Manual 41
ePatch Procedures
ARIC Visit 9/10

Version 3.1
April 13, 2023

ePatch
Manual of Procedures
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0. MANUAL REVISIONS

Version Number	Date	Author	Section(s)	Description of Update
0.1	Nov. 16, 2021	Liz Selvin, Lin Yee Chen, Kiersten Little	All	Initial Draft for Visit 9 ePatch Manual
1.0	Jan. 19, 2022	Liz Selvin, Lin Yee Chen, Kiersten Little	All; Section 2.2 was added; Section 6.1 was added; serial number specified	Updated draft after pre-pilot and training.
1.1	Feb. 11, 2022	Kiersten Little	Section 2.6	Update to section 2.6 based on pilot feedback.
1.2	Feb. 21, 2022	Kiersten Little	Section 6.9	Added contact info for ordering more ePatch devices.
2.0	April 8, 2022	Kiersten Little	Section 1.4, 2.4, 2.5, 2.6, 3.3, and 6.9.	Added additional instructions on proper ePatch application/ removal and who to contact when new devices are not appropriate for use with participants. New eligibility criteria added. EIO data query information added to results reporting information.
2.1	May 17,2022	Kiersten Little	Section 6.9	Updated ordering information
2.2	Feb. 28, 2023	Kiersten Little	Appendices	Removed results letter templates and descriptions of alerts/abnormal findings. These are now included as a separate document on the ARIC website (MOP 41 Results Letter Templates).
3.0	Mar. 21, 2023	Arielle Valint	All	Update references to Visit 9 to be Visit 9 or Visit 10 throughout manual. Minor update to eligibility criteria for Visit 10. Update language about where to find eligibility for study in ARIC participant snapshot. Removed Sample Consent Addendum. This will be posted as a separate document with this manual on the ARIC website.
3.1	April 13	Arielle Valint	Section 3.2	Updated BioTel Mailing Address

1. OVERVIEW

1.1 Overarching Study Aim

Episodes of high and low glucose (hyperglycemia and hypoglycemia) in persons with diabetes may contribute to the occurrence of cardiac arrhythmias. However, prior studies have relied on clinical data or visit-based 12-lead ECG recordings and have not had detailed information on glucose patterns.

Study Aim: To evaluate the link between glycemic variability, hyperglycemia, and hypoglycemia and cardiac arrhythmias in ARIC participants with diabetes.

1.2 Background and Rationale

Arrhythmias (irregular heartbeats) are common in older adults; most do not cause noticeable symptoms, but they are still associated with significant complications, including stroke and mortality. Older adults with diabetes have approximately 20% higher risk of some arrhythmias compared to older adults without diabetes. People with uncontrolled blood sugar have as much as 60% higher risk of arrhythmias, but the reason for this is not understood. It is thought that variability of blood sugar (having both very high and very low blood sugar and having rapid changes in blood sugar) could contribute to the development of arrhythmias. This protocol will provide some of the first data on continuous measurements of both blood sugar instability and arrhythmias in people at high risk for both conditions.

The ePatch device (BioTel, Inc) is a small, lightweight monitor that is used clinically to monitor for arrhythmias. **We will apply the ePatch to all eligible and consenting participants returning for the ARIC Visit 9 (V9) or Visit 10 (V10) exam who have a history of type 2 diabetes and agree to wear the continuous glucose monitoring (CGM) device concurrently**. The ePatch will be worn at the same time as the CGM. This will allow us to simultaneously evaluate glucose patterns and patterns in heart activity. Participants will mail the ePatch device back to the Field Centers in the same box as the CGM sensors. The Field Centers will then send the ePatch devices to BioTel for data download and processing using pre-paid, pre-addressed boxes.

1.3 Key Measures

- Up to 14 days of continuous monitoring of cardiac rhythm activity.

1.4 Study Participants

The ePatch study protocol will be offered to all participants returning for the Visit 9 or Visit 10 examination who have agreed to participate in the continuous glucose monitoring (CGM) protocol, and who meet at least one of the following criteria:

- Reported use of diabetes medication at Visit 5, 6, or 7
- Self-reported diabetes diagnosis as of Visit 7
- Diabetes reported on the MCU form since January 1, 2020.

At Visit 10, the eligibility criteria were changed to:

- Reported use of diabetes medication at Visit 5, 6, or 7
- Confirmation of diabetes diagnosis on the Diabetes Questionnaire (DQF) at Visit 6 or Visit 7
- Diabetes reported on the MCU form since the start of Visit 6
- Did not complete ePatch protocol at ARIC Visit 9.

Eligibility status appears in the Visit 9 and Visit 10 Participant Snapshot Report.

Participants may report that their diabetes is well managed due to lifestyle changes or having low glucose or HbA1c values. Those participants may still be recruited for this study. Sites are encouraged to frame recruitment such that ARIC records indicate the participant has previously reported having diabetes. However, if the participant insists they were never diagnosed with diabetes, staff should respect their understanding of their own health and not push to recruit the participant into the study.

1.4.1 Exclusions

The same exclusion criteria as the CGM protocol will be used:

- The participant has a history of allergic skin reaction to adhesive tape
- The participant cannot mail the device back to the field center or deliver the device back to the Field Center.
- It is anticipated that a participant will not be able to complete the two weeks of monitoring (e.g., MRI or CT scan scheduled during the 2-week wear period, travel, etc.).
- If the participant has an implantable medical device such as a pacemaker.

If a participant is excluded from the CGM or ePatch protocol at the time of their Visit 9 or Visit 10 appointment, but is still eligible for the ePatch study (i.e. the participant is interested in the study and does not have an allergic skin reaction to adhesive tape or wear an implantable medical device), the protocol should be offered to the participant at the closest time point when monitoring is possible and both devices can be worn at the same time.

1.4.2 Contraindications

The ePatch should not be placed on broken, damaged, or irritated skin.

Similar to the CGM, the ePatch sensor should be removed prior to X-ray, computed tomography (CT), or magnetic resonance imaging (MRI) scans. The ePatch may affect the results of these scans, the imaging equipment may damage the ePatch sensor, and it may result in injuries to the patient.

1.4.3 Participant Reimbursement

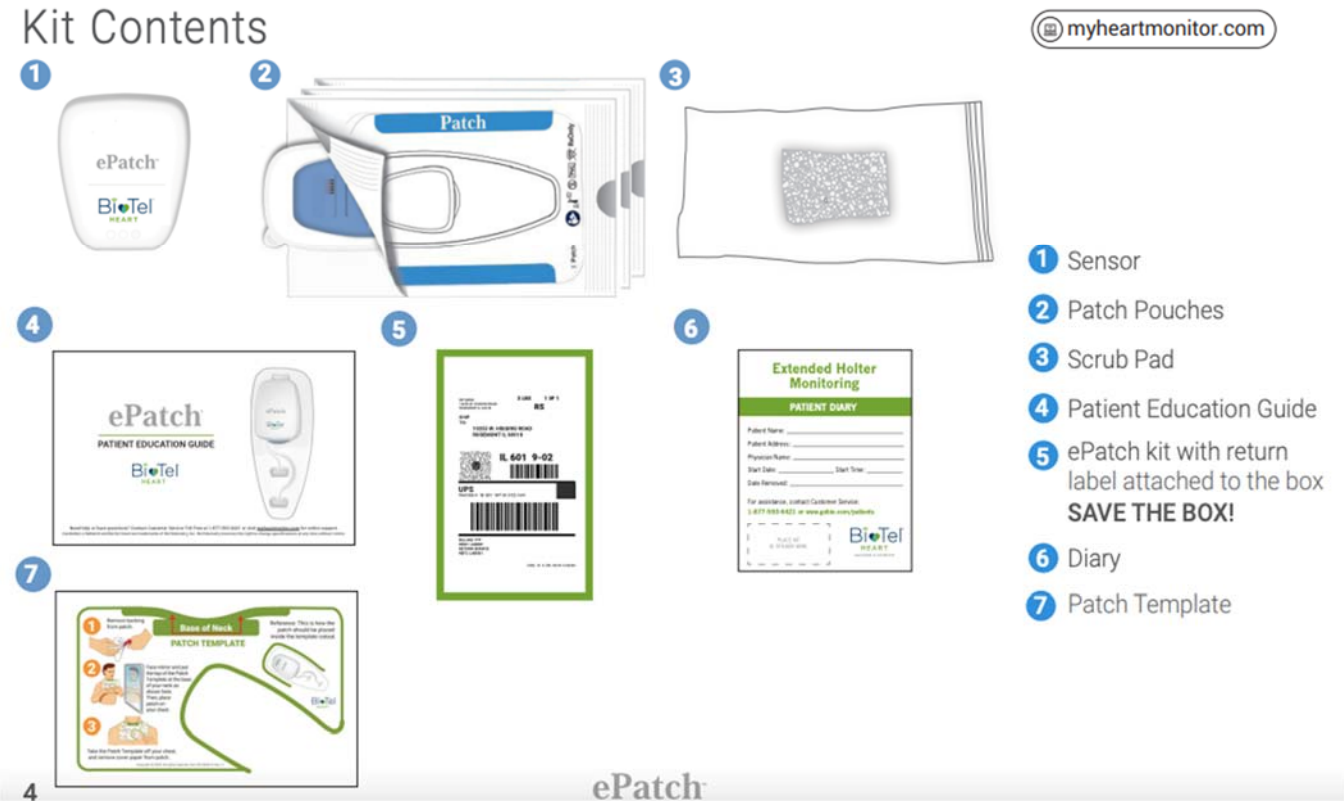
Participants will be reimbursed an additional $25 when the ePatch device is returned to the Field Center.

