

Blood Glucose Point of Care Testing for Patients on Vasoconstrictors in the ICU

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Blood Glucose Point of Care Testing for Patients on Vasoconstrictors in the ICU

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BACKGROUND / INTRODUCTION

- Point of Care (POC) glucometers, testing capillary blood from finger sticks, are frequently relied on for measuring blood glucose (BG) levels in patients. For patients receiving blood pressure support via vasopressors, capillary POC BG testing can be inaccurate.
- PICO Question: "In adult critically ill patients on two or more vasopressors, does POC testing of arterial blood lead to safer and more effective glycemic management than POC testing of capillary blood?"
- Inoue, Egi, Kotani, and Morita (2013) conducted a systematic review of studies, revealing that the accuracy of arterial POC measurements was significantly higher than that of capillary POC measurements.
- Ellis et.al (2013) conducted a study on critically ill patients, comparing capillary and arterial POC testing, and found that arterial samples were more accurate than capillary samples. This study also found that the accuracy of arterial blood samples for POC testing was not affected by peripheral perfusion. It was specifically noted that patients on two or more vasopressors showed decreased accuracy of capillary POCT BG values.
- Juneja, Pandey, and Singh (2013) concluded that the accuracy of capillary blood samples did not conform to the ISO standards in the patients on vasopressors.
- Raurell-Torredà, Del Llano-Serrano, Almirall-Solsona, and Nicolás-Arfelis (2014) determined that use of blood obtained via an arterial catheter is safe and effective for glucose monitoring in patients undergoing intensive insulin therapy.
- Periera et al. (2015) evaluated the accuracy of bedside POC BG measurements using arterial, capillary and catheter venous blood samples in ICU patients and concluded that "arterial samples seem to be the only source sufficiently accurate to be used with point-of-care glucometers" (p. 10).

METHODS

- Inclusion Criteria: patients on two or more vasopressors with arterial access.
- At prescribed time for POC BG testing, a nurse collected both capillary and arterial samples to compare results (Figure 1).

- Nurses noted whether or not treatments for BG levels were indicated. Treatments were based on arterial BG value (Figure 1).
- A barcode was created to scan for the capillary POC testing, so the patient was not charged for an extra test, and the results of this test did not transfer onto the patient's medical record.

POC Blood Glucose Testing

For use with Patients on two (2) or more vasopressors with an arterial line.

For POC testing, scan patient's bracelet for arterial sample (treatments based off arterial result). For capillary sample, scan the paper barcode included with this sheet (instead of pt bracelet).

MR #: _____

*Treatments to be based off of Arterial values. Place a checkmark in box if treatment is required for Arterial value and/or if it would have been required for capillary value.

Time of Testing	Arterial Blood Glucose POC	Capillary Blood Glucose POC
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1. Flow sheet provided to staff for data collection

OUTCOMES

- The data obtained suggests a greater than 20% difference between arterial POC BG values and capillary POC BG values in the majority of comparisons.
- Capillary BG values were higher than arterial BG values, potentially leading to unnecessary insulin treatment and hypoglycemic episodes (Figure 2).

RESULTS

- One patient met the inclusion for this study.
- 3 out of the 4 BG comparisons had a significant difference, which would have altered treatment (Figure 2).
- All capillary POC BG values were higher than arterial POC BG values (Figure 2).

