Measuring ankle systolic blood pressure: validation of the dinamap 1846 SX

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Clinical and epidemiologic situations requiring repeated measurements of blood pressure in the lower extremity are increasingly incorporating automated measurement devices; however, no device has been validated adequately for ankle blood pressure. This study evaluates the Dinamap 1846 SX against Doppler ultrasound in determining ankle systolic blood pressure (SBP) and compares a parallel with contour wrapping technique for applying the blood pressure cuff. Ankle SBP was measured on 71 adult volunteers by both devices simultaneously, for each cuff wrap. Averages of three readings were compared to evaluate Dinamap versus Doppler SBP estimates and to assess any cuff wrap effect. Multiple linear regression was used to assess potential effect modifiers. Instrument differences (Dinamap minus Doppler) for the parallel wrap (95% confidence intervals in parenthesis) were –1.5 mmHg (-3.1, 0.0) and –3.9 mmHg (-5.6, -2.2) for the contour wrap. Wrap effect differences (contour minus parallel) for the Doppler were –4.9 mmHg (6.3, -3.5) and –7.2 mmHg (-8.7, -5.8) for the Dinamap. Degree of ankle taper was a strong modifier of cuff effect for the Dinamap but not for the Doppler: adjusted cuff effect with the Dinamap ranged from –3 to –10 mmHg. Measurement precision (within-person reproducibility, measured by within-person standard deviation and reliability coefficient [R]) was higher for the Dinamap than the Doppler technique, lowest for the parallel wrap and Doppler configuration (standard deviation = 5.4 mmHg, R = 0.88) and greatest for the contour wrap and Dinamap (standard deviation = 4.0 mmHg, R = 0.94). In conclusion, cuff-wrapping technique can generate SBP differences of greater magnitude than instrument differences. Conditional on the use of the contour wrap, and by virtue of its high repeatability and ease of operation, the Dinamap is a useful tool for epidemiologic study and the clinical assessment of peripheral arterial disease.

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