References

1. Eley VA, Christensen R, Kumar S, Callaway LK. A review of blood pressure measurement in obese pregnant women. *Int J Obstet Anesth* 2018;**35**:64–74.
2. Nathan HL, de Greeff A, Hezelgrave N, Chappell L, Shennan A. An accurate semi-automated oscillometric blood pressure (BP) device for use in pregnancy in a low- and middle-income country population: the Microlife 3AS1-2. *Blood Press Monit* 2014;**20**:52–5.
3. Nathan HL, Seed PT, Hezelgrave NL, et al. Early warning system hypertension thresholds to predict adverse outcomes in pre-eclampsia: a prospective cohort study. *Pregnancy Hypertens* 2018;**12**:183–8.
4. Nathan HL, De Greef A, Hezelgrave N, Chappell L, Shennan A. Accuracy validation of the microlife 3AS1-2 blood pressure device in an African pregnant population with low blood pressure. *Blood Press Monit* 2015;**20**:299–302.
5. Nathan HL, Vousden N, Lawley E, et al. Development and evaluation of a novel Vital Signs Alert device for use in pregnancy in low-resource settings. *BMJ Innovations* 2018;**4**:192–8.

0959-289X/$ - see front matter

https://doi.org/10.1016/j.ijoa.2018.11.006

In reply

We thank you for your interest in our article.[1] We agree that the ability to accurately measure blood pressure in low-, medium- and high-resource settings is crucial. It is also important to be able to measure both low and high blood pressure accurately. On page 67 of the published manuscript[1] we state that "...five of 14 of the devices intended for clinic use (as opposed to home blood pressure monitoring use) were validated according to approved protocols and were without protocol violations." This is a citation of the 2018 paper by Bello et al.[2] which was published in the journal Hypertension.

Consistent with our citation, Bello et al.[2] concluded that the validation process applied in the manuscripts published by Nathan et al.[3,4] contained minor protocol violations, which they define in their online supplementary materials. For these studies, they attributed the minor protocol violations to the systolic and diastolic blood pressure ranges.

The purpose of describing the findings of Bello et al.[2] in our manuscript was to highlight the difficulties faced in validating blood pressure measurement devices in pregnant women, even before the issues of obesity and very large arm circumference are considered. We did not intend to list all the devices evaluated by Bello et al.[2]

As the title suggests, our manuscript is a review of blood pressure measurement in obese pregnant women. The Microlife 3AS1-2™ was validated in women with an arm circumference of up to 36 cm (in women with low blood pressure[4]) and in women with a mean arm circumference of 31 cm (including women with preeclampsia, no range or standard deviation published). It is therefore reasonable that this device was not a focus of our review.

V. Eley, R. Christensen
Department of Anaesthesia and Perioperative Medicine The Royal Brisbane and Women's Hospital and The University of Queensland, Faculty of Medicine, Brisbane Queensland, Australia
E-mail address: v.eley@uq.edu.au

S. Kumar
Mater Research Institute and Department of Maternal Fetal Medicine, The Mater Mothers' Hospital, Brisbane Queensland, Australia

L. Callaway
The University of Queensland, Faculty of Medicine and Department of Obstetrics and Gynaecology and Obstetric Medicine, The Royal Brisbane and Women's Hospital Brisbane, Queensland, Australia

References

1. Eley V, Christensen R, Kumar S, Callaway L. A review of blood pressure measurement in obese pregnant women. *Int J Obstet Anesth* 2018;**35**:64–74.
2. Bello NA, Woolley JJ, Cleary KL, et al. Accuracy of blood pressure measurement devices in pregnancy. *Hypertension* 2018;**71**:326.
3. Nathan LH, De Greeff LA, Hezelgrave CN, Chappell HL, Shennan HA. An accurate semiautomated oscillometric blood pressure device for use in pregnancy (including pre-eclampsia) in a low-income and middle-income country population: the Microlife 3AS1-2. *Blood Press Monit* 2015;**20**:52–5.
4. Nathan LH, De Greeff LA, Hezelgrave CN, Chappell HL, Shennan HA. Accuracy validation of the Microlife 3AS1-2 blood pressure device in a pregnant population with low blood pressure. *Blood Press Monit* 2015;**20**:299–302.

0959-289X/$ - see front matter

https://doi.org/10.1016/j.ijoa.2018.11.003

Are high-risk obstetric patients properly identified and managed?

Maternal morbidity and mortality are epidemics that are on the rise world-wide, with maternal morbidity and pregnancy-related mortality rates more than doubling in the United States in the last 30 years. The causes are widespread and multivariant, however, before we can address the issue of preventable harm, we must firstly develop a valid measure of assessing and identifying those at risk. Once identified, appropriate triage to higher levels of care or resource allocation can be assessed, to appropriately prepare for potentially complicated deliveries or antepartum or postpartum management. In addition, coordinated care plans specifically designed to address

risk, preventable harm and negative outcomes can then be developed and communicated with providers in the antepartum, intrapartum and postpartum periods.

