


QUALITY WORK INSTRUCTIONAL MANUAL	  HALCYON MARINE HEALTHCARE SYSTEMS	DOCUMENT NO. QWI 28.0	EFFECTIVITY DATE: January 23, 2019
			REVISION NO.: 3
		PREPARED BY: Marilar F. De Guzman, MD QAM	APPROVED BY: Glennnda E. Canlas, MD Medical Director
SUBJECT: WORK INSTRUCTIONAL MANUAL FOR 2D ECHOCARDIOGRAPHY			

**I. STEP BY STEP PROCEDURE IN RECEIVING PATIENT**


1. Receives referral with attached follow up form or ticker and verify the patient's identity.
2. Ask the patient if the test is already paid or charge to company. Otherwise, instruct the patient to proceed to the Cashier to settle the payment.  
Note: In the event of system downtime, coordinate with the CSO for patient queuing.
3. Write the date of examination, PEME number, name of patient, age and company in the patient's logbook.
4. Explain the procedure and its length of time with the patient.
5. Instruct the patient to remove metals, jewelries and upper clothing.
6. Instruct the patient to lie down on the echo bed.
7. Place ECG leads as directed below:
  1. White Lead – RA (Right Arm)
  2. Black Lead – LA (Left Arm)
  3. Red Lead – LL (Left Leg)
8. Perform the procedure and examination.
9. Inform the patient when the procedure has ended to remove the electrodes.
10. Has the patient put back his clothes.
11. Instruct the patient to wait in the waiting area for doctor's evaluation.

**II. OBTAINING BASELINE 2D-ECHO IN THE MACHINE**

1. Prepare the 2D Echo machine.

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2. Plug and wait until UPS reaches 200 and up. Wait until the "OK" word comes out.
3. Long press the ON button (beep can be heard) and wait until "OK" word comes out.
4. Long press the power button on the Echo machine.
5. Enter the patient's data on the machine.  
Note: Data should be complete (height and weight to get the BSA (Body Surface Area)).
6. Press OK and start the study.
7. Inform the patient that the test procedure will begin.
8. Instruct the patient to remove metals, jewelries and upper clothing.
9. Instruct the patient to lie down on the echo bed.
10. Place the ECG leads and explain to the patient that the study focuses on his/her chest area.
11. Put a gel on the probe and start acquiring images.

### III. **PROTOCOL**


1. Position the probe on the patient's chest.
2. Move, angulate, rotate, tilt the probe to find the best possible view.
3. Press "clip store" button to record video.
4. Press "print/store1" button to record freeze image.

### IV. **PLAX (Parasternal Long Axis)**

1. Acquire PLAX B-Mode moving acquisition

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2. Isolate Ao and LA and press "set" to adjust the size. Press "set" again to move, then isolate. Acquire moving acquisition.
3. Freeze the video and measure LVOT (Diameter, Sinus, Junction), then unfreeze after storing
4. To measure the M-Mode Ao, press M and put the line where the Ao valve is flapping. Press M again, then measure the Ao diam, Av cusp diam and LA diam.
5. To Isolate MV, follow the steps in isolating the Ao and LA and acquire moving acquisition
6. Freeze the video and measure the M-Mode MV. To measure the M-Mode MV, follow the steps in M-Mode Ao/LA and position the M line in the MV, then measure the EPSS.
7. To Isolate LV, follow the steps in isolating Ao and LA and acquire moving acquisition
8. Freeze the video and measure the M-Mode LV study. To measure the M-Mode LV, follow the steps in M-Mode Ao/LA and position the M line in the LV, then measure the Diastole- ivsd, lvidd, pwd, Systole- ivss, lvids and pws.
9. Return to the whole PLAX view and remove the isolation by pressing "Set" to adjust and press again after adjusting.
10. To acquire the Color Ao, press "C" and "set" button and get moving acquisition
11. To acquire the Color MV, follow the steps of color Ao and focus on MV and get the half view of LA and LV.
12. To acquire the color whole PLAX view, follow steps above and adjust the box
13. Acquire the RV Inflow B-Mode and Color moving acquisition
14. Measure the Dopplers TV Vmax and TR Vmax

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**Legend:**

ACRONYMS	MEANINGS	ACRONYMS	MEANINGS	ACRONYMS	MEANINGS
Ao	Aorta	PLAX	Parasternal Long Axis	TR	Tricuspid Regurgitation
LA	Left Atrium	Vmin/Vmax	Velocity min/Velocity max		
MV	Mitral Valve	RV	Right Ventricle		
LV	Left Ventricle	TV	Tricuspid (valve)		

**V. PSAX (Parasternal Short Axis)**


1. Isolate the MPA and acquire B-Mode, and Color moving acquisition.
2. Measure the Dopplers PA Act, PV Vmax and PR Vmax).
3. Isolate the Ao and acquire B-Mode, and Color moving acquisition.
4. Isolate the RV and acquire B-Mode, and Color moving acquisition.
5. PSAX BASE and acquire B-Mode and Color moving acquisition.
6. PSAX MID and acquire B-Mode and Color moving acquisition.
7. PSAX APEX and acquire B-Mode and Color moving acquisition.

