



Beyond the Cuff: A Clinician's Guide to Continuous Non-Invasive Blood Pressure Monitoring

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INTRODUCTION

- Hemodynamic monitoring in the acute care setting primarily consists the invasive arterial line and the non-invasive oscillometric cuff.
- Arterial lines offer continuous, accurate data, but pose **risks like infection, thrombosis, and ischemia** while safer oscillometric cuffs require intermittent blood pressure sampling which may **not detect episodes of intraoperative hypotension**, associated with adverse outcomes.^{1, 2}
- Continuous Non-Invasive Blood Pressure (CNIBP) monitoring technologies **aim to provide beat-to-beat data without the risks** associated with arterial cannulation.
- The few commercially available CNIBP technologies have **specific, limited validations**, creating a knowledge gap for clinicians regarding their appropriate use cases.

RESULTS

Continuous Non-Invasive Hemodynamic Monitoring Devices					
Device	Method	Form Factor	Validated for:	Use with caution in:	
 ClearSight <i>Edwards Lifesciences</i>	Volume Clamp*	Finger Cuff	<ul style="list-style-type: none"> • Tracking MAP in hemodynamically stable patients³ • Cesarean sections under neuraxial anesthesia⁴ • Patients with LVADs⁵ 	<ul style="list-style-type: none"> • Cardiac surgery⁶ • Post-op systolic BP monitoring⁷ • Patients with PAD⁸ • Patients with BMI > 45⁹ 	
 CNAP <i>CNSystems</i>	Volume Clamp	Finger Cuff	<ul style="list-style-type: none"> • Elective surgery, including neurosurgery¹⁰ • ICU patients¹¹ • Tracking post-operative hemodynamic changes¹² 	<ul style="list-style-type: none"> • Arrhythmias¹³ • Obese patients during bariatric operations¹⁴ 	
 Finapres NOVA <i>Finapres Medical Systems</i>	Volume Clamp	Finger Cuff	<ul style="list-style-type: none"> • Stable cardiac patients¹⁵ • Exercise BP tracking¹⁶ 	<ul style="list-style-type: none"> • Patients on vasopressors¹⁷ 	
 Corsano Cardiowatch <i>Corsano Health</i>	Pulse Transit Time (PTT)**	Wrist-worn Wearable	<ul style="list-style-type: none"> • At home wellness monitoring¹⁸ 	<ul style="list-style-type: none"> • Clinical settings¹⁸ 	

DISCUSSION

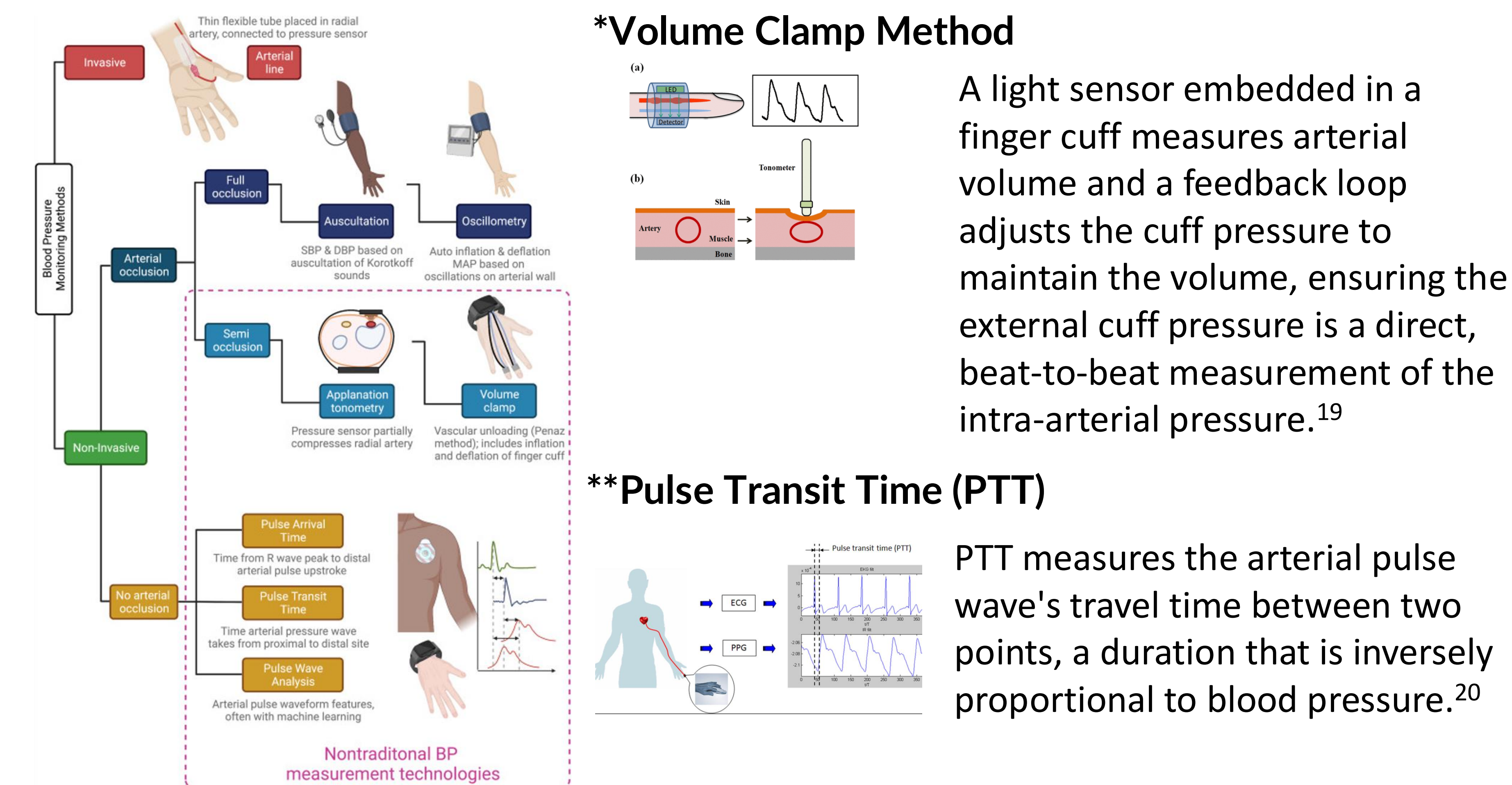
- Systems based on the volume clamp method demonstrate the most clinical reliability and are suitable for select acute care settings.
- The ClearSight system has the most extensive evidence base validating its accuracy against invasive arterial lines across several specific clinical scenarios.
- All available devices are limited by deteriorating accuracy at extreme ends of the physiological spectrum, including in patients with severe shock, high BMI, or significant peripheral artery disease.

FUTURE DIRECTIONS

- Continue validating current and emerging CNIBP technologies in a variety of acute care and peri-operative settings.
- Aggregate validated use cases and disseminate findings to physicians to guide appropriate clinical adoption.
- Prioritize research into CNIBP technologies that are accurate at extreme ends of the physiological spectrum.

METHODS

- Literature search:** A literature review was conducted using PubMed and Google Scholar for peer-reviewed articles using terms such as “non-invasive blood pressure,” “volume clamp” and specific device names.
- Article selection:** Articles were selected for relevance to perioperative and clinical acute care settings with a focus on clinical validation studies.
- Synthesis:** Findings were synthesized into a comparative summary chart to serve as a clinical guide.



CONCLUSIONS

1. CNIBP devices must be used with a clear understanding of their specific, validated patient populations.
2. Further research is necessary to develop an optimal CNIBP technology that overcomes the limitations of current devices.



REFERENCES