1.5 Equipment, Materials, and Supplies

- ePatch Kit
- CGM/ePatch Combined Participant Handout
- 1 ePatch Template (supplied by BioTel Research)
- 1 participant mailer kit (shared between the CGM sensor and the ePatch sensor).
    - Include 1 additional biohazard bag

The ePatch Kit contains the following:

- 1 Safety Razor
- 1 ePatch Sensor
- 4 Self-adhesive Patches
- 2 Prep/Scrub Pads – this is not used to abrade the skin (as in the previous Zio Patch project) but is used to remove excessive skin oil.
- 1 Patient Education Guide – **not used.**
- 1 ePatch Kit box with return label attached. **Note: SAVE THE BOX at the Field Center. We will use this to send the sensors to BioTel for processing. Sensors may be sent together in batches to BioTel in any of the ePatch boxes, and do not need to be matched with the original box.**
- 1 Symptom Diary – **not used**.



Supplies to be sent home with participant:

- CGM/ePatch combined Participant Handout
- Extra self-adhesive patches

- Patch placement template
- Participant mailer kit with two biohazard bags for mailing the CGM and ePatch sensors back to the clinic. Note: each participant will receive one (1) mailer kit used to send back both sensors.

1.5.1 Forms

- ePatch Sensor Initialization Form (EIO)
- ePatch Sensor Return Status Form (EDR)
- ePatch Reviewer Form (EDX)

1.6 Consent Process

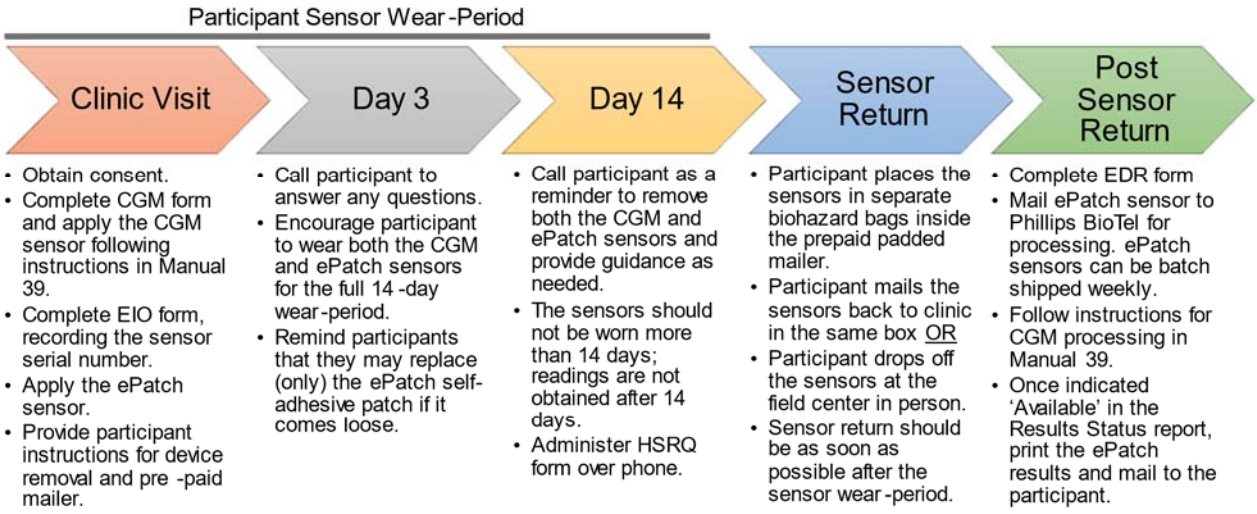
Eligible participants (indicated in the V9 or V10 participant snapshot report) who have agreed to wear the CGM sensor concurrently will need to be consented for the ePatch protocol.

1.7 Overview of Study Procedures

Participants with **diagnosed diabetes** attending the V9 or V10 exam will be invited to participate in the proposed project, which includes wearing the ePatch for 2 weeks concurrently with the CGM sensor. ePatch eligibility is indicated on the V9 and V10 Participant Snapshot Report.

Registration of the participant on the BioTel website (see **BioTel Registration Checklist**) and application of the ePatch to the participants' left upper chest will take 10-15 minutes (**see [1] Training Slides, [2] BioTel produced Training video https://www.youtube.com/watch?v=_RO7eZY3tZ0. Note: only the following time stamped portions of the training video are applicable to the ePatch as used in this ARIC protocol: 0:41 – 1:49 and 2:45 – 4:34**).

For application of the ePatch sensor, participants will need to remove their upper body clothing; women do not need to remove their bra. Day 1 is the day the ePatch is applied to the participant.


Participant Sensor Wear-Period
Clinic Visit
Day 3
Day 14
Sensor Return
Post Sensor Return
• Obtain consent.
• Complete CGM form and apply the CGM sensor following instructions in Manual 39.
• Complete EIO form, recording the sensor serial number.
• Apply the ePatch sensor.
• Provide participant instructions for device removal and pre-paid mailer.
• Call participant to answer any questions.
• Encourage participant to wear both the CGM and ePatch sensors for the full 14-day wear-period.
• Remind participants that they may replace (only) the ePatch self-adhesive patch if it comes loose.
• Call participant as a reminder to remove both the CGM and ePatch sensors and provide guidance as needed.
• The sensors should not be worn more than 14 days; readings are not obtained after 14 days.
• Administer HSRQ form over phone.
• Participant places the sensors in separate biohazard bags inside the prepaid padded mailer.
• Participant mails the sensors back to clinic in the same box OR
• Participant drops off the sensors at the field center in person.
• Sensor return should be as soon as possible after the sensor wear-period.
• Complete EDR form
• Mail ePatch sensor to Phillips BioTel for processing. ePatch sensors can be batch shipped weekly.
• Follow instructions for CGM processing in Manual 39.
• Once indicated 'Available' in the Results Status report, print the ePatch results and mail to the participant.

