Abstract Title: Automated Transducer Leveling System for Pressure Measurements

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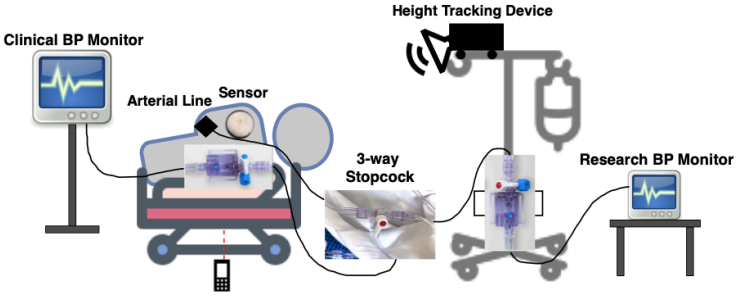
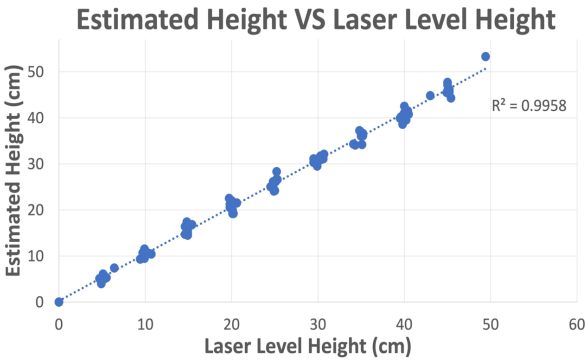
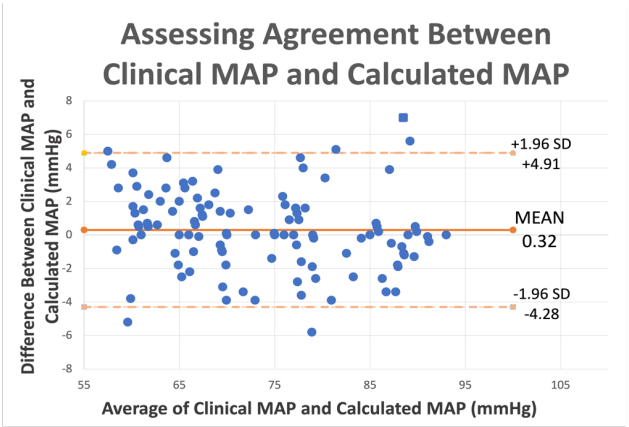
Accurate invasive pressure measurements depend on the alignment of the pressure transducer with the patient's phlebostatic axis which is typically done by visually estimating the phlebostatic axis and manually moving the transducer which is on an IV pole near the patient. There is currently no warning system or way to remind a provider to make this adjustment. Failure to align the pressure transducer with the patient's phlebostatic axis can lead to inaccurate pressure measurements, initiation of inappropriate treatment, and patient harm. We created a novel automated height tracking system consisting of a wireless sensor that attaches to the patient's chest and a detector device with a wireless speaker that can determine the sensor's height using inaudible sound waves. The automated height tracking system maintains the pressure transducer in a stationary position, estimating the blood pressure with hydrostatic force adjustments based on continuous height measurements.



We obtained 120 paired height and paired blood pressure measurements from 9 post-cardiac surgery patients in the ICU. The mean ± SD for the height difference between the heights measured by the laser distance meter and the automated transducer leveling system was 0.7 cm ± 1.0 cm with an R^2 value of 0.996. Over 95% of our calculated blood pressures were within 5 millimeters of mercury of the patient's recorded clinical blood pressure.





Our novel automated height tracking system is able to detect changes in the patient's position and determine the height difference between the transducer and the patient's chest obviating the need for the provider to remember to manually adjust the transducer height. This innovation has the potential to improve patient care and safety as well as decreasing provider workload, limiting the potential for human error.

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