

STANDARD OPERATING PROCEDURE
FOR ePOC BLOOD GAS ANALYSER

For use in:	KIDSNTS
By:	All Clinical Staff
For:	
Department Responsible for Document:	KIDSNTS
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This Standard Operating Procedure (SOP) is available on the KIDSNTS pages of the Birmingham Women's and Children's NHS Foundation Trust's Intranet.

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2. Abbreviations

• ePOC	electronic Point of Care
• POCT	Point of care testing
• Host	The 'computer'
• Reader	The 'analyser'
• QC	Quality Control
• IQC	Internal Quality Control
• EQA	External Quality Assessment
• BCH	Birmingham Children's Hospital
• IO	Intraosseous
• µl	microliters
•	

3. Introduction

The ePOC system is a handheld, wireless, point of care system, to enable comprehensive blood analysis testing at the patient's bedside on a single, room temperature stored test card. Results are obtained in less than one minute.



4. Scope

The purpose of this document is to provide practical guidance for the use of the ePOC Blood gas analyser in KIDSNTS to perform point of care testing (POCT) and how to undertake quality testing.

5. Background

POCT may be defined as any analytical test performed on biological fluid – e.g. blood, urine, faeces – by a healthcare professional outside the main diagnostic laboratory setting. It may also be referred to as near patient testing (NPT), bed-side testing or extra laboratory testing. POCT is used throughout the Trust to facilitate clinical management of our patients. Used correctly it may be a convenient and rapid way of obtaining results.

Whilst patients are in the care of KIDSNTS POCT should only be undertaken by trained and competent healthcare professionals.

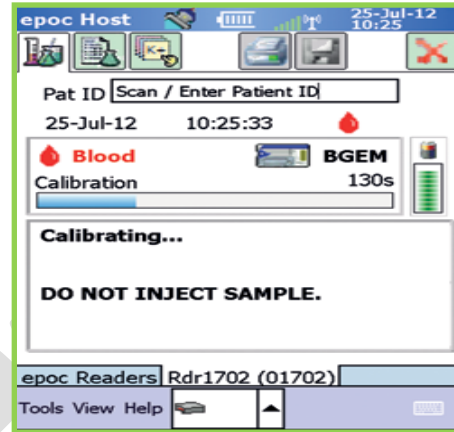
6. Procedures

6.1 Supply and storage

- 6.1.1 Test cards - supplied as box of 25 or 50, single use, self-calibrated cards in foil package. Store upright at room temperature (15-30°C) until expiry date.
- 6.1.2 Care-fill capillary tubes – supplied as box of 10 which are lithium heparin coated. Storage at 2°C to 30°C until expiry date.
- 6.1.3 Host and Reader need to be joined together for charging. Initial charge 8-12 hours. To be kept on appropriate charging unit in store room when not in use.

6.2 ePOC configuration and use

- 6.2.1 Switch on Host and Reader (these can be run via Wireless Bluetooth connection if separated). Host is the computer for data entry of user and patient ID. Reader is the unit for test card and analysis of blood sample.
- 6.2.2 Host and Reader will always perform 15 second QC test when they first connect. DO NOT insert test card at this stage.
- 6.2.3 Input user ID and password into Host using barcode or keypad.
- 6.2.4 Wait until Reader defaults to run blood test and the Host prompts card insertion before inserting test card.
- 6.2.5 Enter patient ID (must be either BCH 'C' or 'L' numbers or KIDSNTS case number using barcode or keypad.
- 6.2.6 Open test card from tear notch taking care not to touch sensor module at the top and sample port at bottom. NEVER PLACE TEST CARD ON ANY SURFACE. IT MUST GO DIRECTLY INTO READER ONCE OPEN.
- 6.2.7 Ensure Reader is on flat surface and place test card into slot using both thumbs smoothly and firmly to push until resistance is felt. Reader will BLEEP to indicate acceptance of barcode of test card. If unable to read remove card and try again.



6.3 Test card calibration

6.3.1 Calibration takes 2mins 45 seconds as fluid from test card is released over the sensors. During calibration patient ID can be entered but NO SAMPLE ADDED UNTIL PROMPTED. (use Tab 2 at top left to enter additional details. Type of sample MUST be added. Sample will be analysed, but results will not be released if Patient ID and sample type not inputted.)

6.3.2 You will have 7.5 mins following calibration to add sample.

6.4 Sample introduction using syringe

6.4.1 Blood samples can be from arterial, venous, umbilical cord or IO access.

6.4.2 Add patient sample when "INJECT SAMPLE" message appears.

6.4.3 Ensure at least 92µl sample size in syringe. A 1 ml syringe is recommended due to greater control of instillation of sample. Discard first 2 drops of sample.