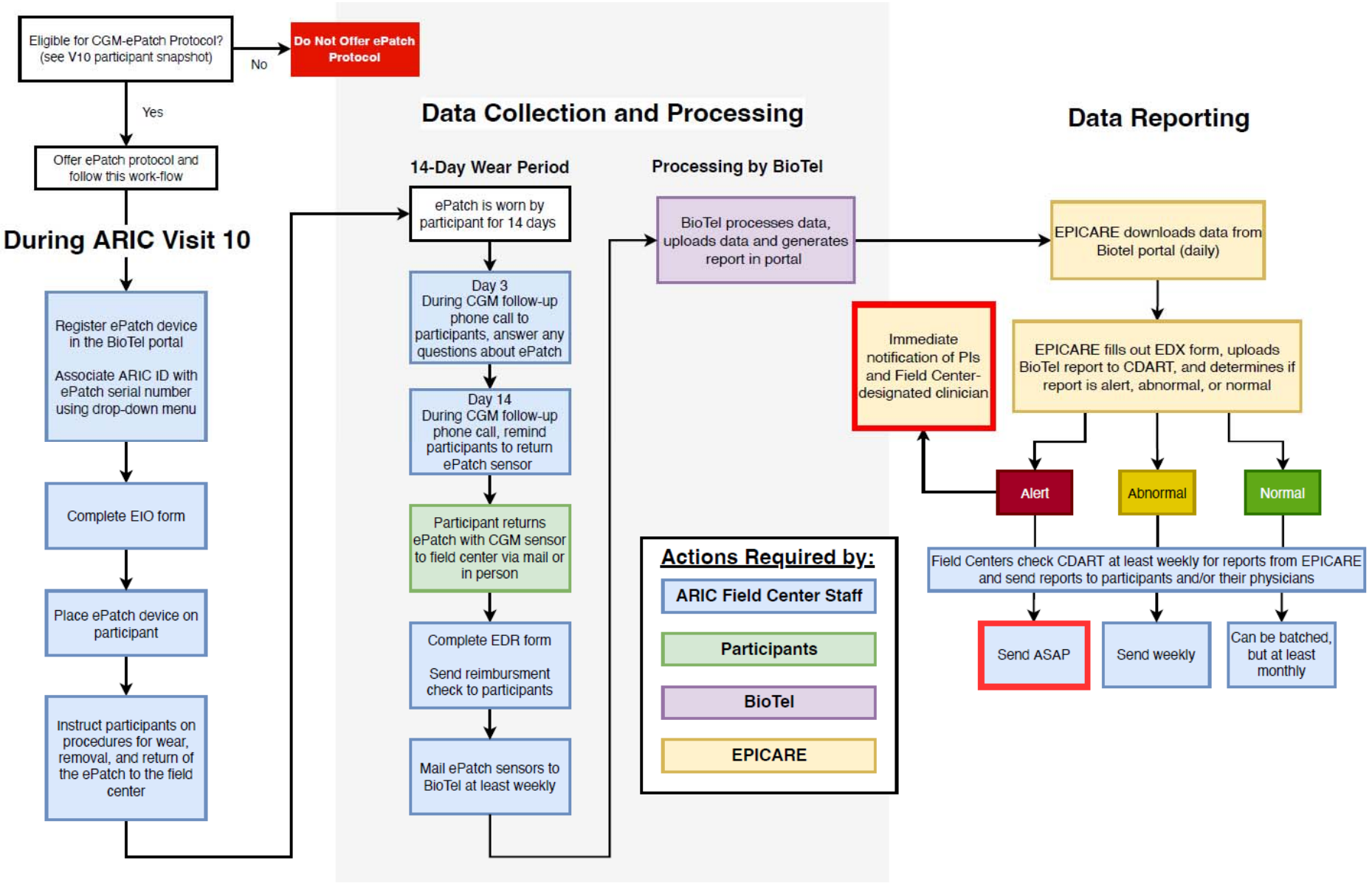
1.8 Overview of the ePatch Device

The ePatch continuously records and stores data that can be converted into information on the heart's electrical system. The ePatch sensor will be placed by study staff slightly to the left of the center of the participant's chest and it is designed to be worn for 14 days. The participant can shower or exercise as normal while wearing the ePatch.

Figure: Image of the ePatch sensor, the self-adhesive patch, and the placement location.

https://www.myheartmonitor.com/device/epatch/

1.9 ePatch Workflow and Timeline Schematic



2. DETAILED STUDY PROCEDURES

2.1 Overview of the BioTel ePatch Device

The ePatch continuously records and stores data that can be converted into information on the heart's electrical system by certified cardiac technicians at BioTel Heart. The ePatch sensor will be placed by study staff on the center of the participant's chest using the included placement template and self-adhesive patch. The participant can shower or exercise as normal while wearing the ePatch but should not swim or bathe (the patch is water-resistant, not waterproof).

Figure: examples of correct placement of device

2.2 Charging the Sensor

- The sensor will be shipped from BioTel Research charged; however, we recommend charging prior to giving to a participant to ensure the battery is fully charged. Please allow for an hour to charge.
- The indicator light on the black cradle will flash white while it's charging and will turn a solid white when it's fully charge.
- If the sensor has been sitting on the shelf, it should be recharged regardless of whether it's being provided to a participant. Otherwise, the internal clock may reset.

To charge the sensor, follow the instructions below:

1. Insert the sensor into the cradle at the end of the USB cord.

2. Insert the USB cable into the USB power adapter
3. Plug USB power adapter into a wall receptacle. **Do NOT use a computer to charge the sensor, as this may lock the device**

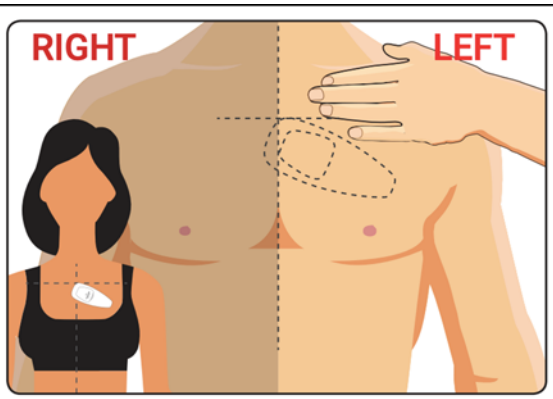
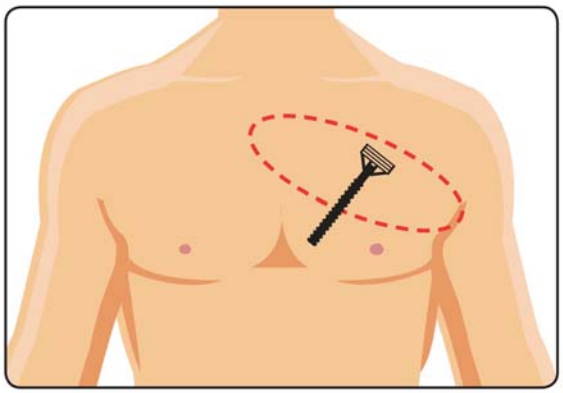
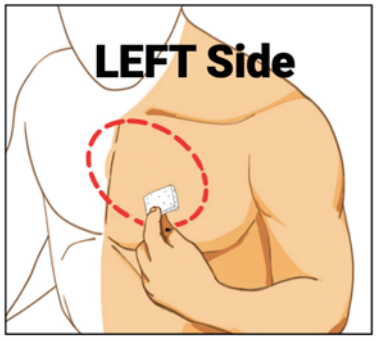
2.3 Procedures for Registering the ePatch Device

Instructions for accessing the BioTel ePatch portal will take place during a central training with Dr. Lin Yee Chen and the Phillips BioTel company. Field Centers will need to register with the ePatch portal. The Philips BioTel's project manager will set up ePatch portal accounts for Field Center staff.

The Field Center staff will register the ePatch device in the ePatch portal and associate the ARIC participant ID with the ePatch serial number **using a drop-down menu** at the time of the clinic visit. The serial number can be found on the back of the sensor. The serial number in the drop-down menu consists of 6 numerical digits following the letters "EC", for a total of 8 alphanumeric characters (ECXXXXXX). The 6 numerical digits can be found next to the letters SN on the back of the ePatch sensor. Staff must begin typing the serial number, being sure to start with the letters "EC", into the ePatch portal to see the drop-down menu appear. Staff must select the correct serial number from the drop-down menu when they see the correct number appear. When registering the device in the ePatch portal, staff should select Male for gender and 1970 for year of birth for **all participants**.

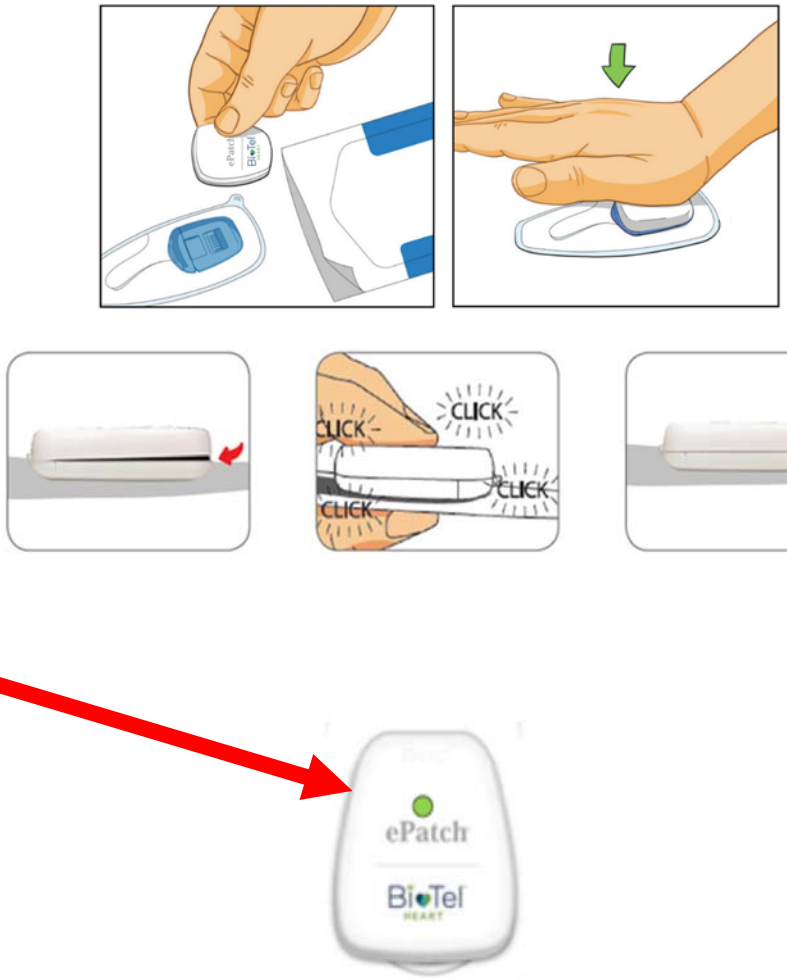
The serial number ALSO needs to be linked to the ARIC participant ID in CDART in the EIO form. There are two identifiers found on the back of the sensor that can be used to correctly identify the sensor in the EIO form: the first, to the right of the QR code, is 22 characters that may include letters, numbers, and symbols. If users scan the QR code of the device to register it in the CDART EIO form, this is the identifier that will appear. There is also a 6-digit number that is a subset of the 22-character code next to the letters SN. As an alternative, this number can be hand typed into the EIO form. Either of these options will uniquely identify the ePatch sensor. **To prevent transcription error, we recommend that the QR code is directly scanned into the EIO form.**

