for contrast. Physician to administer contrast if required.
10. Start DOBUTamine as per physician: <ul style="list-style-type: none"> Turn channel on, "RESTORE" settings and verify dose Press "EXERCISE" on CASE as DOBUTamine reaches patient 		CASE machine will begin timer and signal timing for DOBUTamine titrations.
11. Assess and document: <ul style="list-style-type: none"> ECG changes (ST or T wave changes, arrhythmias) Blood pressure and heart rate Signs and symptoms of ischemia or poor perfusion Print 12 lead ECGs as necessary 	Obtain required images during appropriate stages. Monitor patient for signs of discomfort and monitor imaging for any new wall motion abnormalities.	Notify physician for drop in SBP more than 10mmHg. Notify MD of any other concerns or potential indications for stopping test.

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RN Procedure:	Sonographer Procedure	Assessment/Rationale
<p>12. Titrate DOBUTamine infusion as per specific protocol until test targets achieved or end points for terminating test occur.</p> <ul style="list-style-type: none"> Notify physician & sonographer when either measure reached. Atropine may be ordered by physician to augment heart rate to target 	<p>Continue imaging as required. If low flow aortic stenosis protocol, monitor for increasing flow over aortic valve.</p> <p>Ensure appropriate images acquired at target heart rate (or increased flow over aortic valve).</p>	<p>Test targets differ by protocol.</p> <p>Peak images should be acquired even if target heart rate is not attained.</p> <p>*Supervising MD will decide when peak heart rate echo images have been obtained.*</p>
<p>13. When physician gives okay to stop test, stop DOBUTamine infusion and press “RECOVERY” on the CASE machine to move test into recovery.</p> <ul style="list-style-type: none"> Continue to assess and document patient’s status including ECG changes, blood pressure, and heart rate. Administer metoprolol as per physician to reverse effects of DOBUTamine 	<p>Complete Echo inputs.</p>	<p>Facilitate accurate documentation in the CASE.</p> <p>Metoprolol or verapamil IV may be ordered to reverse the effects of DOBUTamine.</p> <p>Nurses may administer metoprolol. Physician must give first dose of verapamil.</p>
<p>14. Once patient’s heart rate has dropped below 100 bpm or at baseline and patient is symptom free obtain discharge order from MD and document in CASE.</p> <ul style="list-style-type: none"> Press “TEST END” on the CASE. Review all ECG strips and print any additional 12 lead tracings as needed. Transfer CASE data to MUSE 	<p>Disconnect patient from Echo machine (if applicable).</p>	<p>MD to determine patient is safe for discharge.</p> <p>Facilitate accurate documentation in the CASE of procedure. Provide opportunity to print any abnormal ECG tracings that occurred during procedure.</p>

RN Procedure:	Sonographer Procedure	Assessment/Rationale
15. Discharge patient: <ul style="list-style-type: none"> Disconnect patient from CASE and TANGO monitoring D/C saline lock if outpatient. Complete all required documentation Give verbal report to receiving unit if patient is an inpatient Clean and prep area for next procedure 		Ensures patient safe to leave hospital or return to unit if inpatient.

On-going Assessment	Interventions
Monitor, assess, and document: <ul style="list-style-type: none"> Blood pressure per protocol and PRN ECG changes, heart rate, and cardiac rhythm Signs and symptoms of poor perfusion Patient symptoms/complaints Presence of glaucoma, patient must not drive for 12 hours if have glaucoma and have received atropine 	Notify physician immediately if assessment findings reveal: <ul style="list-style-type: none"> Target heart rate reached Hypotension with SBP less than 80 mmHg or drop of more than 10 mmHg& symptomatic Hypertension with SBP more than 240 mmHg or DBP more than 120 mmHg ST depression or elevation Angina, or other signs/symptoms of ischemia or poor perfusion (i.e. nausea, dyspnea, dizziness, cyanosis) Arrhythmia Patient request to stop test

Documentation

IV start order is placed in Cerner

Patient demographics, reason for testing, testing protocol, medications, vital signs and patient condition documented in the case machine which is transferred to MUSE upon completion of exam – MUSE generates the final report.

Patient and Family Education

- Review patient education material with patient/family (Dobutamine Stress Echocardiogram, available on the [PHEM](#) web site)
- Explain procedure in language that the patient can understand. Use interpreter (virtual or in person as appropriate) and ensure questions are answered prior to proceeding with test.

Evaluation

Expected Outcomes

- Hemodynamic stability during testing procedure
- Clear visualization of cardiac structures and function with echo
- Acceptable level of comfort for patient with no adverse reactions to test/medication

Related Documents

1. Parenteral Drug and Therapy Manual – [DOBUtamine](#)
2. [DOBUtamine Dosage chart \(1mg/mL\)](#)
3. [BD-00-12-40080](#) - IV Therapy, Peripheral: Insertion, Care and Maintenance

References

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Persons/Groups Consulted:

Echocardiographer

Pharmacy

Professional Practice

Developed By:

Clinical Nurse Specialist, Adult Congenital Heart Disease

Nurse Educator, Cardiac Intensive Care Unit

Cardiac Intensive Care Unit RNs

Cardiac Echo Lab Technician

CNL, Cardiac Cath Lab

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Appendix A Indications and Contraindications for Dobutamine Stress Echocardiogram

Indications

1. Evaluation of ischemia for suspected or known coronary artery disease (CAD) (risk stratification)
2. Assessment of myocardial viability in the context of known CAD (i.e.: "hibernating" myocardium)
3. Evaluation of valvular dysfunction, specifically mitral and aortic stenosis
4. Assessment of pre-transplant cardiac function and post-transplant allograft vasculopathy
5. Evaluation of pulmonary hypertension
6. Evaluation of dyspnea of possible cardiac origin
7. Evaluation of low flow AS (AS with LV dysfunction) to rule out "pseudo-severe AS"

Contraindications

- Unstable angina, recent myocardial infarction (less than 1week)
- Hemodynamically significant left ventricular outflow tract obstruction (Aortic Stenosis)
- Aortic dissections or large aortic aneurysms
- Severe baseline hypertension (more than 180/110 mmHg)
- Uncontrolled arrhythmias causing symptoms of hemodynamic compromise
- Active myocarditis, pericarditis, or endocarditis
- Acute pulmonary embolism, deep vein thrombosis
- History of ventricular arrhythmias