Abbreviated GEM 4000

**Purpose:** rapidly analyze whole blood samples to determine measured and calculated results for blood gas, HCT, electrolytes, glucose and lactate.

**Procedure:** 6 month recertification following orientation, then read/review/recertify annually:

**Operator ID:** is not to be shared; Employee ID number

**Supplies**
1. Cartridge: stored at Room Temperature
2. CVP: performed each time a new cartridge is inserted in the GEM
3. PVP: performed q 6 months (performed by POC)
4. CVP & PVP: refrigerated expiration date is manufacture’s, Room Temperature expiration date is 1 year
5. Label with ID and indicate expiration date

**Quality Control**
1. CVP
2. Mix about 10 times and tap top
3. Touch the CVP on the ready screen
4. Scan CVP ampule
5. Confirm CVP sample and run all required levels of CVP.
6. Check CVP results to make sure they are within the acceptable limits before ACCEPTING.
7. Discard any failures.
8. All must pass before proceeding with patient testing.

**Inserting a Cartridge**
1. Grasp plastic protective cover and Pull firmly to remove.
2. Insert within 1 minute of removing the plastic cover.
3. Wait for “Ready” screen to appear
4. **Warm up takes ~40 min.**

All levels of CVP must be run and within range before patient testing. The analyte buttons will be green when all levels of CVP have passed.

If **CVP fails,** discard the test, perform a 2 point calibration and repeat. If CVP continues to fail even after performing several 2 point calibrations insert a new cartridge and notify Point of Care Testing of a cartridge failure.

If an automatic one- or two-point calibration fails, the GEM 4000 will automatically initiate up to two additional one- or two-point calibration sequences in an effort to recover from a failure. If the sensor does not respond to the automatic two-point calibrations, then the appropriate error message will be printed on the calibration report, and the status indication on screen turns red. Do the following:

1. Initiate a manual 2 point calibration to see if analyte will pass

**Interfering Substances**
1. Benzalkonium Chloride: falsely elevate Na and Ionized Calcium
2. Benzalkonium Heparin: falsely elevate Na and Ionized Calcium
3. Thiopental Sodium: interfere with Na, potassium, pCO2, & ionized calcium
4. Anesthetic Halothane: may produce unreliable pO2 results due to interfering w/pO2 sensor
5. Severely abnormal plasma osmolarities
6. Abnormal levels of proteins or lipids
PROCEDURAL NOTES:

1. Do not allow untrained or an unauthorized personnel to use this instrument.
2. **Analyzer status** – text should say Ready and background should be green
3. If GEM® 4000 testing is not available due to instrument malfunction, lack of supplies, untrained staff, or any other problem that prevents accurate testing, alternative hospital laboratory testing must be done.
4. GEM® 4000 test results are affected by poor technique during blood collection and delivery to the sample well. The accuracy of the test is largely dependent upon the quality of the sample collection.
5. **If power is interrupted (analyzer unplugged), you must restore power to the analyzer with 20 minutes, or you will need to replace the cartridge.**
6. All biohazard safety guidelines pertaining to the handling of human blood, such as the CDC guidelines of Universal Precautions, should be strictly adhered to when collecting, handling blood specimens and operating the GEM 4000.
7. Do not use CVP and cartridges past their expiration date or CVP and cartridges that have been stored improperly stored.
8. Do not use anticoagulants other than lithium or sodium heparin at the proper final concentrations. Anticoagulants such as EDTA, citrate, oxalate, or sodium fluoride may adversely affect sensor performance.
9. Because of the high gas solubility of paraffin hydrocarbons, avoid the use of grease or mineral oil lubricants.
10. A high concentration of sodium heparin can lead to elevated sodium readings.
11. High concentration of lithium and sodium heparin can slightly lower ionized calcium readings.
12. A higher concentration of balanced heparin (50 to 70 IU/mL of whole blood) may be used when sampling with capillary tubes.

**Proper Sample**

1. Whole blood: arterial, venous or capillary
2. Must be heparinized sample (25 USP units/ml) **WITH A CAPPED SYRINGE**
3. Without clots & air bubbles **MUST MIX SYRINGE, CHECK FOR AIR BUBBLES AND CLOTS**
4. If drawing from arterial or venous line discard first draw of each sample.
5. Check for the presence of the “READY” screen
6. Mix sample and position sample so that the sample probe is near but not touching the bottom of the syringe
7. Select “OK” to begin aspirating sample
8. When the instrument beeps remove the sample
9. Dispose sample in biohazard waste container.
10. When analysis is complete, review results then ACCEPT or DISCARD; any questionable or crisis values should be analyzed again by obtaining another properly collected sample
11. Press exit to get to the “READY” screen

**Required Documentation:**

1. Date/Time of test performed
2. ID of testing staff
3. Patient results
4. Units of measurements

**Information requested prior or during the sample analysis process may include:**

1. Patient ID
2. Operator ID
3. Sample type
4. ICD-9 number: (Need for this may decrease)