Our institution's Division of Obstetric Anesthesia, in conjunction with the Department of Obstetrics and Gynecology, has established an innovative high-risk antenatal care coordination program. The goal of the program is to improve patient outcomes and satisfaction, while decreasing total hospital cost, length of stay and intensive care unit admissions. We're in the process of analyzing our data and will be submitting for publication shortly, however, based on our experiences, the program has improved early identification and optimization of high-risk patients and collaboration of care amongst providers.

In order to properly manage high-risk parturients, they first need to be accurately identified and triaged. The National Institute of Child Health and Human Development (NICHD) has defined high-risk as anyone with existing health conditions, overweight or obese, multiple gestations or young or old maternal age.[1] The American Society of Anesthesiology (ASA) originally had six classifications to describe a patient's physical status, but this was later modified in 1961 to the five classifications that are used today.[2,3] Pregnancy classifies one as an ASA II patient. The physiologic changes of pregnancy can complicate and exacerbate underlying disease states dramatically, changing risk stratification and anesthetic management. Both the NICHD definition and the ASA classification system provide a broad overview of the issue but neither stratifies risk according to the severity of disease in the pregnant state or takes into account how an underlying disease affects overall morbidity and mortality and the potential for adverse outcomes. It has been noted that being pregnant also results in more inconsistencies when it comes to assigning ASA status by physicians.[4,5] In recent years, some anesthesiologists have proposed the idea of either adding 'E' or 'P' modifiers to pregnant patients.[6–8] While this method identifies the patient as pregnant, it does not stratify risk and we have yet to reach a consensus in terms of classifying and stratifying risk based on the severity of disease and risk of adverse outcome in obstetric patients. Our system of risk classification will take into account not just the comorbidities present but their severity; and how they affect functional status throughout the peripartum period. With this method, a patient with corrected uncomplicated severe congenital heart disease may be classified as at lower risk than someone with asymptomatic aortic root dilation, a condition that, although asymptomatic, has the potential for significant harm. We believe that this new system of classification will aid obstetricians and anesthesiologists to properly triage high-risk patients and arrange for further resource allocations if needed.

J.D. Murphy, T.A. Nguyen
Anesthesiology and Critical Care Medicine
Johns Hopkins University School of Medicine
Baltimore, USA
E-mail address: tanhnguyen@jhmi.edu

References

1. "What Is a High-Risk Pregnancy?" National Institute of Child Health and Human Development, U.S. Department of Health and Human Services. Available at: www.nichd.nih.gov/health/topics/pregnancy/conditioninfo/high-risk. Accessed October 1, 2018.
2. Saklad M. Grading of patients for surgical procedures. *Anesthesiology* 1941;**2**:281–4.
3. Dripps RD, Lamont A, Eckenhoff JE. The role of anesthesia in surgical mortality. *JAMA* 1961;**178**:261.
4. Owens WD, Felts JA, Spitznagel EL. ASA physical status classifications: a study of consistency of ratings. *Anesthesiology* 1978;**49**:239.
5. Barbeito A, Schultz J, Muir H, et al. ASA physical status classification. A pregnant pause. *Anesthesiology* 2002;**96**(Suppl. 1):96.
6. Pratt SD. "Clinical Forum Revisited: The "P" Value" (PDF). Spring 2003 newsletter. The Society for Obstetric Anesthesia and Perinatology (SOAP). pp. 9–11. Retrieved 2007-07-09.
7. Segal S. Women presenting in labor should be classified as ASA E: Pro. Winter 2003 newsletter. The Society for Obstetric Anesthesia and Perinatology (SOAP). Available at: https://soap.org. Accessed October 2018.
8. Goodman S. Women presenting in labor should be classified as ASA E: Con. Winter 2003 newsletter. The Society for Obstetric Anesthesia and Perinatology (SOAP). Available at: https://soap.org. Accessed October 2018.

0959-289X/$ - see front matter

https://doi.org/10.1016/j.ijoa.2018.11.001

Antenatal anaesthetic assessment clinics: a survey of United Kingdom practice

A survey of United Kingdom (UK) practice in 2005 showed that only 30% of obstetric units ran a regular anaesthetic pre-assessment clinic for obstetric patients. The remaining 70% saw patients only on an ad hoc basis.[1] In light of these findings, we conducted a survey to look again at the provision of antenatal anaesthetic assessment clinics in the UK, in order to establish if the provision of such a service has improved since 2005. The Obstetric Anaesthetists' Association (OAA) survey subcommittee approved this survey and it was subsequently sent via email to the lead obstetric anaesthetist in all obstetric units registered with the OAA.

Replies were received from 110 of the 191 units contacted (60%). Ninety-three percent of units who responded have an anaesthetic antenatal assessment clinic with a structured referral process. Of those that do have a clinic, over 90% utilised a referral mechanism