
Electrocardiography Assessment Manual

**Women's Interagency HIV Study
(WIHS)**

The WIHS Central ECG Reading Center (EPICARE)
Epidemiological Cardiology Research Center (EPICARE)
Division of Public Health Sciences
Wake Forest University School of Medicine
Winston Salem, NC

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1 INTRODUCTION

The Epidemiological Cardiology Research Center (EPICARE) is the WIHS Central ECG Reading Center (EPICARE). It is located at Wake Forest University School of Medicine, Winston Salem, NC. The EPICARE main contacts are listed in **Appendix A**.

2 BACKGROUND AND PURPOSE

There is a strong evidence for an increased risk of cardiovascular disease (CVD) in women with HIV. Detection of abnormalities in the resting electrocardiogram (ECG) of HIV-infected women may identify potential mechanisms to explain the increased frequency of such adverse cardiac events as well as predictors that could help identifying those at risk. Hence, the upcoming WIHS physical examination will incorporate the assessment of cardiac electrical patterns and rhythm disorders by using a 12-lead GE MAC 3500 electrocardiograph machine. Specifically, the ECG records will serve to establish the distribution of clinical and subclinical cardiac disease findings including myocardial infarction and ischemia, left ventricular hypertrophy, prolonged QT interval, reduced heart rate variability, and sustained and non-sustained arrhythmias as well as the development of subclinical ECG findings that are determined to be associated with poor prognosis. The WIHS ECG reading center (EPICARE Center) will use the standards of the Minnesota ECG classification as basis for detection of these abnormalities. A number of continuous ECG measurements that are known to be predictive of CVD events will also be detected from the study ECGs.

3. FIELD CENTER PROCEDURES

The field center procedures include ECG acquisition (section 3.1) and local ECG reading for alert findings (section 3.2).

3.1. ECG ACQUISITION PROCEDURES

At each WIHS site, three sequential digital ECGs will be recorded in the fasting state for each participant. The three sequential ECGs will help obtaining heart rate variability with reasonable reproducibility. (Note: obtaining 3 sequential ECGs does not mean repeating all the process 3 times, but it is just pressing the record button 3 times!). The fasting ECG minimizes the impact of the food ingestion and glucose levels on heart rate variability and repolarization measures. Even if the participant is not fasting, the ECG recording should still be done. The ECGs stored in the ECG machine will be transmitted to the EPICARE at least once a week. The ECG form (**Appendix B**) must be filled after each recording.

3.1.1 Electrocardiograph

The electrocardiograph to be used for ECG recording and transmission in the WIHS study is the GE MAC 3500 portable electrocardiograph (**Figure 1**). The MAC3500 is a portable device and can easily be moved from one location to another.

- Each machine will be configured specifically for the WIHS study ECG acquisition and transmission.
- The MAC3500 is to be used for resting ECG recording only.
- It is not intended for use as a vital signs physiological monitor.
- The MAC3500 has a customized menu specific to the WIHS study.

- **Appendix C** includes the instructional charts that outline the SETUP for the WIHS MAC 3500 ECG machines.
- All of the WIHS ECG technicians should become familiar with the GE MAC 3500 Operator's Manual. The educational materials provided with the ECG machine has tutorial on how to operate the machine. Contact the ECG Reading Center for advices about the machine if further help is needed.

Figure 1



3.1.2. Supplies

Table 1 summarizes the equipment and supplies needed for recording and transmitting ECGs. Always order supplies in advance

Table 1

- | |
|---|
| <ul style="list-style-type: none"> • GEMSIT MAC3500 Electrocardiograph with its 10 lead acquisition module • Flexible measuring tape • Telephone jack cable • Scissors • Felt tip non-toxic washable markers • The EPICARE contact list (Appendix A) • Reference guides for "Patient Data Entry" (Table 2) • Reference guide for "Transmission of ECG" • GEMSIT MAC3500 operation manual • MAC3500 ECG paper • Disposable silver chloride electrodes • Alcohol swabs and gauze pads • Cotton surgical tape • Examining table disposable paper • SD card (optional in case of challenges in transmission) |
|---|

3.1.3 Preparation for ECG recording

- Participant should be relaxed and comfortable in supine or semi-recumbent position.
- Examination table/bed should be adequate to comfortably accommodate the participant.
- Supply drape for exposed upper torso.
- An additional covering may be needed to prevent the participant from becoming chilled.
- Make sure ankles and wrists are accessible for electrode application.
- ECG electrode placement should be performed with the technician standing to the participant's left side.
- Reference guide for "Participant Data Entry" instructions should be available to insure accuracy.
- Supplies needed for ECG acquisition should be assembled and arranged efficiently.

3.1.4 Location of the ECG electrodes

3.1.4.1 Location of limb electrodes (Figure 2)

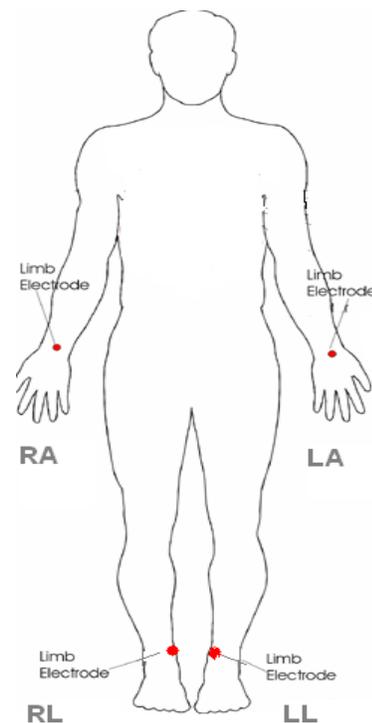
RIGHT LEG (RL) and LEFT LEG (LL):

- On the inner side of the right leg (RL), above the ankle, rub briskly an area about 1-2 inches in diameter with an alcohol swab using firm, circular motions
- Mark the position to place the electrode later.
- Repeat this procedure for the left leg (LL).
- In amputees, the leg lead electrode may be placed higher up on the torso.

RIGHT ARM (RA) AND LEFT ARM (LA):

- Rub the inner side of the right arm (RA) above the wrist similar to what you did with the right and left legs.
- Mark the position to place the electrode later.
- Repeat the process for the left arm (LA).
- In amputees, the arm electrode may be placed on the shoulder, below the clavicle.

FIGURE 2



3.1.4.2 Location of chest electrodes

V1 and V2:

- First, locate the sternal angle about the width of your 3 middle fingers below the sternal notch (**Figure 3**). Mark a dot over the sternal angle.
- Feel the sternal angle between the index and middle fingers of your right hand, keeping the fingers wide apart and moving your fingers firmly up and down. While feeling the sternal angle, move your fingers to the left side of the sternum and feel the 2nd rib between your fingers where it joins the sternal angle.
- Move your middle finger to the interspace below the second rib and with your index finger locate the interspace below the next rib (3rd) and again below the next (4th) rib. This is the 4th intercostal space. Mark an **X** at this level at the mid-sternal line. **X** is the reference level for V1 and V2. Mark their locations at the right and left sternal border (**Figures 3 and 4**).
- Measure the distance in inches (to the nearest ½ inch) from the sternal notch to the **X** mark using a flexible measuring tape. This is the NV distance (**Figure 5**).
- Enter the NV measure on the ECG form (**Appendix B**)

