Title: ADEQUACY OF AUTOMATED BLOOD PRESSURE CUFFS WITH EPINEPHRINE TEST DOSES IN BETA BLOCKED PATIENTS

Authors: P. W. Johnson, M.D., M. Hou, M.D., and M. F. Mulroy, M.D.

Affiliation: Department of Anesthesiology, Virginia Mason Medical Center, Seattle, WA 98111

Introduction: Epinephrine-containing test doses have become a "standard of care" in epidural anesthesia since the original report of the reliability of pulse changes in response to 15 μg of epinephrine injected intravenously. The increasing frequency of the use of beta blockers in surgical patients has compromised the reliability of this test dose. Recent work in our institution confirmed that beta blocked patients do not become tachycardic, but that blood pressure increases transiently with an associated bradycardia. Since this bradycardia may not be a reliable sign in the elderly, we assessed the efficacy of automated non-invasive blood pressure devices (NIBPs) to detect these transient hemodynamic changes.

METHODS: After approval by the Institutional Review Board and informed consent, six healthy volunteers were given 80 mg of propranolol orally over 12 hours before testing. Baseline blood pressure and pulse were determined while the subjects were monitored with a continuous non-invasive finger plethysmograph blood pressure device (Finapres, Ohmeda). On the opposite arm, each volunteer was monitored with a standard NIBP (2 subjects each with Criticon Dinamap, Spacelab, and Datascope 2100). Epinephrine (15 μg in 3 cc saline) was injected intravenously. Pulse rate and blood pressure were continually monitored with the Finapres and recorded every 5 seconds over 3 minutes. The NIBPs were set to cycle "continuously" at the shortest interval possible and these readings and times were recorded for each cycle.

RESULTS: The accompanying graphs represent the systolic and diastolic blood pressure from the Finapres as solid lines and the pulse as a dashed line. The individual points are the systolic and diastolic blood pressures from the NIBPs. In only 2 of 6 subjects did the NIBP device detect the changes seen with the continuous monitor. In two subjects, the NIBPs (one Dinamap, one Datascope) were unable to cycle during the 30-50 second period of bradycardia and therefore "missed" the intravascular injection. (Figure 1) In two other subjects the NIBP (one Datascope, one Spacelabs) did cycle but did not detect the hypertensive response. (Figure 2)

DISCUSSION: The usual test dose of 15 μg of epinephrine in a beta blocked subject causes bradycardia and hypertension of a transient nature. Three standard commercial NIBP devices did not reliably detect these changes in 4 of 6 subjects. Failure was due to inability to cycle during episodes of bradycardia or failure to detect any change in blood pressure on the one or two cycles which occurred during the hypertensive event. This may reflect an exaggerated sensitivity of the