6.4.4 Hold syringe vertically between fingertips and thumbs.

6.4.5 Using downward pressure, secure tip of syringe into sample port, and rotate ¼ turn to create a good seal.

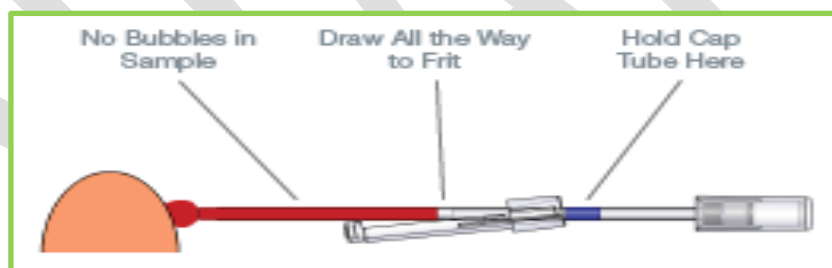
6.4.6 Maintaining downward pressure, depress plunger gently until you hear a single bleep.



6.5 Taking blood sample using care-fill capillary tube

6.5.1 Care-fill capillary tubes are lithium heparin coated requiring storage at 2*c to 30*c.

6.5.2 Hold capillary tube horizontally by blue band and point towards patient's puncture site to collect blood sample without bubbles. Continue filling until blood contacts the white 'frit' plug in middle of tube.



6.5.3 To fit the adaptor over the end of capillary tube, push tube into adaptor until secured.

6.6 Sample introduction using care-fill capillary tube

6.6.1 Ensure at least 90µl sample size in Care-fill capillary tube.

6.6.2 Hold capillary tube vertically between fingertips and thumbs.

6.6.3 Using downward pressure, secure tip of capillary tube into sample port and rotate ¼ turn to create a good seal.

6.6.4 Maintaining downward pressure, depress plunger gently until you hear a single bleep.

6.7 Sample analysis

6.7.1 Reader will automatically analyse sample once correct amount is added. This takes approximately 35 seconds. (During this time user can enter patient ID and additional details if not done previously).

6.8 Obtaining results

6.8.1 Results are available in 3 sub tabs: 1. Gases 2. Chemistry 3. Metabolites. Use stylus to select each tab.

6.8.2 Results can be printed (when paired with relevant printer) by selecting print button.

6.8.3 Once completed remove test card and discard in a clinical waste bin.

6.8.4 If results are displayed as > or < then these results are outside measuring range of the ePOC analyser unit.

6.9 Maintenance of ePOC unit

6.9.1 Turn off ePOC Host and Reader when not in use to conserve battery.

6.9.2 Store Host and Reader connected together in secure location when not in use.

6.9.3 Keep Host and Reader in dry location while in use and storage.

6.9.4 Periodically check wires and cables of the AC adaptor to check for wear and tear and ensure integrity of electrical connections.

6.9.5 Keep ePOC system manual available to both operator and administrator.

6.9.6 Ensure ePOC system manual is complete and kept up to date.

6.10 Cleaning and restocking after use

6.10.1 Clean using 70% isopropyl alcohol wipes or Green Clinell wipes and protective gloves.

6.10.2 Before use remove excess moisture created from wipes.

6.10.3 Any blood staining is to be removed immediately from surface twice with fresh wipes and unit wiped with 70% isopropyl alcohol for at least 5 seconds, or as per local equipment decontamination guidelines.

6.10.4 Replenish transport box with test cards and Care-fill capillary tubes in bag ready for next use. Store 10 test cards and 10 capillary tubes.

6.11 Troubleshooting

6.11.1 Host cannot connect to Reader

- Ensure Reader is switched on.
- Press the Discovery Icon.
- Turn the system off and on.

6.11.2 Reader unable to read barcode when inserting test card

- Remove test card and insert again with swift smooth motion until firmly seated. If still unsuccessful after multiple attempts – use new test card.

6.11.3 Error message “FLUID DETECTED IN TEST CARD” appears when test card inserted into Reader:

- There is fluid in test card inserted or there is defect on test card.
- Incorrect transport or storage of test cards may have caused this error.
- Remove and insert new test card.

6.11.4 Error message “iQC FAILURE” appeared instead of patient results:

- Many aspects of testing can cause this dependant on the specific error these include: Reader issues. Host issues, user error, storage conditions, card related, iQC failures on sensors.
- Repeat whole of blood gas analysis procedure with new test card.

6.12 Performing Quality Control Tests

6.12.1 Verification of Thermal Control System (Thermal QA)

- The ePOC Reader contains a Thermal Control Subsystem consisting of two heater blocks. When measurements are performed at a controlled temperature, a heater block contacts the test card's sensor region and maintains the temperature of the sensors and fluids that come into contact with the sensors at the required temperature: $37^{\circ} \pm 0.15^{\circ} \text{C}$. Verification of the Thermal Control System (Thermal QA) should be performed **twice** a year for each Reader.
- For best results, perform Thermal QA on a Reader after it has been resting in a location with no airflow (e.g. box or cabinet) and no change in temperature for at least two hours. Reader must remain "OFF" for at least 30 minutes prior to Thermal QA because heating from circuits inside Reader will cause temperature variations.