FIGURE 3

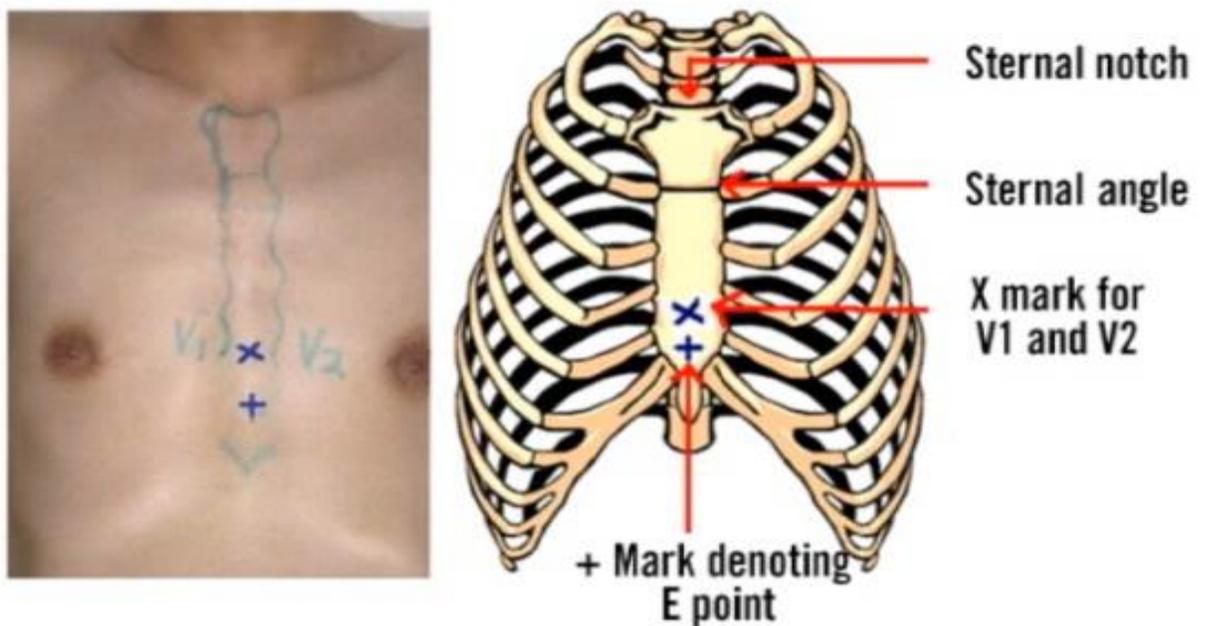


FIGURE 4

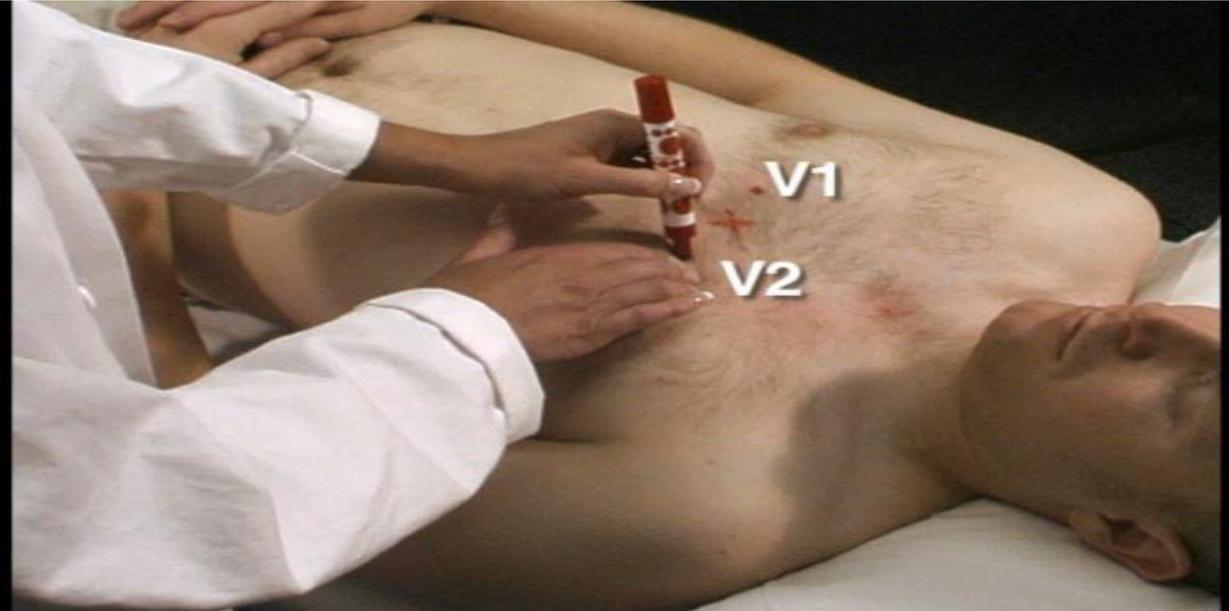
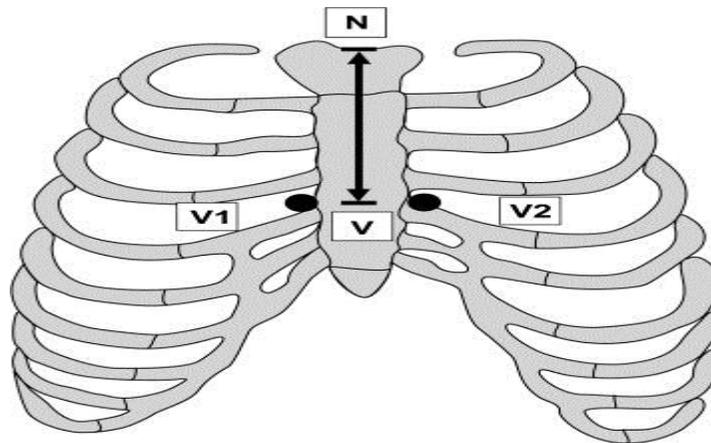


FIGURE 5



V4 and V6

- From the location of V2, palpate with the middle finger of your right hand the intercostal space and follow it laterally outside the sternal border and at a slight angle down. Feel the 5th rib between your index and middle fingers and then feel the 5th intercostal space with your index finger.
- At the level of the 5th intercostal space, mark a + sign at the mid-sternal line below your X mark for V1-V2 level. This + is the reference level “E” for V4, V5, and V6 (Figure 3 and Figure 6).
- In overweight persons and in women with tender breast tissue, it is often difficult to locate the 5th intercostal space. In such a case, mark the + sign for E point 1 ¼ in below your reference level X for V1 and V2 (in smaller adults, 1 inch is enough).

FIGURE 6



APPROXIMATE LOCATION OF V6

- Move the left elbow laterally without moving it anteriorly or posteriorly, while observing the anterior and posterior axillary folds. The left elbow must be supported properly.
- Follow a line exactly in the vertical midplane of the thorax (mid-axillary line - **Figure 7**) down where the line meets the horizontal plane of E point. Using your marker, make a vertical 1-2 inch long line there as an approximate location of V6 (**Figure 8**).

FIGURE 7



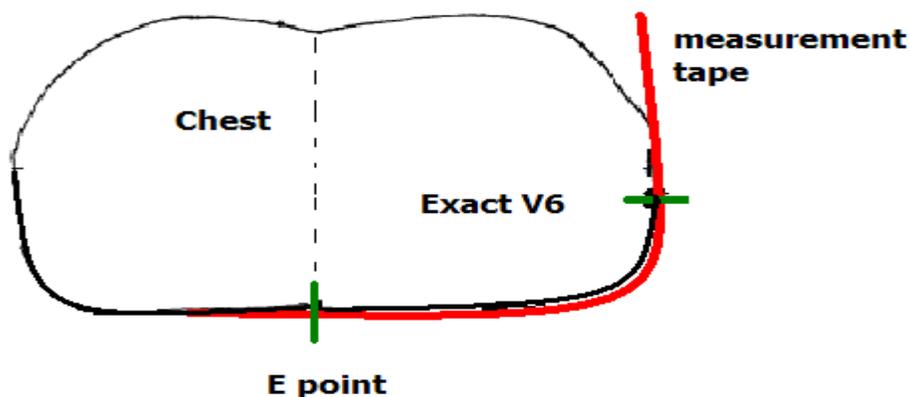
FIGURE 8



EXACT LOCATION OF V6

- Exact location of V6 is determined by using a flexible measuring tape.
- Place the measuring tape horizontally on the chest and extend it from the E point until it crosses the 1-2 inch vertical mark you made before (the approximate V6 location). The crossing point would be the exact V6 location (**Figure 9**)
- Mark the exact location of V6

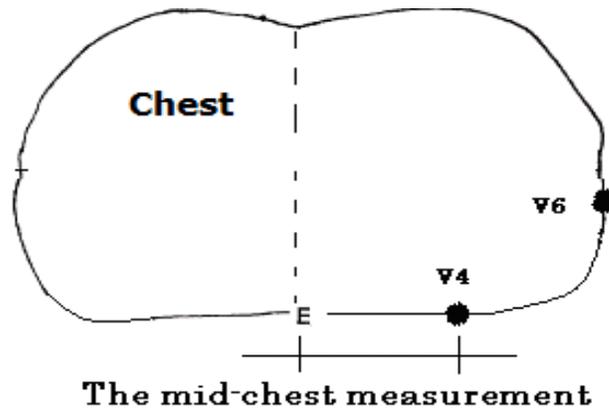
FIGURE 9



EXACT LOCATION OF V4

- V4 is also located by using a flexible measuring tape
- Use the measuring tape to identify the halfway point between the exact location of V6 and the E point. This mid-chest point is the location of V4.
- Measure the distance from the V4 location to the E point in inches (to the nearest ½ inch). This is the mid-chest measurement (**Figure 10**).
- Enter the mid-chest measurement on the ECG form too (**Appendix B**)

FIGURE 10



LOCATIONS OF V3 and V5

- Mark V3 exactly halfway between V2 and V4 (Figure 11).
- Mark V5 exactly halfway between V4 and V6 (Figure 11).

FIGURE 11



3.1.4.3 Attaching the electrodes:

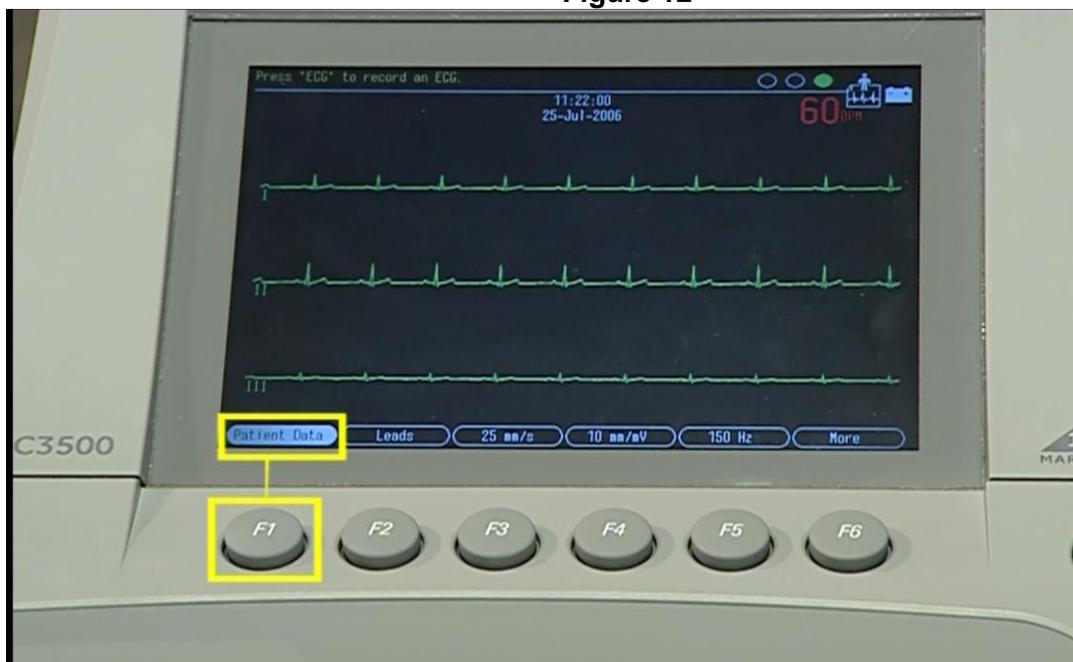
- After you have marked electrodes positions and rubbed them with alcohol swabs, you may apply the electrodes.
- Lower limb electrodes should be facing up, while upper limb electrodes could be facing up or down
- Do not place electrodes directly over bone.
- Attach lead wires in the same, correct order every time to establish routine and to eliminate lead swaps.
- Position the MULTI-LINK on the participant's abdomen.
- Grasp each lead at the MULTI-LINK attachment point.
- Follow lead wire to the electrode attachment end.
- Attach wire to electrode, making sure clip is not in contact with electrode adhesive.
- Make sure lead wires have some slack and are hanging loosely.
- You may secure the lead wire to the skin by applying paper tape 1-inch below the clip, especially if the ECG shows baseline noise despite careful preparation.