2.4 Procedures for ePatch Sensor Application

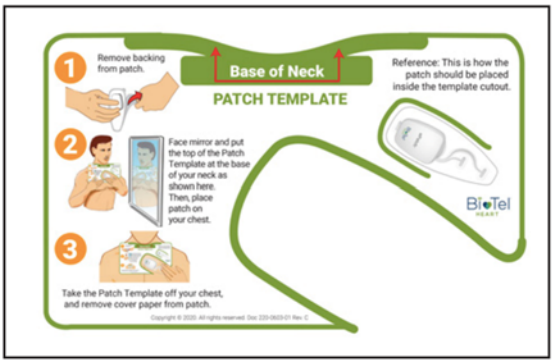
0. <u>Location</u> • Locate the notch of the collarbone on the LEFT side of the participant's body. • Measure three (3) finger widths below the notch of the collarbone • The patch will be placed diagonally down the left side of the chest from this point.	
1. <u>Skin preparation</u> The ePatch must be placed on bare, hairless skin to allow for adequate contact between the device and the body's electrical system. Try not to place the ePatch on skin moles or skin tags. • If the participant has hair on their chest, the area on the upper left side (area marked by the red oval in the diagram) must be shaved. • Clean area with alcohol wipes • Dry area with paper towel **Note: Do not apply any lotions or oils**	
2. <u>Scrub skin</u> Using scrub pad provided in kit, scrub the cleaned area with firm pressure in a circular motion for one minute. This step is not meant to abrade the skin but to remove excessive skin oil. **Note: this step is necessary for the patch to adhere completely and smoothly to the chest and is needed to ensure quality of the recording**	

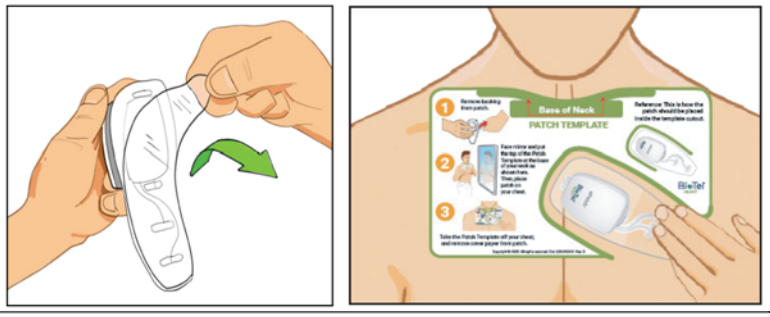
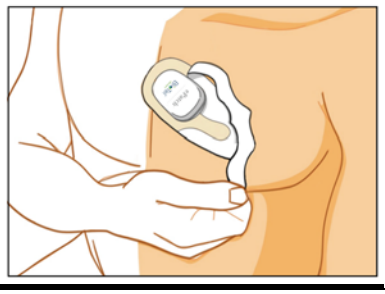
3. Place sensor into patch

- Remove a patch from the patch pouch.
- Place the patch on a flat, hard surface
- Place the sensor into the patch and press down firmly to snap into place. You should hear a snap and may hear several clicks while doing this.
- Visually inspect all edges between the sensor and the patch for gaps. **There should be no gaps between the sensor and the electrode**.
- Once you successfully seat the sensor into the patch (i.e., electrode) you will see a constant green light, followed by a flashing green light for 30 seconds. The light will then disappear.
- **The recording will automatically start when the flashing green light stops.**
- If you do NOT see a green light, or if you see a red light, use an alternate sensor.
    - The sensor can be returned to BioTel Research. Please include a note in your packing slip indicating the issue.



4. Locate patch placement template



5. **Remove clear backing from ePatch and apply to chest using placement template**	
6. **Press patch firmly and remove white paper** • Visually inspect the patch on the participant. If applied properly, the patch will be completely smooth; there should be no bubbles.	

2.5 Instructing Participants on Procedures for ePatch Removal

The field staff will provide the participants with the Combined CGM/ePatch Participant Handout, which includes instructions on removal of the patch and sensor. Participants in the ePatch study should only be given the combined handout, not the CGM handout, since the combined handout contains the information for both sensors. Staff will walk the participants through the steps and answer any questions the participants have.

The Participant Handout will also include information for participants about what to do if the ePatch or CGM sensors fall off early. If the ePatch falls off early, participants should contact the field center to schedule a time for staff to replace the patch as soon as possible. If the participant is unable to return to the field center, they should still contact the field center and staff may choose to walk them through the steps for replacing the patch themselves. It is preferred for staff to replace the patch to ensure that the device is not damaged during the replacement process, however patch replacement instructions are included in the Participant Handout and extra adhesive stickers are provided for the participant for self-application. If the CGM falls off early, participants must return to the clinic to have it replaced.

Note: The ePatch will only be replaced if it falls of early. Participants will NOT electively replace the ePatch at Day 5. If the patch falls off after 10 days of wear time and staff determine that it is too difficult to help the participant replace the device, the participant may choose to return the device early for processing. Staff should add a notelog to the EDR form, Question 2, explaining what happened if the device is returned early.

2.6 Procedures for Returning the ePatch to the Field Centers

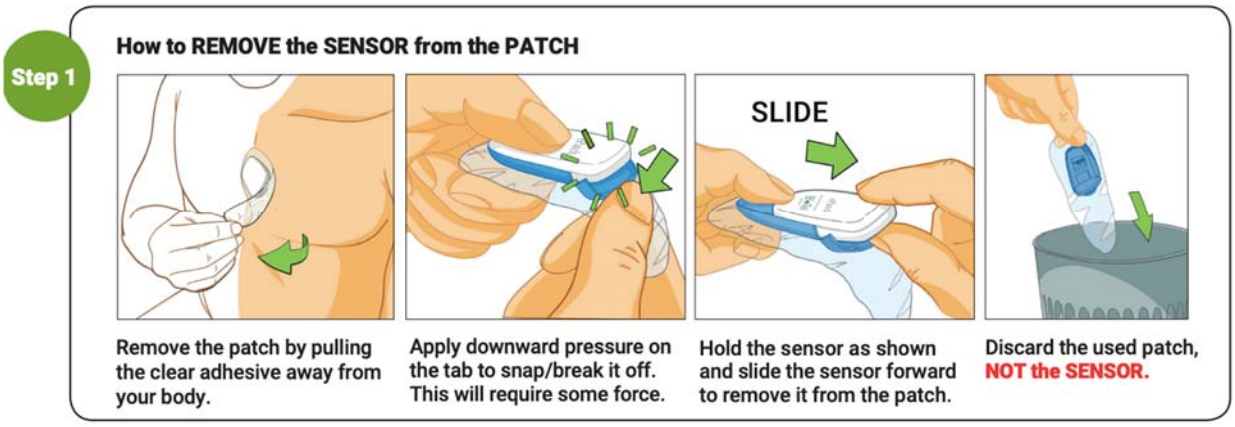
On Day 14, ARIC staff call participants to remind them to remove and return the CGM sensor and the ePatch device to the Field Center using a single pre-paid and labeled

return box. Instruct participants not to discard anything; everything should be returned to the Field Center using the pre-paid and labeled return box. Participants can fold the patch over before placing it in the biohazard bag to prevent the adhesive from sticking to the bag.

Please instruct participants to put the ePatch sensor and the CGM sensor into different biohazard bags. However, if participants put both the ePatch sensor and the CGM sensor into the same biohazard bag, it will be OK.

Eight business days after Day 14, if the ePatch and CGM have not been returned to the Field Center, call the participant to remind him/her to return the devices to the Field Center.

Once the ePatch device has been returned to the Field Center, staff will need to remove the patch from the sensor in order to see the serial number on the back of the sensor and confirm that the number matches the number entered in the EIO form. Follow these instructions for removing the patch from the sensor:



Staff should follow the above instructions for removing the patch so they can view the serial number on the back of the sensor. Staff should NOT write the serial number on the front of the sensor in sharpie, or they may be charged a cleaning fee.

Note, staff need to be careful to not pry or force the device out of the patch. The sensor should be unclipped from the patch by applying downward pressure on the tab on the long side of the patch. Once unclipped, the sensor should be able to slide out easily. Prying the device from the patch will damage the metal components of the sensor and will prevent it from having readable data.

3. DATA AND RESULTS REPORTING

3.1 ePatch Sensor Tracking

Field Center staff will need to associate the ARIC participant ID with the serial number of each ePatch sensor in the EIO form at the time of the clinic visit. There are two identifiers found on the back of the sensor that can be used to correctly identify the sensor: the first, to the right of the QR code, is 22 characters and may include letters, numbers, and symbols. If users choose to scan the QR code of the device to register it in the system, this is the identifier that will appear. There is also a 6-digit number next to the letters SN that is a subset of the 22-character code. This number can be hand typed into the EIO form if needed. This is the same number that was used to register the sensor in the ePatch portal. Both identifiers will uniquely identify the ePatch sensor.