To verify Thermal Control System for a Reader:

- 6.12.1.1 Turn the Reader "ON." Using an ePOC Host, discover, then press and hold the Reader Icon for about 1 second. Log in with personal barcode.
- 6.12.1.2 Select Run Thermal QA from the dropdown menu.
- 6.12.1.3 Measurements for Thermal QA are displayed, including "PASS" or "FAIL."
- 6.12.1.4 If the Reader fails Thermal QA, this may indicate that the three temperature Sensors inside the Reader are not at same temperature. This can occur if Reader is not fully equilibrated to environment after being turned "OFF." Repeat Thermal QA one time. Reader is acceptable for use if Thermal QA passes on second attempt.
- 6.12.1.5 If Thermal QA fails when repeated, then contact Siemens' Technical Services.

6.12.2 Electronic QC

- 6.12.2.1 The ePOC Reader comes equipped with automated internal quality control procedures which are performed electronically during the initialization of the

ePOC Reader when connecting with an ePOC Host and immediately before testing process, each time a test is run. This electronic QC is automated.

- 6.12.2.2 If a Reader fails the electronic QC, turn the Reader “OFF” and “ON” again. If Reader connects successfully to the Host (therefore passing the electronic QC) it is acceptable for use. If the problem is not resolved, then contact Seimans Technical Services.

6.12.3 Calibration Verification - IQC

- 6.12.3.1 Test cards must have an IQC performed (See section 6.12.4) when a new Lot # is received, at scheduled intervals or where there has been a discrepancy in results obtained by a reader.
- 6.12.3.2 For new Lot #'s, analyze both level 1 and 3 fluid controls on all 6 readers and record results obtained in the Blue ePOC Records Folder.
- 6.12.3.3 For scheduled IQC's analyse either Level 1 **OR** Level 3 fluid control as per schedule and record results obtained in the Blue ePOC Records Folder.
- 6.12.3.4 Where there has been a discrepancy with results obtained on patient samples analyse both level 1 **AND** 3 fluid controls and record results obtained in the Blue ePOC Records Folder.

6.12.4 Performing an IQC (Internal Quality Check)

- Control fluid ampoules must be allowed to equilibrate to Room Temperature (20-25°C) before use. Equilibration time is 4 hours minimum for a full box, 1 hour for single ampoules outside of the box and must be analysed within 24 hours.
 - Quality Control Fluids contain dissolved gases and become very unstable soon after they are opened. Once opened, the fluid should be analyzed immediately.
 - Multiple Test Cards can be tested using the same ampoule only if tested at same time on multiple Readers.
- 6.12.4.1 Turn the Reader “ON.” Using an ePOC Host, discover, then press and hold the Reader Icon for about 1 second. Log in with personal barcode.

- 6.12.4.2 Select Run QA from the 'Tools' dropdown menu.
- 6.12.4.3 Once the Host has configured with it's Reader inset a new test card.
- 6.12.4.4 Find the appropriate Value Assignment Datasheet (VAD) and scan the barcode.
 - Value Assignment Datasheets contain Target Values and acceptable Ranges for Aqueous Control and Calibration Verification Fluids specific to the ePOC System.
- 6.12.4.5 Once the test card validation is complete, shake the ampoule vigorously for at least 30 seconds to re-equilibrate gases with the solution. When shaken, the ampoule should be held between the thumb and forefinger to avoid warming the solution.
- 6.12.4.6 In order to preserve gases in the Fluid, immediately draw up the fluid from the ampoule into a plain syringe – 2 to 3 ml - by slowly aspirating, from the bottom of the ampoule, through a 16-20-gauge blunt needle.
- 6.12.4.7 Draw up 2 mls of fluid.
- 6.12.4.8 Never use the last 0.5 mL of Control Fluid in the Syringe.
- 6.12.4.9 If air becomes entrapped between the syringe plunger and the fluid do not attempt to expel it. This air is far enough away so as to not affect the solution near the tip of the syringe. However, an air bubble traveling through the sample would contaminate it throughout its entire volume.
- 6.12.4.10 If a stream of air bubbles is drawn into the syringe, or an air bubble gets trapped near the syringe tip, discard both the syringe and the ampoule and begin again with a new syringe and ampoule.
- 6.12.4.11 Without delay, deliver the Fluid into the Test Card.
- 6.12.4.12 Before injecting fluid in the Test Card, expel a few drops from the syringe, remove the blunt needle and apply the syringe luer in the Test Card's Sample Introduction Port as per during a normal Blood Test procedure.
- 6.12.4.13 Record the results obtained in the ePOC blue Records Folder.
- 6.12.4.14 If any reader fails the quality control test, ensure all test conditions are correct and repeat the test. If it still fails, contact BWC Clinical Chemistry for support and remove device from clinical service until issue resolved.