3.1.5. ECG recording

Three ECGs will be recorded for each participant. Check the DVD and operation manual located in the GE clinical training kit for detailed operation instructions.

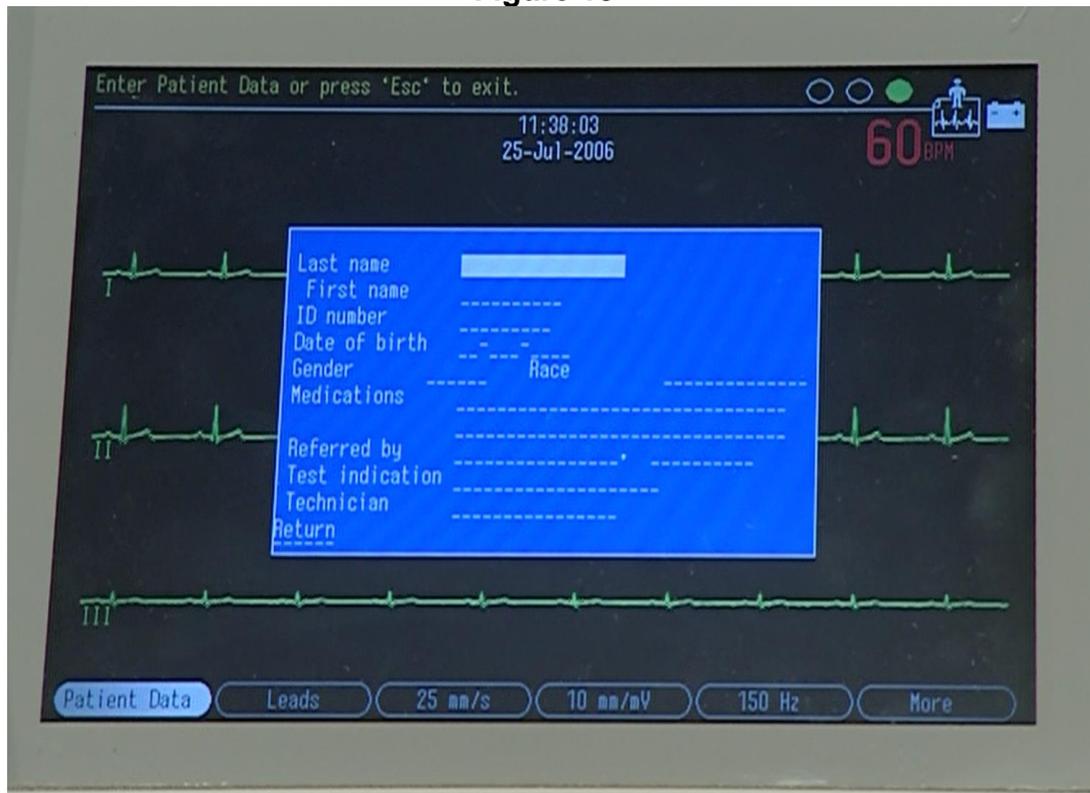
- Turn on the MAC3500.
- If the system starts up without displaying error messages, the system is operational.
- Press F1 to get to patient information **Figure 12**

Figure 12



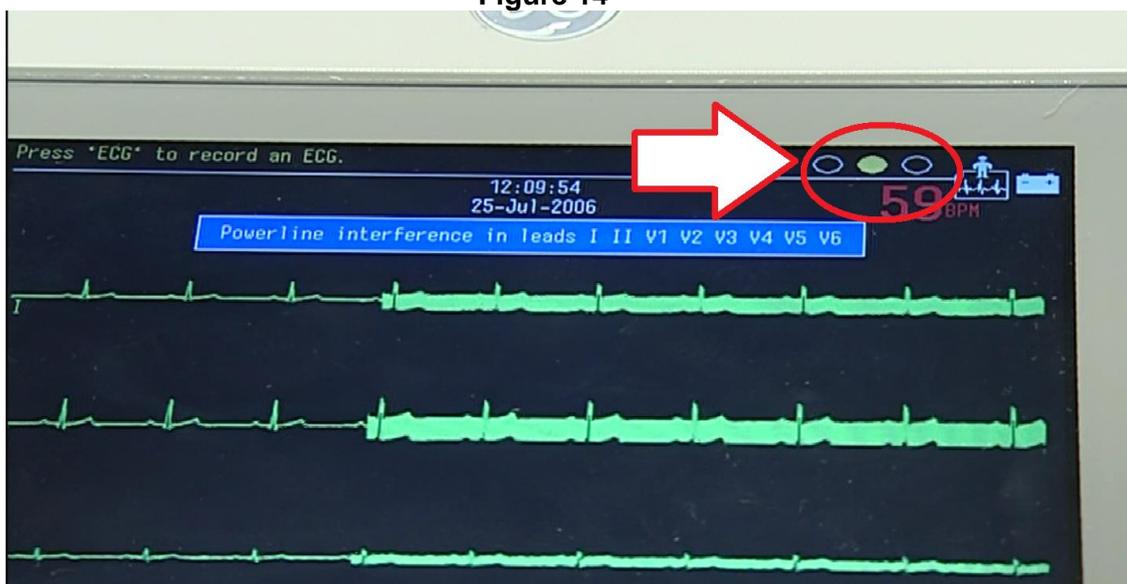
- Another screen with an ECG tracing will appear. **Figure 13**. Enter participant's data as mentioned in **Table 2**

Figure 13



- Once the participant information is entered, check the display screen to verify ECG quality. The Hookup Advisor at the top right will not only indicate the quality of the displayed ECG signal, but will also give clear indications of the nature of the problem (**Figure 14**).

Figure 14



- Press the “ECG” key to print an ECG if you are satisfied with the quality (**Figure 15**).
- Press F3 “Same Pat” to print and record a 2nd ECG, then repeat the process for a 3rd ECG.
- No need to print a “Rhythm strip”, but if needed, you can press Rhythm Key then press stop once done (**Figure 15**)

Figure 15

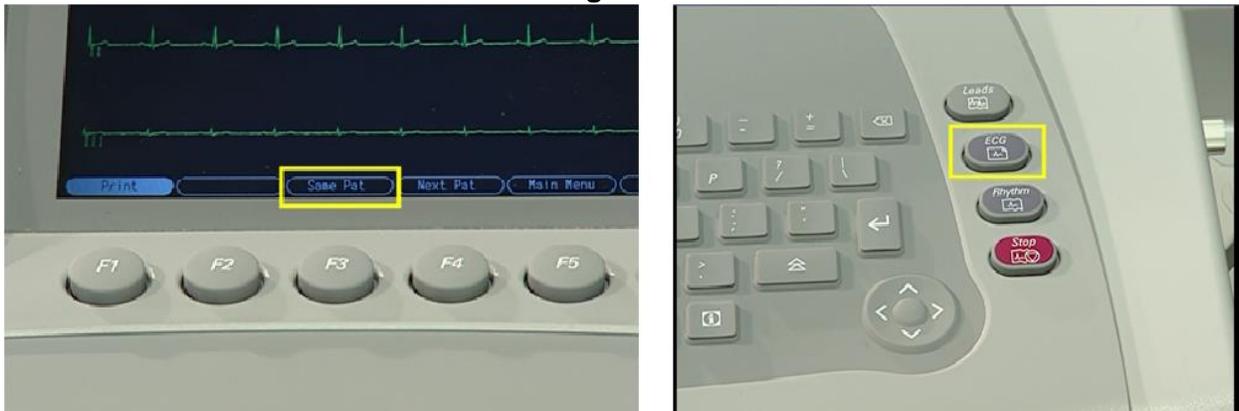


Table 2 Participant Data Entry into the MAC3500 for the WIHS Study

Category Listed on Mac3500	Entry to Machine by ECG Technician
LAST NAME	Do not enter the participant’s last name. Enter WIHS .
FIRST NAME	Enter WIHS exam visit number: 47
PARTICIPANT ID	Enter the ID number given by the CC
SECONDARY ID	Enter same as Participant ID
TECHNICIAN	Enter Tech Last Name or Initials

3.2. Local ECG reading (Alert ECGs)

3.2.1. Rationale

Because there are no available diagnostic statements from the EPICARE except as monthly measurement reports to the WIHS CC, the local clinic reading of the ECGs is essential for safety of the participants.

5.3.2.2. Alert ECGs

The ECG technician should look for the following in the printed diagnostic statement on top of the ECG printout:

- Heart rate < 40 beats/minute
- Heart rate \geq 120 beats/minute
- Acute myocardial infarction/injury (**Figure 16**)
- Acute myocardial ischemia

- e) Ventricular tachycardia (**Figure 17**)
- f) Complete atrioventricular block (**Figure 18**)
- g) *Atrial fibrillation or flutter (**Figure 19 and 20**)
- h) Wolff-Parkinson-White (WPW) Syndrome – Pre-excitation (**Figure 21**)
- i) Prolonged QT Interval (QTc \geq 500 ms)

* Only new atrial fibrillation or flutter defined as atrial fibrillation or flutter with no documentation of prior history of these conditions. You may ask the participant about his/her history of atrial fibrillation or flutter.