The biohazard bags in the mailers should also be labeled with the participant's ARIC ID and sensor serial number to facilitate tracking. The kit will not contain labels with the serial numbers; field centers are asked to create their own labels to make it easy to match the sensor to the appropriate participant when the device is returned. When the device is returned to the clinic, the ePatch serial number should be verified against the serial number that is automatically applied in the EDR form (prefilled from EIO form). In the case of a mismatch, the serial number should be reconciled with the serial number recorded in the EIO form and the Coordinating Center should be notified with any discrepancies. If the serial number entered in the EIO form does not match the serial number in the EDX form, the field center or reading center will be notified and asked to provide verification of the correct number.

Figure: Image of serial numbers on device. The string of characters next to the QR code (+B146EP020/$$+7200249T) will appear in the system if users choose to scan the QR code. The numbers 200249 next to SN can also be hand typed into the EIO form.

3.2 Mailing of ePatch Device to BioTel

The Field Centers will be responsible for mailing the ePatch devices to Phillips BioTel at least weekly using the prepaid, pre-addressed boxes included in the ePatch kit. The sensors can be sent in batches to BioTel using a single box, and do not need to be matched with their original box. Field centers should complete a packing list using the template provided from BioTel.

The following address can be used for shipping boxes to BioTel if the pre-addressed shipping labels are unable to be located.

Attention: ARIC-ePatch Data Technician
Address:
BioTel Research
155 Corporate Woods, Suite 180
Rochester, NY 14623
USA

UPS Account Number: A53E63

If using a prepaid shipping label, always confirm correct shipping address before mailing.

3.3 Data Download

A standard report will be generated by BioTel and will be uploaded to the secure BioTel CardioPortal. This report will be downloaded by EPICARE and uploaded by EPICARE into the CDART system. The standard report includes a cover page summarizing the main arrhythmia diagnoses and ECGs of the arrhythmias; the latter will allow verification of reported arrhythmias. Each ePatch standard report will be identified by an ARIC study ID (recorded in CDART) and no participant identifiers will be available to BioTel. **Appendix 6.7** includes examples of BioTel standard reports.

3.3 Results Reporting

Dr. Elsayed Soliman and his team of physician ECG readers in EPICARE (Wake Forest University) will download the standard report from the BioTel CardioPortal daily. They will verify the accuracy of heart rhythm findings in the BioTel standard report. All ARIC participants will receive an ARIC summary results letter that will be 1 of 3 template letters: (1) “no abnormal findings”, (2) “abnormal findings present”, or (3) “alerts present”. Dr. Elsayed Soliman and the EPICARE staff will decide which template letter should be sent to each participant and this decision will be entered into a secure website (CDART). The BioTel standard report will also be uploaded onto CDART.

The Coordinating Center and Field Centers will have access to EPICARE’s decision on the template letter and the BioTel standard report via CDART. ARIC Field Center staff should check the ePatch Alerts Report in CDART daily to ensure alerts are communicated with participants in a timely manner. In this report, staff will see a note at the top indicating that the Visit 9 or Visit 10 Form Data Queries Report should be run prior to sending participants their results. This is the EIO data query that checks the

serial number in the EDX form against the EIO form and notifies staff when there is a mismatch. In cases of a mismatch, check the serial number in the EIO and EDX forms and the serial number entered into the ePatch registration portal. If staff are unable to resolve the issue by correcting the serial number in the EIO form or ePatch registration portal, contact ARIChelp at arichelp@unc.edu.

After the data query has been run, ARIC Field Center staff will then prepare the ARIC summary of results letters and send it with the cover page of the BioTel standard report to participants. With participants' permission, their physicians will also receive the results letter, BioTel standard report, and the relevant standardized ARIC physician cover letter, which can be found in the appendix of Manual 2 Home and Field Center Procedures (MOP2). BioTel standard reports that do not contain an alert will be released in batches along with the other results sent to the participant (e.g., lab results, CGM reports).

The definitions of abnormal findings and alerts are provided in **Appendix 6.6**. The descriptions for the abnormal findings and alerts, as well as the template ARIC summary results letters for "no abnormal findings", "abnormal findings present", or "alerts present", can be found in the **Results Letter Templates** document on the ARIC website with this manual.

Alert notification

Every day, Dr. Soliman's team will review the ePatch reports for any potentially life-threatening arrhythmias that will require alert notification. In addition, potentially life-threatening arrhythmias that are discovered by BioTel staff will be immediately reported to Dr. Soliman and his team in EPICARE who will verify that the alerts are correct. For all alert findings, Dr. Soliman will immediately enter the alert notification and upload the BioTel standard report onto CDART. Dr. Soliman will also send an email to ARIC Field Center PIs, Field Center staff, and the project PI, Dr. Chen to notify them of the alert. Field center PIs or physicians will call participants to discuss the alert findings and recommend to participants to discuss the alert findings with their physicians. The Field Center physicians are: Dr. Justin Echouffo-Tcheugui (Johns Hopkins University), Dr. Lin Yee Chen (University of Minnesota), Paula Riddle, RN and Barbara Anderson, RN (Wake Forest University), and Dr. Gwen Windham (University of Mississippi).

In addition, on the same day that the alert was reported, ARIC Field Center staff will prepare the ARIC summary results letters and send it with the full BioTel standard report (including ECG tracings) by FedEx to participants, and with participants' permission, their physicians.

4. TRAINING AND CERTIFICATION

All ARIC Field Center Staff involved in the ePatch protocol will participate in a central web-based training. This training will cover application of the ePatch device and procedures for reporting the results to the participants. Dr. Chen and representatives from Philips BioTel will conduct the training via Zoom. The complete training will be recorded for future reference in case any questions arise. In addition to this centralized training, ARIC Field Center Staff should review Manual 2 for Field Center Procedures as well as Manual 39 which details the CGM protocol, and Manual 41 which details the ePatch protocol.

4.1 Certification Checklist:

1. Procedure is explained to participant including length of wear, what to do about bathing/showering, who to call with questions, etc.
2. Technician uses proper technique for site preparation including: identifying the correct placement site, removal of clothing covering placement site, sensor placement site is prepped by shaving the skin if needed, skin is prepped using the correct technique using scrub pad, technician washes hands prior to installation, and technician wears gloves.
3. Technician uses proper technique for sensor placement: preparing participant with instructions for discomfort, technician applies the sensor placement tool against skin, technician asks participant about any final questions, technician cleans area of debris and disposes of any potentially biohazardous waste appropriately.
4. Technician correctly records sensor serial number within CDART, and labels biohazard bag with participant ID# and sensor serial number.

Any staff member who successfully completes the ePatch training and successfully places 2-3 ePatch sensors (observed by a coordinator or senior staff member) is considered certified for the ePatch protocol. The sensors placed for the purpose of certification do not need to be worn, just placed.

5. CLINIC SCRIPTS

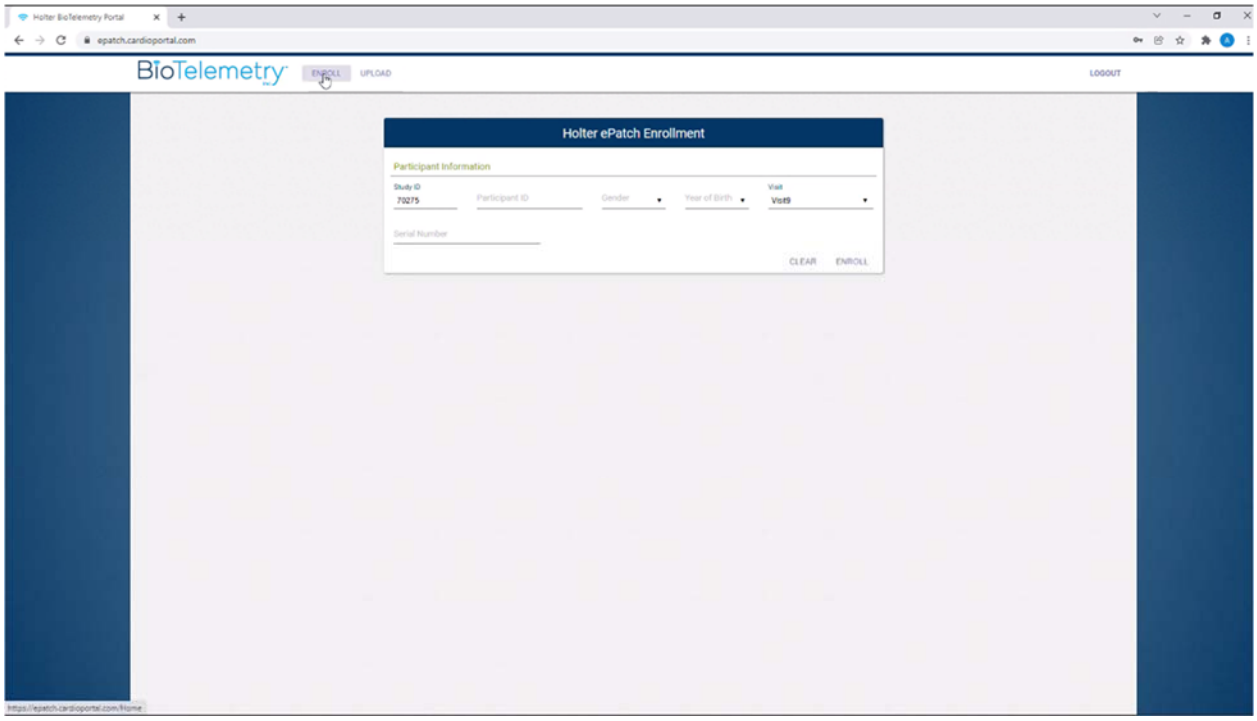
The ePatch study is included in the consent form for ARIC participants to decide whether they want to take part or not. This recruitment script is intended for ARIC participants with diabetes who agree to wear the continuous glucose monitoring device. Eligibility for the ePatch study is included in the Visit Participant Snapshot Report. The staff administering consent will mention that this will add some time to the exam and require them to wear the ePatch for 2 weeks (simultaneously with the CGM).