6.12.5 Performing an External Quality Assessment (EQA)

- Control fluid ampoules must be allowed to equilibrate to Room Temperature (20-25°C) before use. Equilibration time is 4 hours minimum and must be analysed within 6 hours maximum.
- Quality Control Fluids contain dissolved gases and become very unstable soon after they are opened. Once opened, the fluid should be analyzed immediately.
- Multiple Test Cards can be tested using the same ampoule only if tested at same time on multiple Readers.
- EQA must be performed monthly or as per the external quality assessment schedule.

- 6.12.5.1 Turn the Reader "ON." Using an ePOC Host, discover, then press and hold the Reader Icon for about 1 second. Log in with personal barcode.
- 6.12.5.2 Select Run QA from the 'Tools' dropdown menu.
- 6.12.5.3 Once the Host has configured with it's Reader inset a new test card.
- 6.12.5.4 Find the appropriate Value Assignment Datasheet (VAD) and scan the barcode.
- 6.12.5.5 Once the test card validation is complete, shake the ampoule vigorously for at least 30 seconds to re-equilibrate gases with the solution. When shaken, the ampoule should be held between the thumb and forefinger to avoid warming the solution.
- 6.12.5.6 In order to preserve gases in the Fluid, immediately draw up the fluid from the ampoule into a plain syringe – 2 to 3 ml - by slowly aspirating, from the bottom of the ampoule, through a 16-20-gauge blunt needle.
- 6.12.5.7 Draw up 2 mls of fluid.
- 6.12.5.8 Never use the last 0.5 mL of Control Fluid in the Syringe.
- 6.12.5.9 If air becomes entrapped between the syringe plunger and the fluid do not attempt to expel it. This air is far enough away so as to not affect the solution near the tip of the syringe. However, an air bubble traveling though the sample would contaminate it throughout its entire volume. If a stream of air bubbles is drawn into the syringe, or an air bubble gets trapped near the syringe tip,

discard both the syringe and the ampoule and begin again with a new syringe and ampoule.

6.12.5.10 Without delay, deliver the Fluid into the Test Card.

6.12.5.11 Before injecting fluid in the Test Card, expel a few drops from the syringe, remove the blunt needle and apply the syringe luer in the Test Card's Sample Introduction Port as per during a normal Blood Test procedure.

6.12.5.12 Record the results obtained in the ePOC blue Records Folder.

6.12.5.13 If any reader fails the quality control test, ensure all test conditions are correct and repeat the test. If it still fails, contact BWC Clinical Chemistry for support and remove device from clinical service until issue resolved.

7 Further Information

7.1 For further information – Communal Drive (V:) – KIDS – EPOC Training

8 Version Control

Document version	Date	Reason updated	Replaced by	Training required?
1.0				

9 References

- Siemans ePOC User Guide
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10 Related Documents

10.1 User Guideline for Siemens ePOC Blood Gas Analyser - running a blood gas

10.2 User Guideline for Siemens ePOC Blood Gas Analyser - running a quality control (IQC/EQA) test

11 Appendices

11.1 ePOC Blood Gas Analyser Competency Document.



ePOC Blood Gas Analyser Competency Document.

Name:

	Detail	Candidate Signature	Assessor Signature	Date
Knows how to turn on analyser and how to log on.				
Understands where and how cartridges should be stored and to check expiry dates.	Stored at room temperature Do not use expired cartridges.			
Knows how a cartridge should be handled.	Do not touch the electrodes.			
Knows how to insert cartridge into analyser.				
Knows the information the ePOC requires entering.	Patient ID (ideally BCH number but KIDSNTS number if no BCH number) and sample type.			
Can perform a blood gas from a syringe.	Can safely put patient blood into cartridge, load into machine and perform the test.			
Can perform a blood gas from a Care-Fill™ capillary tube.	Can safely put patient blood into cartridge, load into machine and perform the test.			
Knows appropriate action if ePOC results do not fit patient condition.	Redo blood analysis again. Consider using another blood gas analyser. Request Core nursing team member or clinical chemistry to run QC material			
Knows how to report/record results.	Can record results on KIDSNTS observations chart.			
Knows how to retrieve past results.				
Knows how to undertake IQC & EQA (Core Nursing Team Only)	Can accurately perform quality tests and knows how/where to record the results.			
Can use ePOC safely and decontaminate if necessary	Prevents exposure to blood borne pathogens. Knows what to use and how to decontaminate the ePOC.			

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