These ECG findings need to be reviewed by a physician at the clinical sites before the participant leaves the clinic. The clinic physician will decide if any further action is needed. It is important not to alarm the participant by immediately revealing these unconfirmed interpretative statements before discussing the ECG with a site physician. This is because the diagnostic statements on the ECG printout are not always correct. In WIHS study, these statements are only used as a safety measure to avoid missing an acute condition that needs prompt treatment or notification to the participant.

There are other significant ECG abnormalities that warrant treatment, but because they do not require prompt action or immediate notification to the participant, they are not included in the above list. Since local reading of the study ECGs for “alerts” is not part of the ECG reading center procedure, this list of ECG abnormalities may be modified by adding or deleting more ECG abnormalities to match the overall safety measures implemented by the WIHS study or preferred by the local sites. Check the study protocol for more details and types of notification letters to be sent to the participants.

Figure 16 Acute inferior (upper panel) and acute anterior (lower panel) myocardial infarction

Diagnosis key points: Elevated ST segment in a group of adjacent leads with or without Q waves and with or without ST depression in other leads. Patients usually will have chest pain

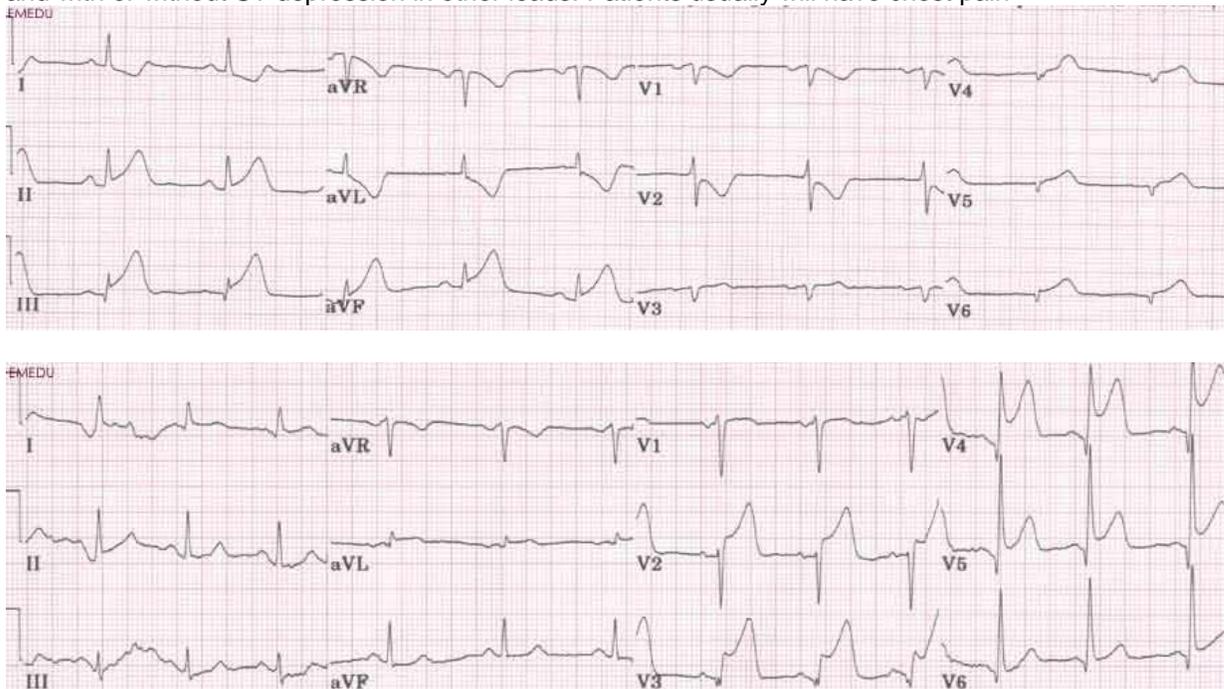


Figure 17 Ventricular tachycardia

Diagnosis key points: Wide complex tachycardia (HR \geq 110) with QRS not preceded by P wave. The participant will be mostly restless

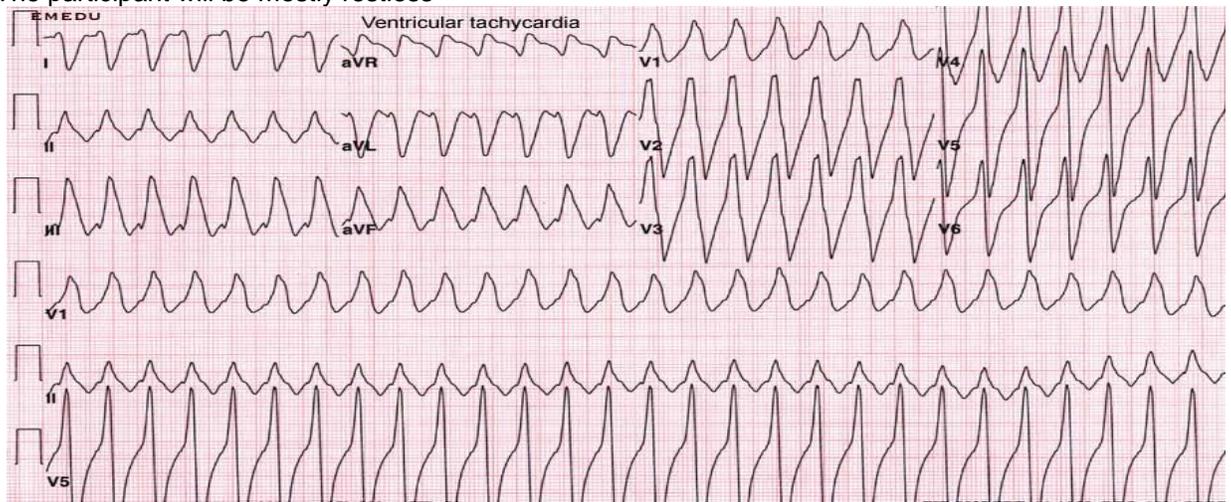


Figure 18 Complete (3rd degree) atrioventricular block

Diagnosis key points: Slow heart rate (around 40 beats per minute) with no relation between the P wave and the QRS

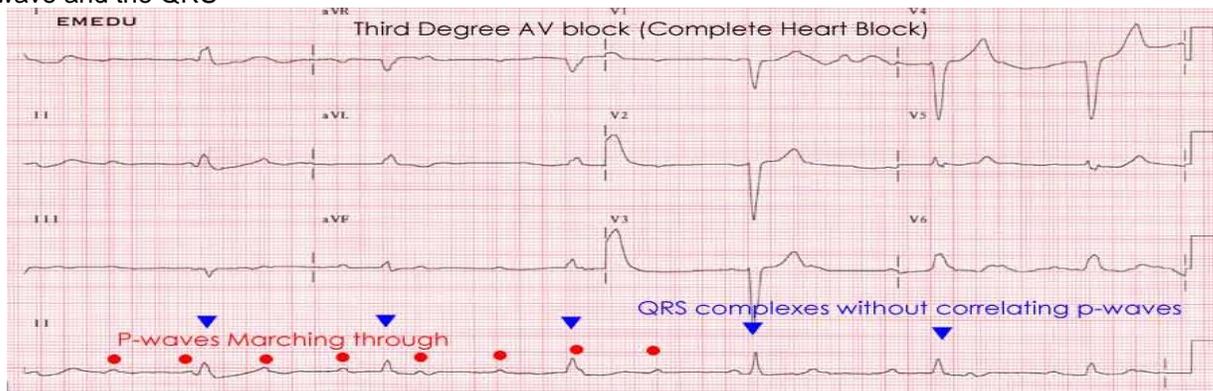


Figure 19 Atrial fibrillation

Diagnosis key points: irregular QRS complexes (heart rate) and absence of the P wave

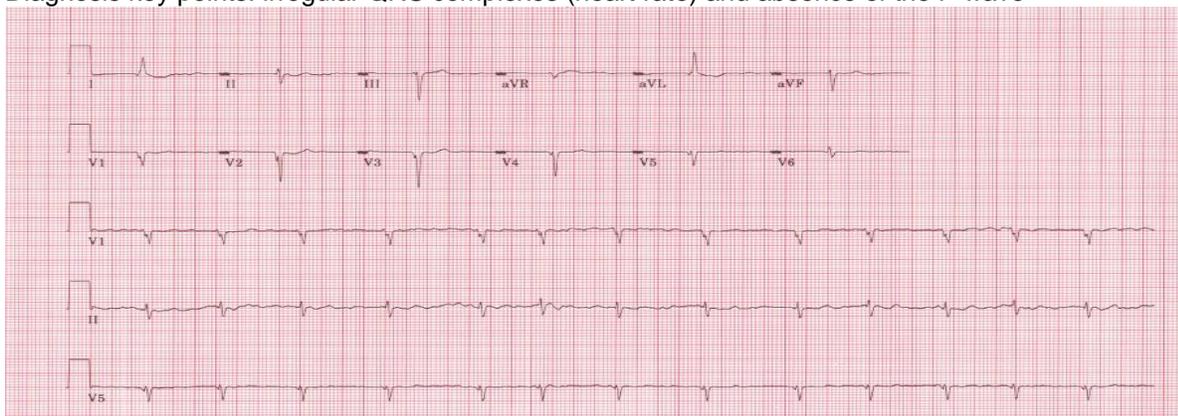


Figure 19 Atrial flutter

Diagnosis key points: multiple P waves; saw-teeth pattern (as in V1), mostly regular but could be irregular with a certain pattern (regular irregularity)