When the main Visit 9 or Visit 10 components are completed and it is time for the ePatch, the staff will say, **"Next we will apply the heart rhythm monitor known as the ePatch and discuss how to wear and return the device. This will take about 10 minutes."**

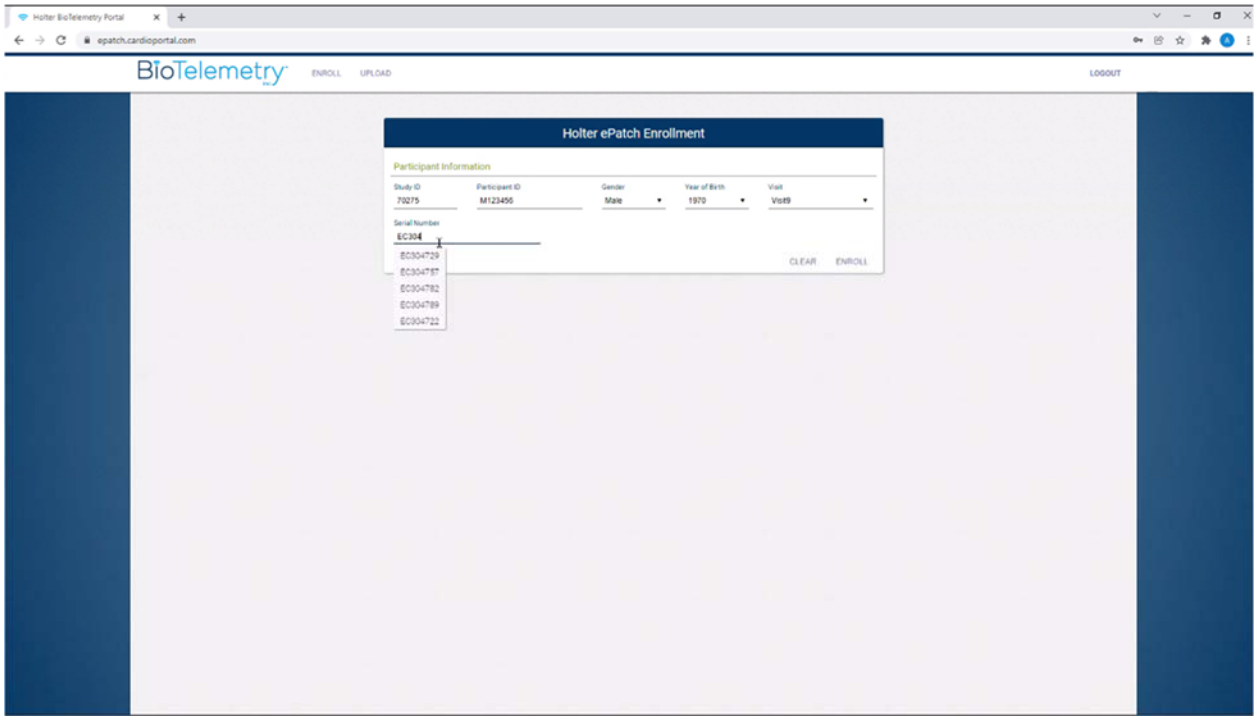
6. APPENDIX

6.1 ePatch Portal Enrollment Instructions

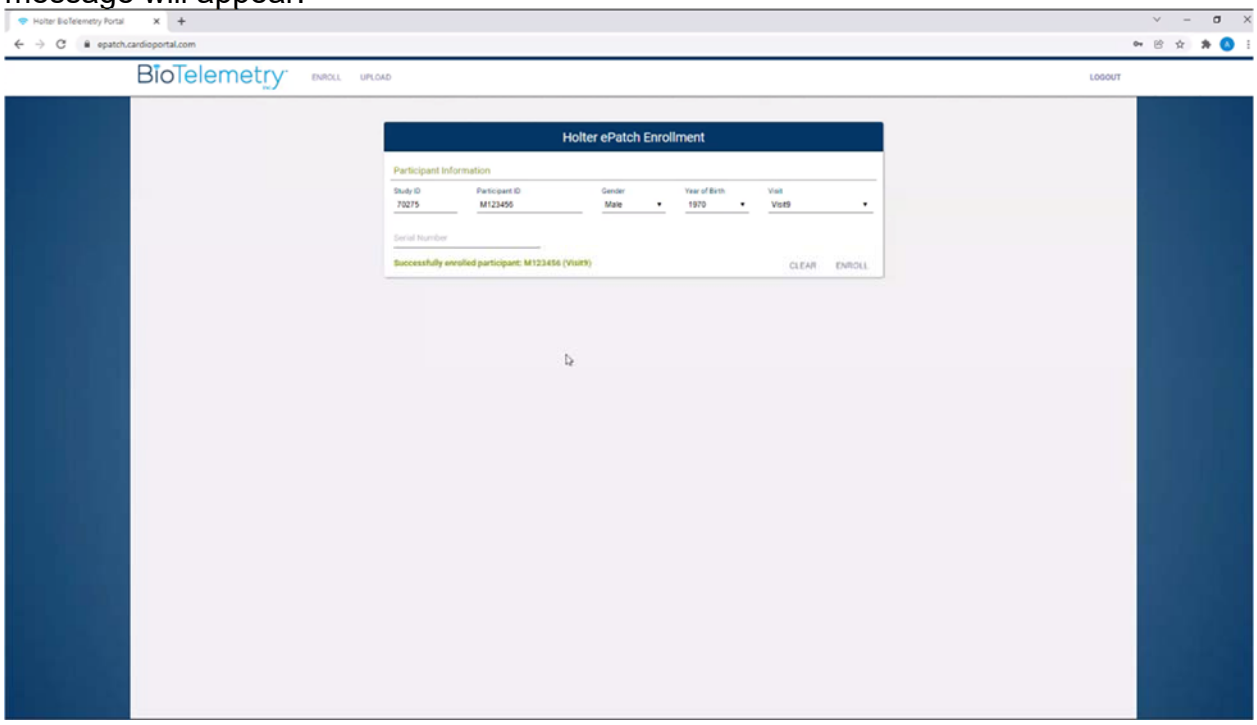
On the ePatch Enrollment Portal, select “Enroll”. Ignore the Study ID field (used internally at BioTel) and enter the ARIC Participant ID in the Participant ID field. Be sure Visit 9 is selected.



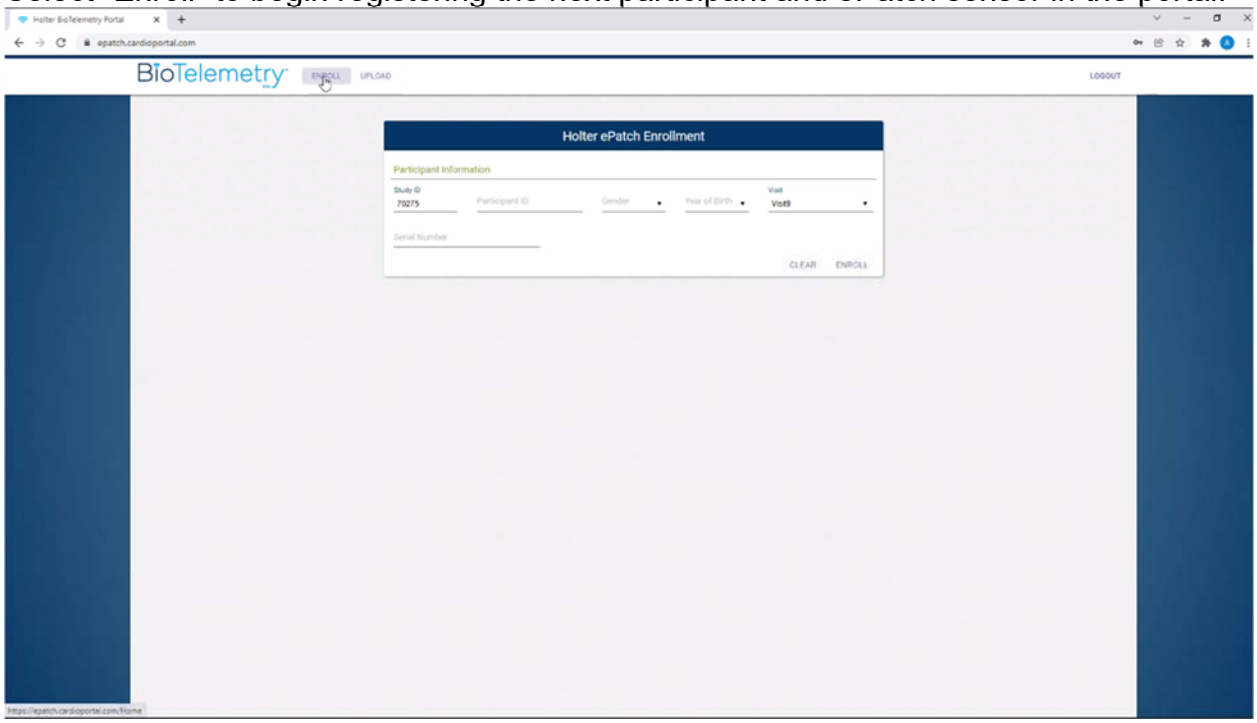
In the Gender field, select Male for all participants. In the Year of Birth field, select 1970 for all participants. To register the device, begin typing the letters “EC” and the first few digits of the serial number (found on the back of the sensor next to SN). The drop-down menu will appear. Select the correct serial number from the drop-down menu.



