ARTERIAL BLOOD PRESSURE RESPONSE TO REPEATED CUFF RE-INFLATIONS WITHOUT INTERPOSED RESTS

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INTRODUCTION
Immediate blood pressure cuff re-inflation without an interposed rest is thought to promote venous congestion and render spurious arterial blood pressure (ABP) values. Recently published data question this assumption. However, yet to be studied is the cumulative effect of multiple cuff re-inflations on ABP when obtained sequentially and without an interposed rest.

PURPOSE
The purpose of the study was to determine if five rapid blood pressure cuff re-inflations obtained without interposed rests progressively alter individual ABP values.

SIGNIFICANCE
Further elucidation of ABP acquisition with regard to multiple sequential measurement is of clinical importance. If rapid cuff re-inflation does indeed alter ABP, then the point at which this occurs should be clarified.

DESIGN
This was a prospective, repeated measures study utilizing a convenience sample of university health professions students.

METHODS
Twenty (10 males, 24.8±2.5; 10 females, 23.5±1.6 yrs) students volunteered to participate in the study. Following receipt of informed consent, subjects were then moved to a separate room for 5 minutes of quiet rest. Upon return to the testing area, each subject was seated comfortably with a blood pressure cuff affixed to the left arm following standard protocol. A Welch Allyn Connex® 6000 Series Vital Signs Monitor was used to obtain all ABPs. No rest interval was provided between successive ABP measurements with the cuff re-inflated immediately following deflation. Investigators did not engage subjects in conversation once the cuff inflation protocol was initiated. A total of five ABP trials (T) were administered utilizing this rapid re-inflation procedure. Pulse rates (b/min) were taken concomitantly at each ABP reading. Alpha level was set at p ≤ 0.05; data were analyzed using SPSS Version 23 software. Bonferroni adjustment was provided for all repeated measure comparisons.

RESULTS
Mean±SD mmHg for systolic (SBP) and diastolic (DBP) pressures over the five trials were: T1 - 125.6±16, 75.8±5.7; T2 - 120.5±16.1, 74.3±6.7; T3 - 120±15.4, 75.4±6.8; T4 - 118.8±15.4, 73.9±6.5; and T5 - 119.8±14.7, 73.8±6.9. Pairwise comparisons revealed significant differences between SBPs T1 vs T2 – T5 (p ≤ .015) only. Significant differences between DBPs over five trials were: T1 vs T2, T4, T5 (p ≤ .041); and T3 vs T4, T5 (p ≤ .021). Pulse rates appeared to vary independent of the changes observed in ABP.

CONCLUSION
All SBPs were lower after T1. This same trend was observed for all DBPs except for T3. The T3 DBP approximated that value observed at T1 (i.e., 75.8 mmHg vs 75.4 mmHg). Given the range of change for both SBPs (6.8 mmHg) and DBPs (2.0 mmHg) over all trials was quite small, it appears no consistent mechanism is at play to alter ABPs when they are obtained sequentially and without interposed rests. We suspect the higher ABPs observed at T1 resulted from a heightened sympathetic response to initial study participation. Based on present data, we conclude the time interval of cuff re-inflation has a negligible effect on ABP measurement.

IMPLICATIONS
This study further supports evidence now emerging that ABP measurement guidelines specific to cuff re-inflation need to be revisited and amended as necessary.