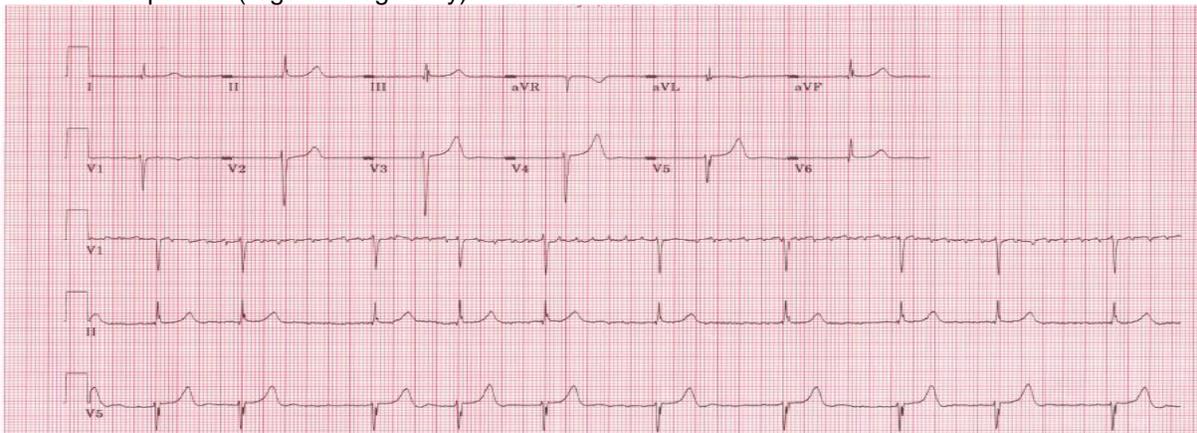
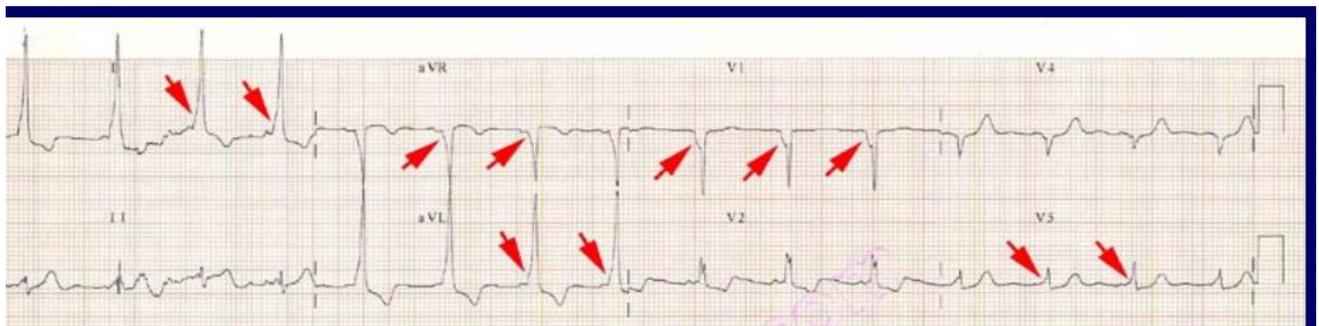


Figure 20: Wolff-Parkinson-White (WPW) Syndrome – Pre-excitation

Diagnosis key points: Short PR and slurred upstroke of R wave



3.3. Data management: Transmission, directory management, data storage

3.3.1 Communications setup for transmission

Internal set up of the ECG machines must be done according to the instructions established by the EPICARE. Correct internal set up should enable the clinics to transmit the study ECGs via a phone line to the reading center. Adding 9 (or other number) to get an outside line and/or adding an access code for long distance are taken into consideration. [NOTE: Contact the EPICARE any time with questions]

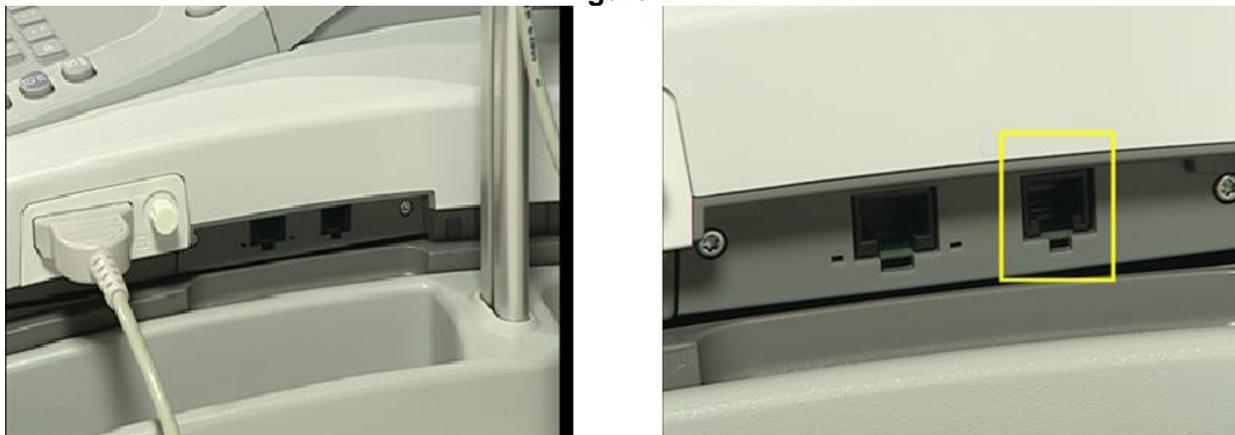
3.3.2 Before transmitting ECGs to the Reading Center

- Ensure that all previously transmitted ECGs are deleted.
- Check to ensure that all IDs are valid.

3.3.3 Transmitting ECGs to the EPICARE

- Plug one end of the phone cable into the phone connector on the rear of the MAC 3500 and the other end into any “**analogue**” (fax) phone line (**Figure 21**)

Figure 21

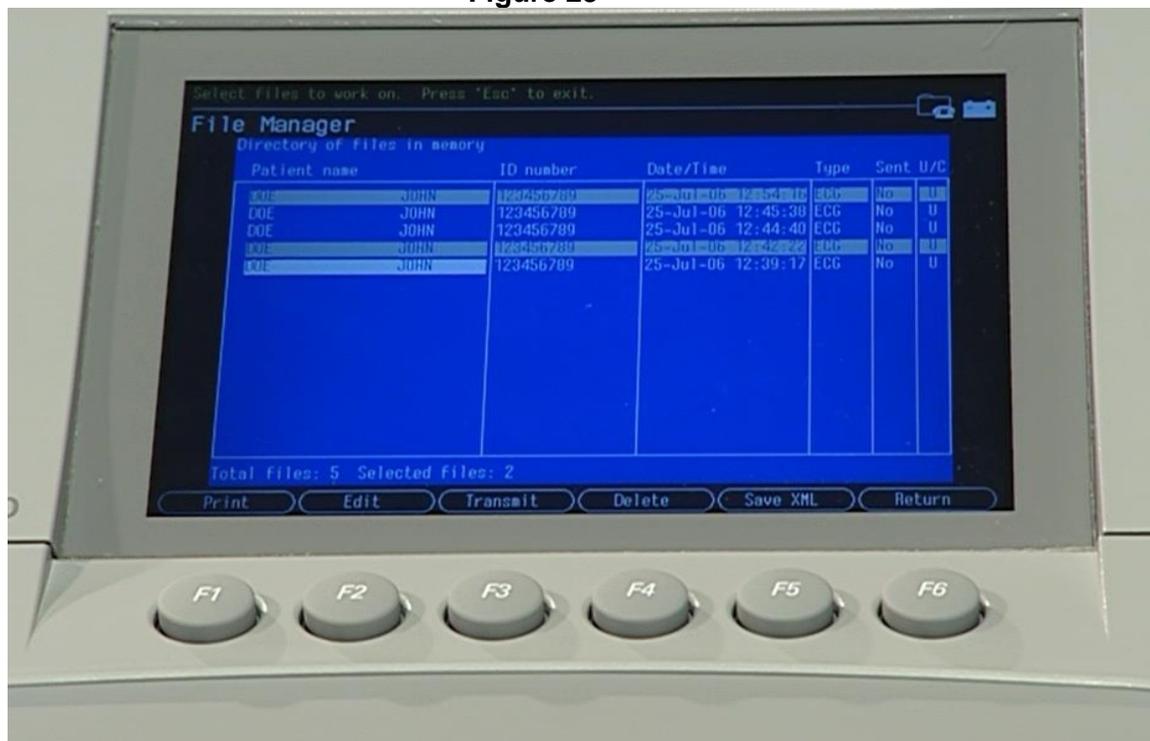


- Press “More” then “Main Menu” then the (F) key for File Manager. From the File Manager you can select records to transmit, print, edit or delete.
- To Select ALL, press select ALL (F2). To select individual records, press Select (F1) then use the arrow key on the trimpad to highlight the record (**Figure 22**). Highlighted records are shaded in grey Press the Key (F) for the desired function such as Transmit (F3) (**Figure 23**).

Figure 22



Figure 23



- Confirmation of receipt of transmitted ECGs could be made by logging into the WIHS/EPICARE website using a user name and password specific to each clinic. Allow 24 hours between transmission and confirmation of receipt through the website and deletion of ECGs from the ECG machine to allow system backup at EPICARE. The ECG Reading Center will communicate further instruction about username/password before the start of the study. See **Appendix D** for detailed instruction on how to log into the WIHS/EPICARE web-site.

3.3.4 Directory management

Keep your directory correct and current by doing the following:

- BEFORE TRANSMISSION: Delete all unwanted ECGs like those with flat lines, poor quality or duplicates. Correct any errors in participant data entry like ID numbers,
- AFTER TRANSMISSION: Delete transmitted ECGs ONLY after confirming that EPICARE has successfully received the ECGs.

3.3.5 Data storage

- The MAC3500 can export records from the internal storage to an SD card.
- SD card could be used as an alternative plan B for sending digital ECG data to the ECG reading center if transmission is impossible. Contact the ECG Reading center for more details

4 READING CENTER TECHNICAL DETAILS

Set-up of the machines is ONLY allowed with assistance of one of the EPICARE staff or an authorized study personnel if it has to be done at the clinic. It may be necessary to re-program the machine after the start of the study if a malfunction occurs, or the battery has been allowed to become dead. The machine set-up and programming instruction are listed in **Appendix C**.