If the participant has been successfully enrolled in the ePatch portal, the following message will appear.



Select “Enroll” to begin registering the next participant and ePatch sensor in the portal.



6.2 Participant Enrollment Checklist

Participant Enrollment Checklist:

1. Has participant been enrolled into the ePatch portal?

2. Has participant been advised that if they have any questions while wearing the ePatch they are to call the ARIC clinic?

3. Has the participant been provided with extra self-adhesive patches, patch placement template, and the ePatch/ CGM Participant Handout?

4. Has participant been advised on ePatch removal?

5. Has participant been advised that they should return the device directly to the study site in the mailer along with the continuous glucose monitoring (CGM) device?

6.3 Overall ePatch Checklist

In clinic

Assess eligibility
Complete EIO form
Apply ePatch to participant
Day 1 is the day ePatch and CGM are applied.

- If the CGM is being applied at a different time, coordinate the placement of the ePatch with CGM placement; both sensors should be worn at the same time.

Day 3 CGM Protocol phone call

Ask whether participant is still wearing ePatch.

- If not, instruct participants on procedures for re-applying the sensor using a new self-adhesive patch

Clarify any questions
Encourage participant to wear the ePatch for the full 14 days

Day 14 CGM Protocol phone call

Clarify any questions
Remind participant to return ePatch sensor to Field Center in the same mailer as the CGM sensor

Receipt of ePatch sensor and retrieval phone calls

Once ePatch sensor is returned to field center, complete EDR form and send reimbursement check to participant
Eight business days after Day 14, if the ePatch and/or CGM sensors have not been returned to the Field Center, call the participant to remind him/her to return the devices to the Field Center.

Results reporting and alert notification

Check CDART daily for determination of (1) normal results, (2) abnormal results, and (3) alerts. For (3), EPICARE will also send email to Field Center PI, Co-I, and field center staff.

For (1) and (2), mail cover letter plus entire BioTel report
(3), Fed Ex cover letter plus entire BioTel report AND Field Center PI or Co-I to call participant

Other issues

- For support regarding ePatch, contact BioTel (Brandon Fear Brandon.Fear@gobio.com)
- For questions regarding project, contact PI (Lin Yee Chen, chenx484@umn.edu)

6.4 FAQs

	Question	Response
1.	What should I do if the ePatch falls off?	Call us.
2.	Can I exercise while wearing the ePatch?	Yes, but excessive sweating may shorten wear time.
3.	Can I shower with the ePatch on?	Yes, but showers should be brief. Avoid spraying water directly on the ePatch. Keep soaps and lotions away from the patch. When towel-drying, hold the ePatch down with one hand. Press the ePatch against your skin to secure it.
4.	Can I take a bath?	No.
5.	Can I go swimming or in a hot tub?	No. The ePatch should not be submerged in water.
6.	Is it normal to experience skin irritation or itchiness in the area of the ePatch?	Some patients have reported minor skin irritation and/or itching while wearing the ePatch. If the irritation or itching is severe or hives or blisters develop, please call us.
7.	What activities should I avoid?	Activities that cause excessive sweating can cause the patch monitor to slide, become loose, fall off, and shorten wear time.
8.	Can I travel with the patch monitor on?	Yes. You will be provided an airplane card that will explain the reason you are wearing the device. For airplane travel, TSA agents should be notified that you are wearing an ePatch heart monitoring device and a CGM glucose monitoring device. A pat-down screen should be requested since the x-rays may interfere with device function.
9.	Can I undergo an MRI exam?	No.

6.5 ePatch Recruitment and Wear Outcomes and Form Actions

Outcome	Actions
The participant has the ePatch successfully placed. The participant wears the ePatch for 10 or more days. **This is the most common scenario.**	1. When initializing the sensor, be sure to complete all items in the EIO form. 2. Complete the EDR form. 3. Once results have been uploaded to CDART by EPICARE, print and mail the PDF results and cover letter to the participant.
The participant is eligible (has diabetes, and no adhesive allergy or implantable medical device) and declines participation in the ePatch study.	1. Open the EIO form and answer the prompts in the Administrative Information section of the form indicating the reason why the participant declined participation then save and close the form. 2. Mark EDR form permanently missing
The participant meets the additional exclusion criteria in the EIO form and does not agree to future participation in the ePatch study.	1. Answer all prompts in the EIO form then save and close the form. Do not assign a sensor to the participant. 2. Mark EDR form permanently missing
The participant meets the additional exclusion criteria in the EIO form and agrees to future participation in the ePatch study.	1. Answer all prompts in the EIO form then save and close the form. Do not assign a sensor to the participant. Temporary exclusion criteria for the ePatch device are detailed in the CGM form. 2. Wait at least 2 weeks before attempting further recruitment for the CGM and ePatch study. 3. With each subsequent recruitment attempt, the same EIO form occurrence should be used and updated to reflect the most recent attempt. 4. Continue recruitment attempts until the participant can have both the CGM and ePatch sensors placed OR the participant does not agree to future participation in the ePatch study. 5. For as long as the participant continues to agree to future participation in the ePatch study, even if they are temporarily excluded based on the criteria listed in the CGM and EIO form, do not mark the EGR form as permanently missing.
The participant has the ePatch successfully placed. The self-adhesive patch is removed on or before day 9 of the 14- day wear period. The participant agrees to replace the patch.	1. Instruct participant on procedures for replacing the self-adhesive patch. 2. If participant cannot replace the patch themselves, schedule a clinic visit as soon as possible to replace the patch. 3. Complete the EDR form when ePatch sensor is returned to the field center.

	4. Once results have been uploaded to CDART by EPICARE (indicated in the Results Status Report), print and mail the PDF results and cover letter to the participant.
The participant has the ePatch successfully placed. The self-adhesive patch is removed on or before day 9 of the 14- day wear period is complete. The participant does not agree to replace the patch.	1. Ask participant to return ePatch sensor to the field center. 2. Complete the EDR form when ePatch sensor is returned to the field center 3. Once results have been uploaded to CDART by EPICARE (indicated in the Results Status Report), print and mail the PDF results and cover letter to the participant.

6.6 Abnormal Findings and Alerts

Abnormal findings

- Atrial fibrillation
- Atrial flutter
- Supraventricular ectopy (SVE)/Premature atrial contractions (PACs) – state only if >1%
- Supraventricular couplets – state only if >1%
- Supraventricular triplets – state only if >1%
- Supraventricular tachycardia
    - If a single episode is >30 seconds
    - If on average, >1 episode per day
- Ventricular ectopy (VE)/Premature ventricular contractions (PVCs) – state only if >1%
- Ventricular couplets – state only if >1%
- Ventricular triplets – state only if >1%
- Non-sustained ventricular tachycardia
    - If a single episode is >15 seconds and ≤30 seconds
    - If on average, >1 episode per day
- 2nd degree AV block, Mobitz I (AV Wenckebach)
- Paced beats (should be very rare since having an implantable device is an exclusion criterion)

Alerts

- Wide QRS tachycardia >120 bpm and sustained for >30 seconds (includes monomorphic ventricular tachycardia, polymorphic ventricular tachycardia, ventricular fibrillation)
- Complete heart block
- 2nd degree AV Block, Mobitz II
- Pause >6 seconds
- Bradycardia <40 bpm and sustained for >30 seconds
- Atrial fibrillation/atrial flutter with average heart rate <40 bpm or >180 bpm and sustained for 60 seconds
- Narrow QRS tachycardia >180bpm and sustained for 60 seconds

EPICARE may in some instances report other abnormalities or alert findings if deemed appropriate.

