Clinically Applicable Model-Based Pulse Contour Analysis Method for Stroke Volume Estimation
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Motivation
Hemodynamic management in ICU is challenging:
• stroke volume (SV) & cardiac output not directly measurable
• variable & complex patient response to therapy
• ambiguity in choosing the best treatment strategy

Model based hemodynamic management:
• Non-additionally invasive SV estimation
• patient-specific, time-varying parameters account for intra- & inter-patient variability
• clinical protocols based on response of cardiac output to intervention

3 Element Windkessel Model
Arterial pressure waveform $P_{MEA}$ divided into:
• $P_{RES}$, pressure that stretches arteries
• $P_{EX}$, pressure proportional to flow

Parameters found using pulse waveform shape & calibration

Results
Pig studies
• Aortic flow probe for validation
• Recruitment manoeuvres & Endotoxin to change SV

Model captures changes in SV well during interventions