4.1. Data processing

All WIHS scheduled ECGs (three per participant per scheduled visit) will be electronically transmitted to EPICARE. ECGs will be received via the GE- MUSE ECG management server. The digital ECGs are stored in an electronic database at the WIHS EPICARE, in a Marquette measurement matrix, by participant ID. This database will remain unaltered. Additionally, a second and third database will be created after technician editing of correct onset and offset of the waveforms. These two databases are then transformed into Minnesota Code and Novacode categories by the EPICARE ECG coding program. A diagram of the data flow is outlined in **Appendix E**

4.2 Data reporting

The format and route of data transfer will be determined by agreement between the Coordinating Center (CC) and the EPICARE. Monthly reports will be sent from the EPICARE to the CC. All electronic ECGs will be processed and reported within 30 days from receipt.

5 QUALITY CONTROL PROCEDURES

5.1 Quality grades

The ECG reading center evaluates and ranks the ECG quality through an automated system with visual confirmation of the results if needed. There are 4 grades; 0, 1 and 2 (which are automatically assigned by the GE-MUSE) and 5 which is manually decided by EPICARE staff for poorest quality- No grade 3 or 4. The best grade is 0 and the worst is 5. Generally, grades 0 and 1 are difficult to separate visually and they are considered good. Grade 2 is given to ECGs that have quality issues that will not significantly interfere with appropriate reading. Grade 5 ECG are given for the ECGs that there have significant quality issues that interfere with accurate automatic reading. The alarming level of poor quality is having more than 5% of the ECGs with quality grade 5. A monthly quality report will be sent to the WIHS coordinating center along with the ECG data results. Sites can use these monthly reports to track the quality of their ECGs.

2 Certification/Recertification procedures

- All ECG technicians **must go through the certification** process before they are allowed to acquire study ECGs.
- Each technician must acquire and successfully transmit 2 good quality ECG sets (3 ECGs each).
- The 2 ECG sets should be performed on 2 different volunteers or on 1 volunteer provided that there is at least 15 minutes between each ECG set.
- After evaluation of certification ECGs by EPICARE staff, the technicians will be notified of their certification status.

- Recertification process is the same as the certification process and will be requested if deterioration of quality is observed at one of the sites.
- The participant data entry should be done according to the instructions in table 3 after pressing the “pat info” key on the MAC 3500 keyboard

Table 3 Entry into the MAC3500 for certification of technicians **ONLY**

Category	Entry
Patient ID	Enter 99999999
Last name	Enter technician’s last name
First name	Enter technician’s first name
Technician	Enter technician’s name

5.3. Examples of common ECG quality problems and possible solutions

- **EXCESSIVE BASELINE DRIFT (Figure 24):** This occurs if the participant is moving around or there is tension on the lead wires. Ask the participant to lie still for a few seconds. Drift in excess of 1 mm between baseline points (QRS onset) of any two successive complexes is a sign of significant drift.
- **EXCESSIVE MUSCLE NOISE (Figure 25):** The participant is either tense due to lack of body support or may be cold. Use a wide bed and blanket to cover the participant.
- **BASELINE DRIFT DUE TO TANGLED WIRES (Figure 26):** Ensure that the wires are not pulling. Be sure to establish a good electrode connection. Lay a towel across the wires, if necessary. Adjusting the angle of the clip at the electrode often helps. You may need to tape down the chest leads; use only hypoallergenic medical tape to prevent allergic reactions. Use a U loop (not a cross loop) with the electrode wires, i.e., the wire should not cross but remain open like a U; never crossover wires.
- **LOOSE ELECTRODE CONNECTION (Figure 27):** Loose electrode connection may cause a wavy baseline in some ECG leads. Check each electrode to ensure that it is secure.
- **SIXTY HZ NOISE (Figure 28):** Periodic 60 HZ noise is sometimes visible in the record. This may be caused by AC interference from a nearby machine. Make a visual check of this before recording the ECG. Unplug any unnecessary surrounding electric equipment
Note: Jewelry does not cause 60 HZ noise.
- **MISSING LEADS AND LEAD REVERSAL (Figures 29-31):** To minimize the chances of having lead reversal and missing leads, always make sure that there are no flat lines in the ECG recording and/or mainly positive QRS in aVR lead. Also, always have a second look at the connections before recording

Figure (24) Excessive baseline drift due to sudden movement of the participant

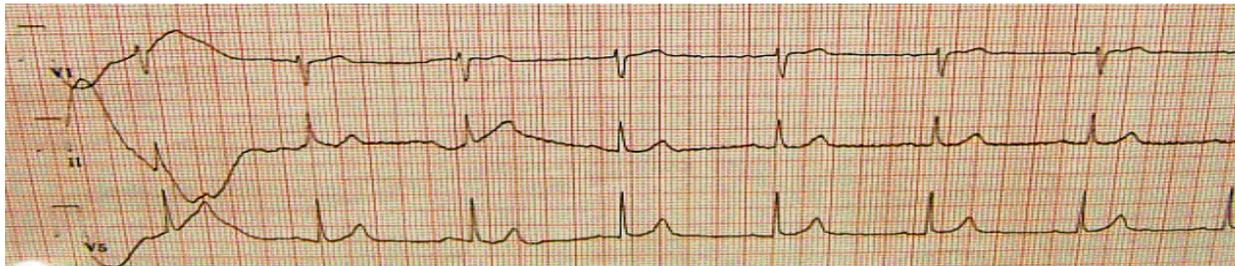


Figure (25) Excessive muscle noise

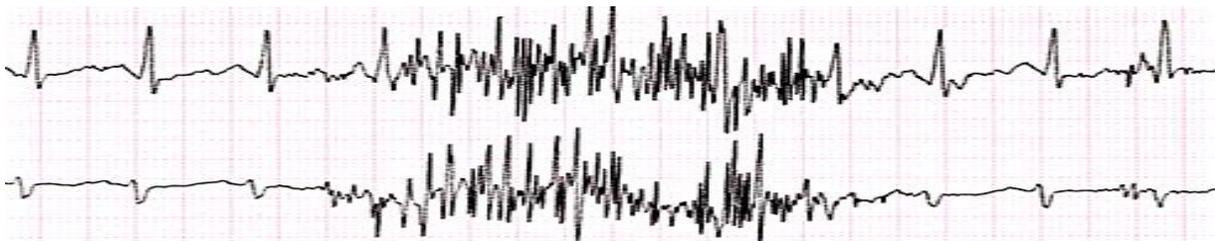


Figure (26) Baseline drift due to tangled wires



Figure (27) Wavy V1 baseline due to loose electrode

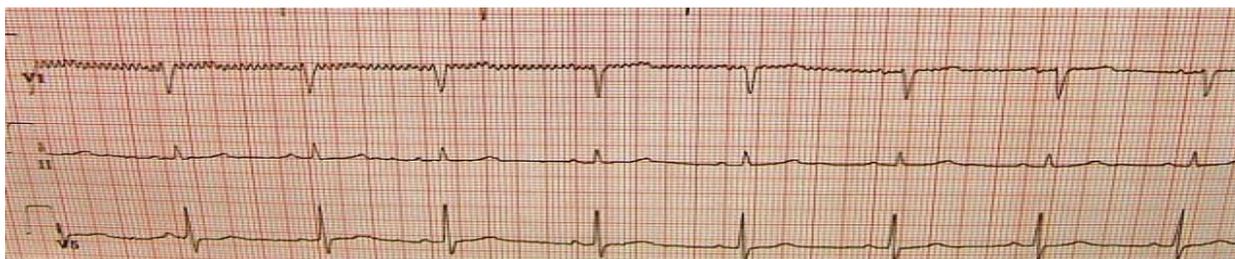


Figure (28) Sixty Hz electrical interference

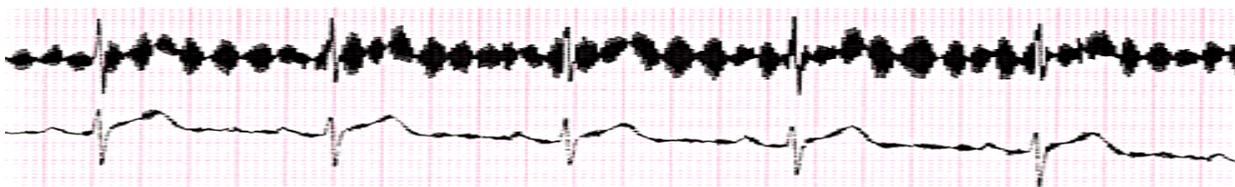


Figure (29) Flat line due to missing V1 lead

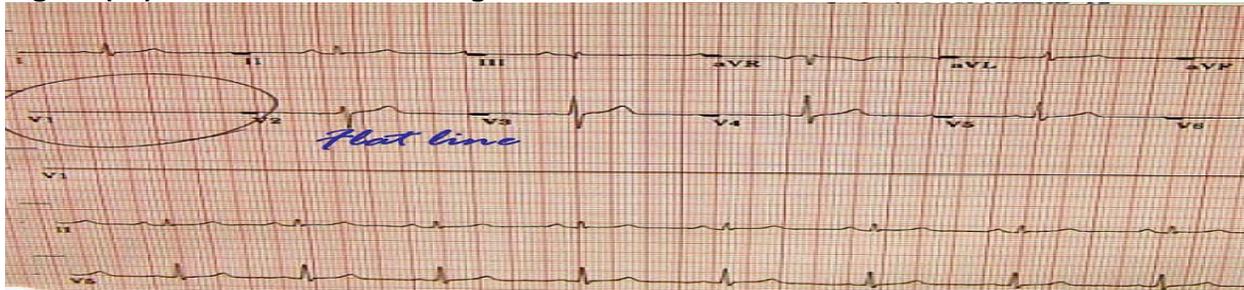


Figure (30) Lead reversal denoted by positive aVR (upper panel) compared to the normal (lower panel)