Description of abnormal findings and alerts

The description or interpretation for each abnormal finding and alert, along with the three results letter templates (alerts, abnormal, normal) can be found in the **Results Letter Templates** document on the ARIC website with this manual.

Directions: State or list the abnormalities and provide the description. Example: The heart rhythm monitor recorded atrial fibrillation and ventricular ectopy. Atrial fibrillation is an irregular heart rhythm. Ventricular ectopy are heartbeats that come early and originate from the lower chambers of the heart. They may feel like “palpitations” or “skipping a beat”.

6.7 Examples of BioTel Reports

Abnormal Report – Atrial Fibrillation, Premature Atrial Contractions, Premature Ventricular Contractions

BioTel HEART

Extended Holter Report
(Tel) 877-593-6421 (Fax) 877-989-0700

Patient Name:
Date of Birth: 00/00/0000 (Age: 00)
Gender: Male
Start Date:
MRN:

Referring Physician:
Ordering Physician:
Rx Duration: 6 Days
Diagnosis (ICD10):

Study Summary

Duration	5d 7h 21m
Rhythm	Sinus Rhythm
Min HR	40 bpm 15:51 10/24
Avg HR	81 bpm
Max HR	203 bpm 20:07 10/23
Total Beats	510,481
Diary Entries	0
Pt. Triggers	11

Pause Summary

Pause (≥2.0s)	10
Longest Pause	4.8s 11:30 10/27

AF Summary

AF Burden	30%
AF Events	9
AF HR Range	48 - 80 bpm
Longest AF	0d 13h 38m 2s

Supraventricular Summary

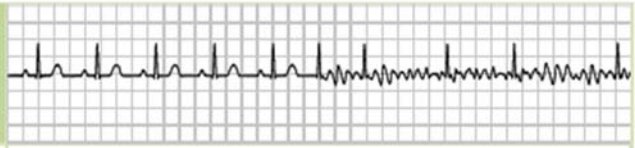
PACs	5,865	1.1%
SVT (≥3 Beats)	0	

Ventricular Summary

PVCs	21,439	4.2%
VT (≥3 Beats)	2	

Arrhythmias

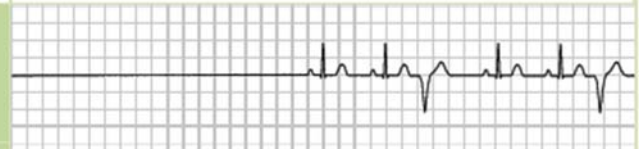
Fastest AF — 80 bpm — 11:22 — 10/25



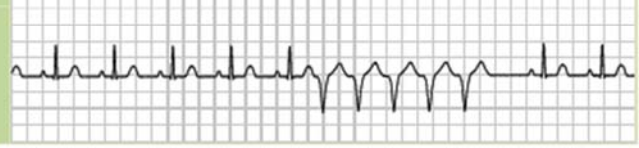
Fastest SVT — None Found

Heart Block — None Found

Longest Pause — 4.8s — 11:30 — 10/27



Fastest VT — 152 bpm — 15:47 — 10/24



Preliminary Findings:

- Patient Monitored 4d 7h 21m
- Min HR 40, Avg. HR 81, Max HR 203
- Pause(s) ≥2.0s occurred 10 time(s) with the longest pause 4.8s at 11:30
- 10/27 AF occurred 9 time(s) with a HR range of 48 - 80; Total AF burden = 30%
- SVT did not occur during the monitoring period
- VT occurred 2 time(s) with the fastest run 152 bpm
- 5,865 PACs with PAC Burden of 1.1%
- 21,439 PVCs with PVC Burden of 4.2

Physician Comments:

SIGNATURE DATE

Doe, Jane | DOB 00/00/0000 | 00/00/0000 Extended Holter Report

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Alert Report: Atrial Fibrillation with average heart rate >180bpm sustained for >60 seconds

Patient: Holter 14-Day
Holter Report

BioTel Heart
Client Services: 877-593-6421
Fax: 877-989-0700
gobio.com

BioTel HEART
Better cardiac data

Patient Summary

Date of Birth	Sex
01/01/1980 (41 yrs.)	**Female**
Patient ID	Pacemaker
--	**No**

Primary Indication
Chest Pain, Unspecified

Clinician Summary

Analysis by | Institution

Report Summary

Recording Length	Analysis Length
14d	**13d 22h 20min**
From 01/25/2021	
To 02/08/2021	
Date of Analysis	Noise Burden
03/03/2021	**0.49%**

Device ID

Heart Rate

Max	Min	Average
199bpm	**49bpm**	**95bpm**
02/03/2021 05:57:27 am	02/02/2021 04:30:05 pm	

Ectopics

Premature Supraventricular Complexes

PSVC Count	Isolated Count	Couplets
--	--	--

Premature Ventricular Complexes

PVC Count	Isolated Count	Morphologies
8,315 (0.43%)	**8,265 (0.43%)**	**4**
Couplets	Bigeminy	Trigeminy
16 (<0.01%)	**24 (<0.01%)**	--

Patient Events

Count
5

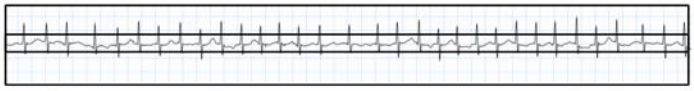
Paced Beats

Count
--

AFib / Flutter

Burden	Longest Episode	Max HR
100.00%	**13d 23h on 01/25/2021 at 04:49:36 pm**	**199bpm**

Representative Strip HR: 194bpm Duration: 13d 23h



Other SVT

Count	Longest Episode	Max HR
--	--	--

Representative Strip: None

Pause

Count	Longest RR
32	**2,352ms on 02/02/2021 at 04:27:42 pm**

Representative Strip Duration: 2,352ms

AV Block

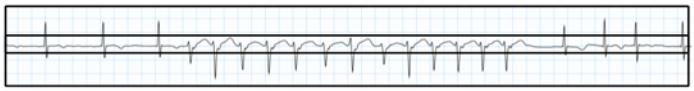
Type	Longest RR
--	--

Representative Strip: None

VT

Count	Longest Episode	Max HR
2	**13 beats on 02/03/2021 at 07:56:28 pm**	**156bpm**

Representative Strip HR: 156bpm Duration: 13 beats



Technician Findings

Patient monitored for 14d starting on 01/25/2021 04:47 pm.
Average heart rate was 95 bpm, Minimum heart rate was 49 bpm on Day 9 / 04:30:05 pm, Max heart rate was 199 bpm on Day 10 / 05:57:27 am

Atrial Fibrillation or Flutter: Burden was 100 %, longest event 13d 23h on Day 1 / 04:49:36 pm, fastest rate 199 bpm on Day 1 / 04:49:36 pm.

PSVC(s): Burden was 0 %, max count per 24 hours 0
SVT (AT, RT): 0 events, longest event 0 s on --, fastest event -- bpm on --

Pause: 32 events, longest pause 2352 ms on Day 9 / 04:27:42 pm
AV Block: 0 %, longest R-R interval 0 ms, most severe block demonstrated --

PVC(s): Burden was 0.43 %, max count per 24 hours 597, 4 disparate morphologies
Ventricular Tachycardia: 2 events, longest event 13 beats at Day 10 / 07:56:28 pm, fastest rate 156 bpm at Day 10 / 07:56:28 pm

Physician Findings

Signature

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6.8 Contact Information

Field center staff can direct questions to the following individuals, depending on the topic area and question:

- Email Brandon Fear at Brandon.Fear@gobio.com with technical questions related to the ePatch.
- Email Lin Yee Chen at chenx484@umn.edu with general questions related to the protocol, such as results notification.

Field center physician and medical staff contact information:

- Wake Forest University: Paula Riddle, RN priddle@wakehealth.edu and Barbara Anderson, RN banderso@wakehealth.edu
- University of Mississippi: Dr. Gwen Windham gwindham@umc.edu
- University of Minnesota: Dr. Lin Yee Chen chenx484@umn.edu
- Johns Hopkins University: Dr. Justin Echouffo-Tcheugui jechouf1@jhmi.edu

To order additional ePatch devices, field center staff should email the University of Minnesota Project Coordinator (currently Susan Griemel moone104@umn.edu). The Coordinating Center or UMN Project Coordinator will provide guidance via email to the study coordinator at each site regarding the timing of device orders and the amount of devices in each order as this amount may fluctuate throughout the study. Please contact arichelp@unc.edu with any questions.

The ePatch devices are reused by BioTel after processing. However, the devices are meant to go through a rigorous cleaning, sanitizing, and QC procedure before they are shipped for reuse. When sites receive new devices from BioTel, please visually inspect them and let the ePatch team know immediately if there are any issues with the devices. If they are dirty, have scratches, or are anything less than acceptable, take a picture of the devices and send this picture to Andrea Reese (andrea.reese@gobio.com), Niki Oldenburg (olden019@umn.edu), ARIChelp (arichelp@unc.edu), and Lin Yee Chen (chenx484@umn.edu). BioTel will immediately send replacement devices for any devices that are not appropriate to use with participants.