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Monitoring of Patients' Blood Pressure during Caesarean Deliveries

Marlene Shehata*

Department of Genetics and Cardiovascular Diseases, University of Ottawa, Heart Institute, Ruskin Street, Ottawa, Canada

Introduction

Arterial blood pressure (BP) readings must be taken at least once every five minutes during the intraoperative phase of care, according to practise standards set by major professional associations. Since measuring blood pressure is a crucial part of monitoring vital signs during anaesthesia, it's crucial that BP monitors are resistant to potential artefacts from sources like shivering or other often encountered types of interference that may happen during ordinary patient care. There is very little published research comparing the reliability of these commercially available systems in the context of routine intraoperative care of parturients during Caesarean Delivery, a population particularly susceptible to shivering artefacts. Currently available automated, non-invasive oscillometric blood pressure (NIBP) monitors rely on proprietary algorithms to infer systolic and diastolic blood pressures. However, in the office setting, automatic monitors have outperformed manual sphygmomanometry. Our tertiary care hospital installed two distinct brands of automated NIBP monitors in three neighbouring obstetric surgical rooms (ORs) during late summer 2018 renovations [1].

Description

Two operating rooms (ORs) were equipped with a Philips Intellivue MX800 NIBP monitoring system with Philips NIBP cuffs, and one OR was equipped with a Datex-Ohmeda S5 Anaesthesia Physiologic Monitoring system with Welch Allyn Non-Invasive Blood Pressure (NIBP) cuffs. Both NIBP monitors are a part of monitoring systems that are FDA-approved and regulated for usage in people. When patients were undergoing anaesthesia for Caesarean Delivery (CD) in the rooms with the Phillips system as opposed to the adjacent room with the Datex-Ohmeda system, providers reported seeing a higher prevalence of unreadable or otherwise abnormal NIBP readings in August 2019, roughly one year after the installation was finished. When asked about these potential anomalies, company representatives said the monitors were in good physical condition. Although the subjective experiences of the healthcare professionals were regarded seriously, there was no quantitative evidence to support the anecdotal claims about the amount of changes in abnormal BP between the two systems in adjacent rooms [2]. In response, we investigated the frequency of important NIBP measurement gaps and other potential blood pressure aberrations as observed during CD with the use of these two monitoring devices, and the results are presented here. The current study provides quantitative confirmation for practitioners' perceptions that using Phillips monitors in obstetric operating rooms rather than a Datex-Ohmeda monitor resulted in a larger percentage of instances with abnormal blood pressure readings. The dataset utilised for this investigation produced extremely similar cohorts thanks to the previous employment of two monitoring systems in close-by ORs, which may lend it a level of credibility not found in other kinds of retrospective observational studies. Following the substantial missingness of two factors, other strengths include public registration and adherence to a published analytic plan.

This study has the potential for bias due to variations in the accuracy of intraoperative provider charting, which is one of its limitations. For instance, based on the care practises followed at our facility, we believe that more parturients received exogenous oxytocin than was indicated in our dataset. We take comfort in the fact that the absence of oxytocin charting was nearly uniform across all room types, indicating that any error in classifying this covariate would not have differed between patient groups. We suggest that considerable distortion in conclusions about the primary outcome analysis are unlikely to have originated from incorrectly charting oxytocin delivery given that it did not appear to be significantly linked with the primary outcome [3]. We also stress that the major outcome of this trial, which relies on blood pressure measurements, was a machine-recorded variable that was automatically incorporated into our dataset and was not susceptible to provider charting mistakes. We continue to emphasise that the data described here remain fundamentally retrospective and observational in nature, and that the observed association between aberrant BP readings and rooms where one type of monitor was used in comparison to another cannot establish causation, despite the strength of our approach's ability to identify highly similar historical cohorts. The data were vulnerable to a number of missing variables due to the retrospective character of the study, including no differential messiness of BMI from the two groups.

Additionally, the goal of the current investigation was not to identify the underlying cause of the observed variations in art factual blood pressure readings inside either monitor. While speculative, several medical professionals at our hospital have asserted that the aberrant readings are frequently observed in the context of shivering patients, a common occurrence among parturients receiving neuraxial anaesthesia for CD that has drawn a lot of attention in the anaesthesia literature [4]. This suspicion is supported by the observation that the bulk of aberrancies took place in the first third of the anaesthetic, when shivering would ordinarily be most prevalent. If the claimed link between abnormal BP readings and the occurrence of shivering is true, then a key area for future quality improvement of commercial BP monitors should be the better integration of shivering into automated algorithms. In addition to our major analyses, we want to draw attention to two other intriguing findings from our dataset. First, it is noteworthy that across all three ORs in this study, doctors frequently experienced monitoring gaps of at least 6 minutes. More than one in five instances included at least one monitoring gap, even in the "best" room, indicating that both types of monitors under consideration in this study may benefit from changes to their algorithms to increase reliability and accuracy [5].

The second finding that the majority of these aberrancies mostly occurred in the first third of the anaesthetic emphasises the potential significance of these findings. The monitoring that healthcare professionals rely on were found to malfunction alarmingly frequently during the exact period of time when instability is most prevalent and placental blood flow is still crucial for foetal outcomes. The additional finding that the majority of these aberrancies happened during the first third of the anaesthetic further emphasises their potential significance. The monitors that practitioners rely on were found

***Address for Correspondence:** Marlene Shehata, Department of Genetics and Cardiovascular Diseases, University of Ottawa, Heart Institute, Ruskin Street, Ottawa, Canada, E-mail: marleneshehata1997@yahoo.com*

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to malfunction alarmingly frequently during the exact period of time when instability is most prevalent and placental blood flow is still crucial for foetal outcomes [6]. The number of instances where at least one reading revealed a pulse pressure less than 20mmHg represented the second highest relative difference between the monitors among the three types of likely aberrant readings that we considered in our analysis. The absolute difference in this sort of aberrancy between the two types of BP monitors was 11.2% of instances. We feel that this finding points to a clinically significant distinction between the two automated BP methods that merits a specific prospective research as well as additional validation in multicenter observational cohorts.

Conclusion

According to the finding of the current investigation, the two automated BP monitoring systems that were used in our institution's operating rooms for parturients undergoing CD showed considerably different anomalous BP values.

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