**Legend:**

ACRONYMS	MEANINGS	ACRONYMS	MEANINGS	ACRONYMS	MEANINGS
MPA	Main Pulmonary Artery	PV Vmax	Pulmonary (valve)(regurgitation) Velocity	RV	Right Ventricle

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			Max		
PA Act	Pulmonary Artery Acceleration Time	PR	Pulmonary Regurgitation	Ao	Aorta
PSAX	Parasterna Short Axis				

#### VI. **APICAL VIEW**


1. Ensure in 4 Chamber B-Mode and acquire moving acquisition.
2. Freeze and measure the RV, RA, TV, MV and all LA Volume.
3. Unfreeze and measure the TAPSE. To measure the TAPSE, put M-line beside TV.
4. In 4 Chamber B-Mode, focus on LV, then Freeze and measure the Simpsons Systole and Diastole.
5. In 4 Chamber B-Mode, focus on LV, color whole LV- press toggle button to measure DTI medial and lateral.

#### **Legend:**

ACRONYMS	MEANINGS	ACRONYMS	MEANINGS
RV	Right Ventricle	LA	Left Atrium
RA	Right Atrium	TAPSE	tapse-tricuspid annular pre-systolic excursion
TV	tricuspid (valve)	LV	Left Ventricle
MV	Mitral Valve		

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VII. **4 CHAMBER DOPPLER**

1. Acquire Color MV (half of LA and LV) by placing PW above MV to measure the MV Vmax. In addition, place CW below MV to measure MR Vmax and MV Pgmax, then compute.
2. Acquire Color TV (half of RA and RV) by placing PW above TV to measure TV Vmax. Also, put CW below TV to measure the TR Vmax and TV Pgmax.
3. Color whole LA and put PW below where the ascending blood flows to measure P Vein S, P Vien D, P Vien A, and P Vien A Duration
4. Color whole 4 Chamber and acquire moving acquisition.
5. In Chamber B- Mode, acquire moving acquisition.
6. Color Ao and focus on whole Ao and get some part of LV.
7. Acquire LVOT Vmax and LVOT VTI by putting PW on the septum above the Ao valve.
8. Measure the LV IVRT by put the PW on the space between MV and Ao valve.
9. Measure the AV Vmax by putting CW inside the Ao.
10. Measure the AR Vmax and position the CW above Ao valve
11. Color whole 5 Chamber and acquire moving acquisition
12. In 3 Chamber B- Mode, color and acquire moving acquisition
13. In 2 Chamber B-Mode, acquire moving acquisition
14. In 2 Chamber B-Mode, zoom LV, Freeze and measure Simpsons Systole and Diastole

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15. Color whole 2 Chamber and acquire moving acquisition.

**Legend:**

ACRONYMS	MEANINGS	ACRONYMS	MEANINGS
MV	Mitral Valve	LVOT	left ventricular outflow tract
LA	Left Atrium	IVRT	Iso volumic relaxation time
LV	Left Ventricle	AV	Atrioventricular
Ao	Aorta	AR	Aortic regurgitation

**VIII. SUBCOSTAL VIEW B**

In mode and color, place the probe on the Xyphoid process and acquire moving acquisition and measure IVC (Inferior Vena Cava) diameters 1 and 2.

**IX. SUPRASTERNAL VIEW B**


In Mode and Color, place the probe on the patient's neck instruct him to tilt his head, then acquire moving acquisition and measure Vmax (velocity max).

**X. PERFORM THE POST STUDY CARE**

1. Remove the electrodes on the patient's chest and provide a tissue to wipe the excess gel.
2. Wipe the excess gel on the probe.

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Note: Ensure that the probe is always a gel-free.

