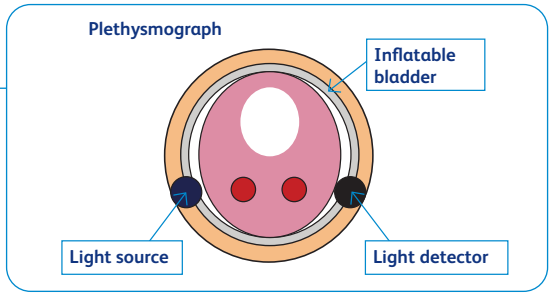
Clearsight Jr Cuff Technology Overview

How does it work?

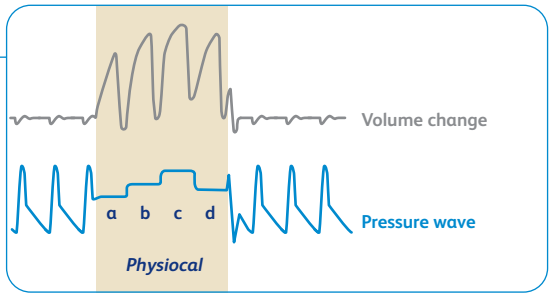
Volume clamp method

- The essence is to dynamically provide equal pressures on either side of the wall of the artery by clamping the artery to a certain constant volume
- 1000 times each second the cuff pressure is adjusted to keep the diameter of the finger arteries constant
- Continuous recording of the cuff pressure results in a real-time finger pressure waveform[1]



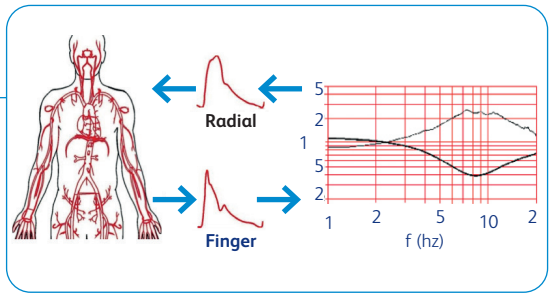
The Physiocal method – Physiological Calibration

- The Physiocal method is the real-time expert system that determines the proper arterial 'unloaded' volume, i.e. no pressure gradient across the arterial wall
- Automatic, periodic adjustments are essential to track the unloaded volume clamp setpoint when smooth muscle tone changes (e.g. during vasoconstriction)
- Calibration interval starts at 10 beats, but it increases to every 70 beats as stability increases
- Physiocal interval >30 beats is considered reliable[2]



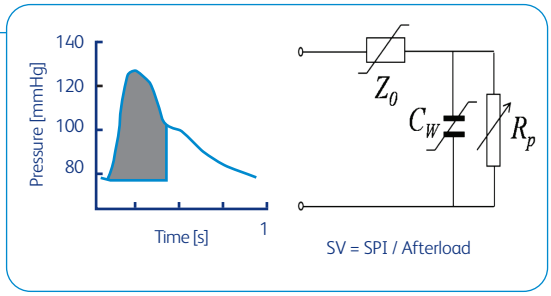
Radial pressure reconstruction

- Clinical standard for noninvasive BP is radial level
- The ClearSight Jr cuff reconstructs the radial arterial pressure waveform from the finger arterial pressure waveform
- The reconstruction algorithm is based on a clinical database[3]



Cardiac output calculation

- Stroke volume is calculated by an algorithm based on a pulse contour method using:
  - Mean arterial pressure (MAP) and heart rate (HR)
  - A physiological model to calculate afterload individualized by age, gender, height and weight
- Cardiac output results from stroke volume times heart rate and is updated every beat[4]



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Validation of monitoring blood pressure and cardiac output with noninvasive finger cuff technology versus traditional methods

Blood pressure validation studies

BP can be measured reliably according to AAMI standard, bias <5 and SD < 8 mmHg

Vs. Noninvasive upper arm cuff	
Kouz, K. et al. Anesthesiology (2023)[5]	242 non-cardiac surgery patients
Maheshwari K. et al Anesthesiology (2018)[6]	320 non-cardiac surgery patients
Meidert, A.S. et al. European Journal of Anaesthesiology (2017)[7]	160 orthopedic patients with a history of chronic hypertension
Chen, G. et al. Journal of Clinical Monitoring and Computing (2012)[8]	25 ASA I-III patients undergoing abdominal or orthopedic surgery
Vs. Invasive radial line	
Kho, et al. Journal of Clinical Anesthesia (2022)[9]	33 patients non-cardiac surgery patients
Shu Y. Lu et al. Journal of Cardiothoracic and Vascular Anesthesia (2021)[10]	20 transcatheter aortic valve replacement patients

Cardiac output validation studies

Measurement of relative changes in CO performs comparably with invasive measurements

Vs. Noninvasive upper arm cuff	
Bubenek-Turconi et al – Anesthesia-Analgesia 2013[11]	28 cardiac surgery patients
Bogert et al – Anaesthesia 2010[12]	25 post CABG patients
Stover et al – BMC Anesthesiology 2009[13]	10 severely ill ICU patients
Vs. Transpulmonary thermodilution	
Broch et al – Anaesthesia 2012[14]	40 cardiac surgery patients
Hofhuizen et al. – J of Critical Care 2014[15]	20 post-cardiac patients
Vs. Trans-thoracic echo-Doppler	
van der Spoel et al. – J Clin Anesth 2012[16]	40 ASA 1-2 patients
Vs. Esophageal echo-Doppler	
Chen et al. J Clin Anesth 2012[17]	25 ASA 1-3 patients

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