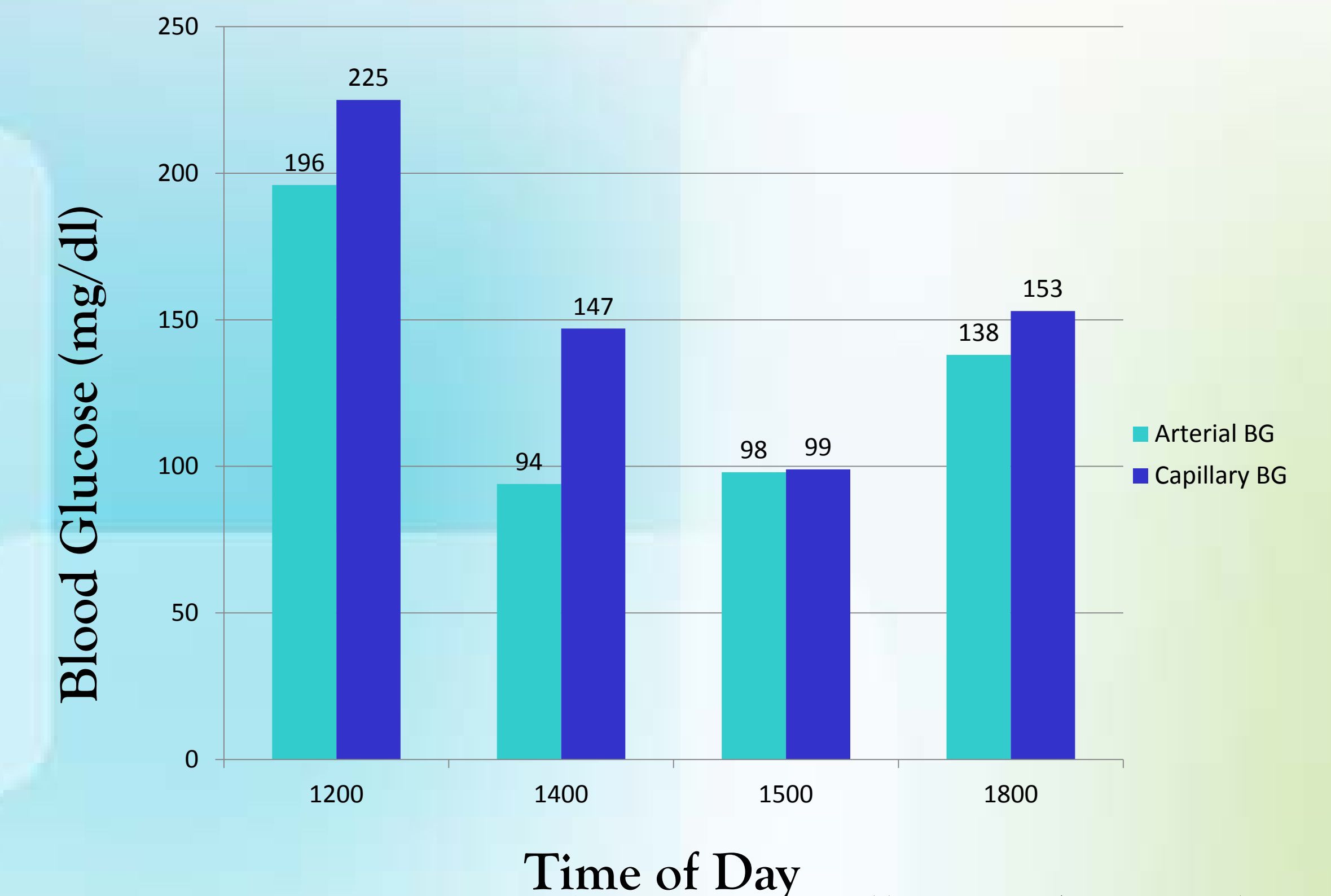


Figure 2. A comparison between capillary and arterial POC BG samples.

CONCLUSIONS/REFERENCES

- Using arterial blood for POC BG testing in patients being treated with two or more vasopressors will provide a more accurate value compared to using capillary blood.
 - Accurate BG measurement is essential in preventing the risk of hypoglycemia in these critically ill patients.
 - Limitations: Decreased acuity in the ICU during the timeframe allocated to data collection produced a very small sample size.
 - Future studies include allowing more time to do the research presented in this study, as well as including venous samples and the usage of a blood gas analyzer.
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