3. Write all the values of the measurements done in the echo form for the Doctor's baseline evaluation.


#### **XI. STRESS 2D ECHO**

1. Prepare the patient and explain the procedure.
2. Perform the Baseline 2D Echo.
3. Once the Baseline 2D Echo was done, do not remove the chord and electrodes
4. Click "New Patient" and encode the patient's data in the Inet Version 2..
5. Get the baseline view of PLAX, MID, 4 CHAMBER and 2 CHAMBER.
6. Place the Treadmill electrodes to the patient's chest and ensure not to overlap with the echo electrodes.
7. Get the baseline BP (Blood Pressure) before proceeding to TET (treadmill).
8. After reaching the target heart rate of 90%, assist the patient to lie immediately on bed.
9. Get the best possible view of PLAX, MID, 4 CHAMBER and 2 CHAMBER of the patient on its peak exercise. Repeat recording, then stop if the doctor says so.
10. Measure the EF (Ejection fraction) of the "peak" exercise in the 4 Chamber and 2 Chamber view.
11. Instruct the patient to remove the electrodes from his/her body. Instruct the patient to put back his/her clothes and to wait in the waiting area for doctor's final evaluation.
12. Signs the ticket

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13. Calls the patient once clearance is done for issuance. If the reading suggest further evaluation form from the Doctor, the patient is advised for work-ups, until the normal result is achieved or concluded as fit.

#### **XII. PROCEDURE OF 2D ECHO TECHNICIAN IN ENCODING OF RESULT**

1. Encodes the results of the patient in the tabular format.
2. Encodes the Cardiologist's interpretation on the table format to summarize and finalize the result.
3. Conducts a Quality Control if all encoded results are correct.
4. Converts the summarized and final results to PDF file.
5. Transfers the PDF files to the patient's folders in Google drive.

#### **XIII. PROCEDURE IN TURNING OFF THE MACHINE**


1. Close all open studies in the Echo machine. Click "New Patient" and if the data is blank, turn off the machine.
2. Long press the power button until the screen turns black.
3. Long press the off button in the UPS (beep can be heard). Wait until it says OK, then unplug.

#### **XIV. DAILY ULTRASOUND SYSTEM CARE**

1. Visually inspect all transducers.

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2. Do not use a transducer which has cracks, punctures, or discoloration on casing or a frayed cable.

***WARNING: To avoid electrical shock, you must visually inspect the transducer condition prior to use. It must be free from wear and tear.***

3. **Discoloration Exception:** The use of the approved disinfectants, Cidex OPA and Glgasept FF, may cause discoloration of transducer housings, including the face of the transducer. Continue to use a transducer if it is discolored due to the use of above mentioned disinfectants.
4. Inspect all power cords. Do not turn on the machine if the cord is frayed or split, or if it shows signs of wear and tear.
5. If the system's power cord is frayed or split, or if it shows signs of wear and tear, contact the Siemens support for the repair.
6. Inspect the ECG connector and the cable. Do not use the ECG function if the connector or cable is damaged or broken.
7. Verify that the trackball, DGC slide controls and other controls on the control panel are clean and free from gel or other contaminants.
8. Once the system is on, check the on-screen displays and lighting.
9. Ensure that the monitor displays the current and time.
10. Verify that the transducer identification and indicated frequency are correct for the active transducer.

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#### **XIV. MONITORING OF EMERGENCY CART**

1. The Emergency Cart (E-cart) consists of the following:

1. Emergency Defibrillator
2. Manual
3. Medicines,
4. Medical supplies and equipment
5. IV fluids

2. The monitoring of the E-cart will be done on a daily basis and will be recorded in the logbook.

The monitoring will be made to ensure completeness of the tools, cleanliness, good working condition, validity of AED (Automated External Defibrillators) patch in terms of validity and expiry dates of medicines.

#### **XV. MONITORING OF OXYGEN TANK**


1. The oxygen tank level will be inspected on a daily basis and will be recorded in the logbook.

2. The Color coded visuals on the regulator means the following:

1. Green - OK
2. Yellow- warning and should be immediately reported.

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3. Red- empty to re-fill
3. Record the inspection result in the logbook.
4. Coordinate with Purchasing Unit in the filing of request form for immediate pick-up of the oxygen tank, to be re-filled by service provider.

#### **XVI. PREPARATION PROCESS FOR POSSIBLE SYSTEM DOWNTIME/ POWER OUTAGE**

1. The 2D Echo Technician should ensure to have complete patient's data written in the logbook for easier retrieval in the event of system downtime or power outage.
2. Echo results saved in the 2D Echo database must be transferred to the Google drive for back up.

#### **XV. CHECKING OF RESULTS DUE TO WRONG ENCODING**

1. The 2D Echo Technician should ensure that the encoded information in the 2D echo/Stress echo results are correct before saving and releasing for Physician's evaluation.
2. Any verification from other units on the results, should be checked and/or corrected immediately for on time updating.

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