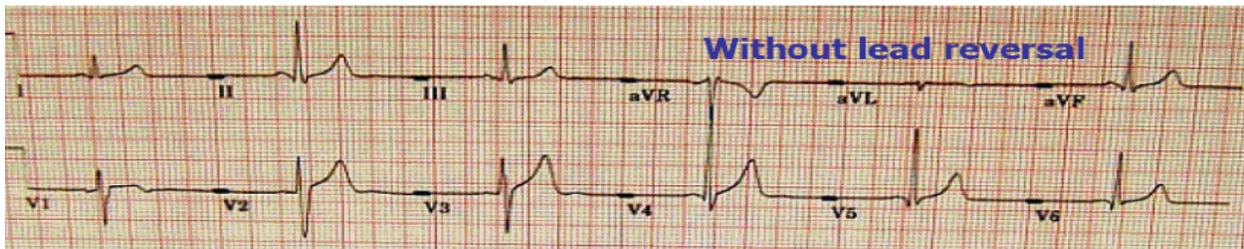
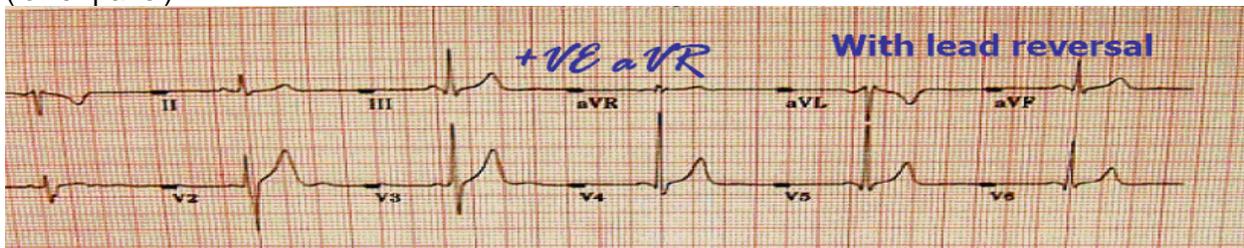
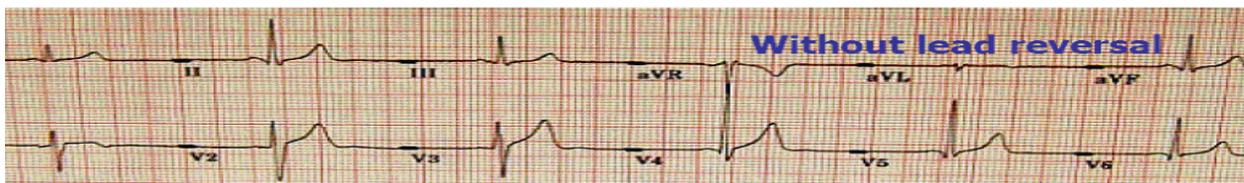
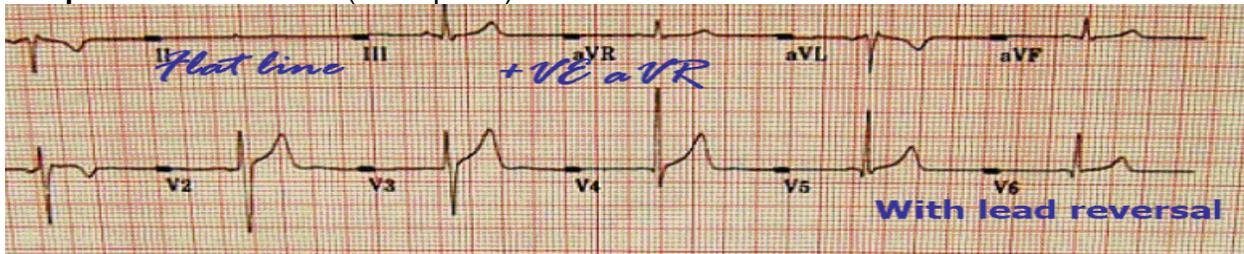


Figure (31) Lead reversal denoted by flat line in one of the limb leads (upper panel) compared to the normal (lower panel)



Appendix A

The WIHS ECG Reading Center contact list

Elsayed Z. Soliman, MD, MSc, MS, Director of the ECG reading center

Phone: (336) 716-8632

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Charles Campbell, AAS, BS, Data Manager

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shensley@wakehealth.edu

Contact Lisa Keasler or Susan Hensley with questions and/or comments pertaining to ECG acquisition and transmission as well as hardware malfunction.

Contact Charles Campbell and Julie Hu with questions and/or comments pertaining to data management or EPICARE website.

Appendix C

MAC 3500 SETUP FOR WIHS Study

In order to setup a MAC3500 for the WIHS study, turn the ECG machine **ON**, select, “**More**” then “**Main Menu**” then “**System Setup**” If asked about password, enter “**system**”. Now you will go to “**Basic System**”. From the list of options in the **Basic System**, go to “**Miscellaneous Setup**”.

Miscellaneous Setup:

Ignore all entries except the following:

Institution Block	
Institution Name	enter WIHS
Site Number	enter 115 . This is the Site entry for all WIHS study ECG machines
Delete after transmit	No
Cart Number	enter the 2-digit number corresponding to your region: 13 Bronx, NY 23 Brooklyn, NY 33 Washington, DC 53 San Francisco, CA 63 Chicago, IL 81 University of North Carolina, NC 82 Atlanta, GA 83 Miami, FL 84 University of Alabama-Birmingham 85 University of Mississippi

Press “**esc**” or arrow down the full list to go back to “**Basic System**” list

From the list of options in the **Basic System**, go to Patient Questions Set up

Patient Questions Set up

Ignore all entries except the following:

ID Required	Yes
ID Length	8
Age	No
Gender	No
Technician	Yes
Technician Required	Yes
Secondary ID	Yes
Visit	Yes

Press “**esc**” or arrow down the full list to go back to “**Basic System**” list.

From the list of options in the **Basic System**, go to “Transmission” Setup

Transmission setup

Ignore all entries except the following:

Dial Tone Required	Yes
Dialing Method	Tone
Modem	Internal
PHONE NO.	MAC3500 phone number that corresponds to your region (336) 713-1103 Bronx, NY (336) 713-1102 Brooklyn, NY (336) 713-1103 Washington, DC (336) 713-1102 San Francisco, CA (336) 713-1103 Chicago, IL (336) 713-1102 University of North Carolina, NC (336) 713-1103 Miami, FL (336) 713-1102 University of Alabama Birmingham (336) 713-1102 University of Mississippi (336) 713-1103 Atlanta, GA
Location	enter EPICARE
Serial line baud rate	9600
Default location	1

Press “**esc**” or arrow down the full list to go back to “**Basic System**” list.

From the “Main Menu” go to the “System Setup” then “ECG” then “ECG Acquisition”

ECG Acquisition Set up

Ignore all entries except the following:

Hook up advisor	Yes
-----------------	-----

Press “esc” or arrow down the full list to go back to “ECG list” list

From the “Main Menu” go to the “System Setup” then “ECG” then “ECG Analysis”

ECG Analysis

Ignore all entries except the following:

Screening Criteria	No
Suppress NORMAL statement	No
Suppress ABNORMAL and BORDERLINE statements	No
Storage format	500 Hz MUSE Network
Store XML format	No
Auto ECG storage	All ECGs
Auto ECG transmission	No ECGs

Press “esc” or arrow down the full list to go back to “ECG list” list

From the “Main Menu” go to the “System Setup” then “ECG” then “Writer setup”

Writer setup

Ignore all entries except the following:

Speed	25 mm/s
Gain	10 mm/mv
Filter	40 Hz

Press “esc” or arrow down the full list to go back to “ECG list” list

Save the setup to the system when you are asked to do so

Appendix D EPICARE WEBSITE USER GUIDE

EPICARE Web-site:

http://epicare.phs.wakehealth.edu/public/Epicare_Home.cfm

EPICARE WEBSITE OVERVIEW

Selected technicians must have a user account created, with valid e-mail address.

On creation, the WFU PHS authentication service will automatically send an email notification.

USER EMAIL NOTIFICATION EXAMPLE

From:	chcampbe@wfubmc.edu
To:	Charles Campbell
Cc:	
Subject:	WFU-PHS authentication credentials


```
Application/Site Context: epicare  
  
username: bbinkins  
Reset Password: uJhaw5
```

NOTE: Sometimes these emails are placed in junk mail or spam folders. If not in your inbox, please look at these alternate locations for the email notification.

EPICARE LOGIN SCREEN

Use this username and Reset Password at the LOGIN screen

<https://epicare.phs.wakehealth.edu/Secure/LOGIN/login.cfm>

Please enter your login information below:

[Instructions](#) [home](#)

Username:

Password:

TO RESET PASSWORD: Go to [Password ReSet Page](#)

For questions concerning your account contact
chcampbe@wakehealth.edu

- On the login page enter your user name as listed in the email
- From the e-mail, copy the Reset Password (must be exact, no spaces)
- Paste the password you have copied
- You should then be directed to the expired password page

EPICARE EXPIRED PASSWORD SCREEN

bbinkins

Your password has expired. Please enter a new one below.

[\(Instructions home\)](#)

Note: Passwords will display in the clear for entry ease/accuracy.
Guard your visual environment appropriately.

Old (expired) password: uJhaw5

New password: Confirm it:

For questions concerning your account contact chcampbe@wakehealth.edu

- The reset (expired) password will be automatically entered on the expired password screen.
- Select a New password that meets the minimum requirements (See HELP file). For this example, I selected: *NewPassword13*
- After entering, look for the “User Record Updated” message below the username

bbinkins

User record updated.

Please return to the [login page](#) and use your new credentials to login.

NOTE: After the Reset Password has been updated to user’s choice, please discard the **WFU-PHS authentication credentials** email. The Reset Password is no longer useable once it has been updated.

CONFIRMED PASSWORD CHANGE

- Select the login page link to go to the login page
- Use your username and password to login
- On successful login you will go to the RptSel (Report Selection) page
- RPTSEL Contains Menus of available SCREENS

REPSEL

USERID: chcampbe	EMAIL ADDRESS: chcampbe@wfubmc.edu		
FIRST NAME: Charles	STUDY NAME: WIHS		
LAST NAME: Campbell	CLINIC ID: 999		
LOGOUT	Confirmation	HelpFile	DataEntryRes

CONFIRMATION REPORT START

USERID: chcampbe	EMAIL ADDRESS: chcampbe@wfubmc.edu
FIRST NAME: Charles	STUDY NAME: WIHS
LAST NAME: Campbell	CLINIC ID: 999

LOG OUT	Confirmation	HelpFile	DataEntryRes
----------------	---------------------	-----------------	---------------------

SELECT ECG CONFIRMATION REPORT BEGINNING DATE.	02/25/2016	▼	BEGIN LOG DATE
SELECT ECG CONFIRMATION REPORT END DATE.	02/25/2016	▼	END LOG DATE
PRESS BUTTON TO RETRIEVE CONFIRMATION REPORT.	<input type="button" value="VIEW ECG CONFIRMATION REPORT"/>		

This form allows users to view the ECGs logged to the EPICARE ECG system database within the last 30 days. By selecting a BEGIN LOG DATE and END LOG DATE, users can view the ECGs transmitted to EPICARE within this time period.

The ECGs available for your queries are those processed at approximately 10 minutes after each hour. Depending on when the ECGs are transmitted, it could be up to 1 hour before they will be available for the report.

Once a beginning and end log date is chosen, click on the VIEW ECG CONFIRMATION REPORT button. You will be presented with a page that lists all ECGs logged within this time period, in table format. This information can be downloaded for your records by pressing the DOWNLOAD TO TEXT FILE button. Click save in the pop-up window and select your file location.

Once the confirmation report is saved, please allow one full business day before deleting the ECG(s) from your MAC1200. This will allow EPICARE's database server to be backed-up.

- ECGS Logged to Database
- LOGDATE is date of transmission to EPICARE and **NOT** date of ECG
- Selected using BEGIN DATE and END DATE
- Website Database is **NOT REAL TIME**
- Updated every 15 minutes
- Based on USERID and Clinic# (MAC3500 CART# AS ASSIGNED BY CC AND EPICARE)

CONFIRMATION REPORT

USERID: chcampbe EMAIL ADDRESS: chcampbe@wfubmc.edu
 FIRST NAME: Charles STUDY NAME: WIHS
 LAST NAME: Campbell CLINIC ID: 999

[LOGOUT](#) [Confirmation](#) [HelpFile](#) [DataEntryRes](#)

SELECT ECG CONFIRMATION REPORT BEGINNING DATE. 02/25/2016 BEGIN LOG DATE
 SELECT ECG CONFIRMATION REPORT END DATE. 02/27/2016 END LOG DATE
 PRESS BUTTON TO RETRIEVE CONFIRMATION REPORT. [VIEW ECG CONFIRMATION REPORT](#)

[DOWNLOAD TO TEXT FILE](#)

PATID	FNAME (VISIT)	LNAME (ACRSTC)	ECG DATE	TECH NAME	LOGDATE	CLINIC
12345	0	WIHS	25 Jul 2016 08:22:34	Tech	25 Feb 2016 09:45 LOCAL 25 Feb 2016 13:45 GMT	10
23456	0	WIHS	25 Jul 2016 09:23:34	Tech	26 Feb 2016 09:45 LOCAL 26 Feb 2016 13:45 GMT	10
34567	0	WIHS	25 Jul 2016 10:24:34	Tech	27 Feb 2016 09:45 LOCAL 27 Feb 2016 13:45 GMT	10

DOWNLOADED FILE

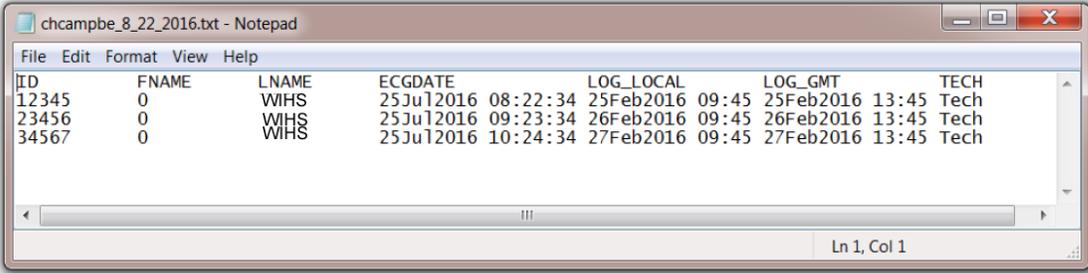
USERID: chcampbe EMAIL ADDRESS: chcampbe@wfubmc.edu
 FIRST NAME: Charles STUDY NAME: WIHS
 LAST NAME: Campbell CLINIC ID: 999

LOGOUT
Confirmation
HelpFile
DataEntryRes

SELECT ECG CONFIRMATION REPORT BEGINNING DATE. 02/25/2016 BEGIN LOG DATE
 SELECT ECG CONFIRMATION REPORT END DATE. 02/27/2016 END LOG DATE
 PRESS BUTTON TO RETRIEVE CONFIRMATION REPORT. VIEW ECG CONFIRMATION REPORT

DOWNLOAD TO TEXT FILE

PATID	FNAME (VISIT)	LNAME (ACRSTC)	ECG DATE	TECH NAME	LOGDATE	CLINIC
12345	0	WIHS	25 Jul 2016 08:22:34	Tech	25 Feb 2016 09:45 LOCAL 25 Feb 2016 13:45 GMT	10
23456	0	WIHS	25 Jul 2016 09:23:34	Tech	26 Feb 2016 09:45 LOCAL 26 Feb 2016 13:45 GMT	10
34567	0	WIHS	25 Jul 2016 10:24:34	Tech	27 Feb 2016 09:45 LOCAL 27 Feb 2016 13:45 GMT	10



The screenshot shows a Notepad window titled 'chcampbe_8_22_2016.txt - Notepad'. The text content is as follows:

```

File Edit Format View Help
ID      FNAME      LNAME      ECGDATE      LOG_LOCAL      LOG_GMT      TECH
12345   0          WIHS       25Jul2016 08:22:34  25Feb2016 09:45  25Feb2016 13:45  Tech
23456   0          WIHS       25Jul2016 09:23:34  26Feb2016 09:45  26Feb2016 13:45  Tech
34567   0          WIHS       25Jul2016 10:24:34  27Feb2016 09:45  27Feb2016 13:45  Tech
    
```

Ln 1, Col 1

- Download all confirmation reports to clinic files for your records
- Fixed length text file

HELP FILE START

USERID: chcampbe	EMAIL ADDRESS: chcampbe@wfubmc.edu
FIRST NAME: Charles	STUDY NAME: WIHS
LAST NAME: Campbell	CLINIC ID: 999

LOGOUT	Confirmation	HelpFile ▾	DataEntryRes
--------	--------------	------------	--------------

FREQUENTLY ASKED QUESTIONS HELP FILE
TRANSMIT ECGs HELP FILE
TO SET/RESET DATE AND TIME
TO EDIT PATIENT DATA ENTRIES

DATAENTRYRES

USERID: chcampbe	EMAIL ADDRESS: chcampbe@wfubmc.edu
FIRST NAME: Charles	STUDY NAME: WIHS
LAST NAME: Campbell	CLINIC ID: 999

[LOGOUT](#) [Confirmation](#) [HelpFile](#) [DataEntryRes](#)

Review the table for Data Entry Issues. You may request Updates on ID, ACROSTIC, and/or VISIT information.

- Choose only the record(s) for which you wish to request Database corrections
- Place a check mark in the CHECKBOX(s) on the row(s) for the record(s)
- Edit the desired field(s) to be updated

Please leave records with no changes needed **UNCHECKED**.

When complete, press the RQST UPDATE ON RECORD button at the bottom of the table. You will be taken to a screen confirming your record(s) have been placed in a table for future action.

	CURRENT ID	CORRECT ID	ECGDATE	CURRENT ACROSTIC	CORRECT ACROSTIC	CURRENT VISIT	CORRECT VISIT
<input checked="" type="checkbox"/>	12345	1234567	2016-07-25 08:22:34.0	WIHS	WIHS	0	1 <input type="text" value="x"/>
<input type="checkbox"/>	23456	23456	2016-07-25 09:23:34.0	WIHS	WIHS	0	0
<input type="checkbox"/>	34567	34567	2016-07-25 10:24:34.0	WIHS	WIHS	0	0

- Data Entry Resolution Page
- Request updates on ID, Acrostic, and/or Visit
- Choose only records for which you wish to request database corrections
- Leave records with no changes **UNCHECKED**
- Records placed in table for later action, changes are **NOT REAL TIME**

DATAENTRYUPDATE

USERID: chcampbe	EMAIL ADDRESS: chcampbe@wfubmc.edu
FIRST NAME: Charles	STUDY NAME: WIHS
LAST NAME: Campbell	CLINIC ID: 999

[LOGOUT](#) [Confirmation](#) [HelpFile](#) [DataEntryRes](#)

DATA ENTRY RESOLUTION REQUEST STATUS

CORRECT ID	CORRECT ACROSTIC	CORRECT VISIT	COMMENT
1234567	WIHS	1	Resolution Request Submitted for Later Update

[GET ANOTHER RECORD](#)

- Data Entry Update Page
- Data Entry Resolution Request Status
- List those records for which user has requested changes
- EPICARE Staff receives email notification that a Resolution request has been submitted. Staff will apply changes in timely manner.

Appendix E ECG Data Flow

