

Extended Supplemental Materials

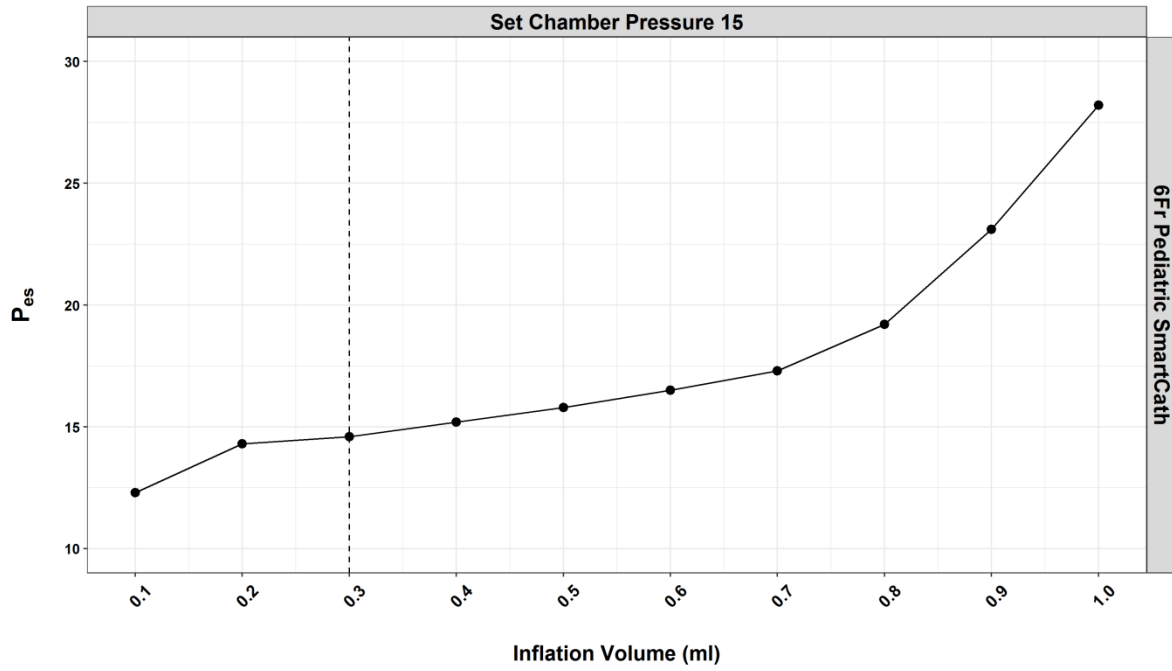
1.

V <i>(V₀ = reference volume V⁺ = volume above V₀ V⁻ = volume above V₀)</i>	Pes	ΔPes <i>(Pes at V⁺ minus Pes at V⁻) (* = Values higher than median)</i>	Remaining values for ΔPes (After discarding highest values *)	Optimal Filling Volume [] <i>(Minimum V from remaining)</i>
0.1	12.3			
0.2	14.3	*2.3		
0.3	14.6	0.9	0.9	[0.3]
0.4	15.2	1.2	1.2	
0.5	15.8	1.3	1.3	
0.6	16.5	1.5	1.5	
0.7	17.3	*2.7		
0.8	19.2	*5.8		
0.9	23.1	*9		
1.0	28.2			

ESM 1.

Steps to obtaining the minimal filling volume when esophageal pressure measurements are collected in step-wise inflation volumes with evenly spaced filling volumes, example from bench data when using a model esophagus with the 6Fr Pediatric CareFusion Catheter – graphic for drawing of curve on ESM2. ΔPes is first calculated for each inflation volume where ΔP = Pes at V⁺ minus Pes at V⁻, which are the inflation volumes immediately above and below the inflation volume at which ΔP is being calculated. The top half of inflation volumes that had the highest values for ΔPes are then discarded. Lastly the lowest inflation volume remaining is chosen as the optimal filling volume – which should represent the beginning of the low elastance portion of the Pes-inflation volume curve.

2.



ESM 2.

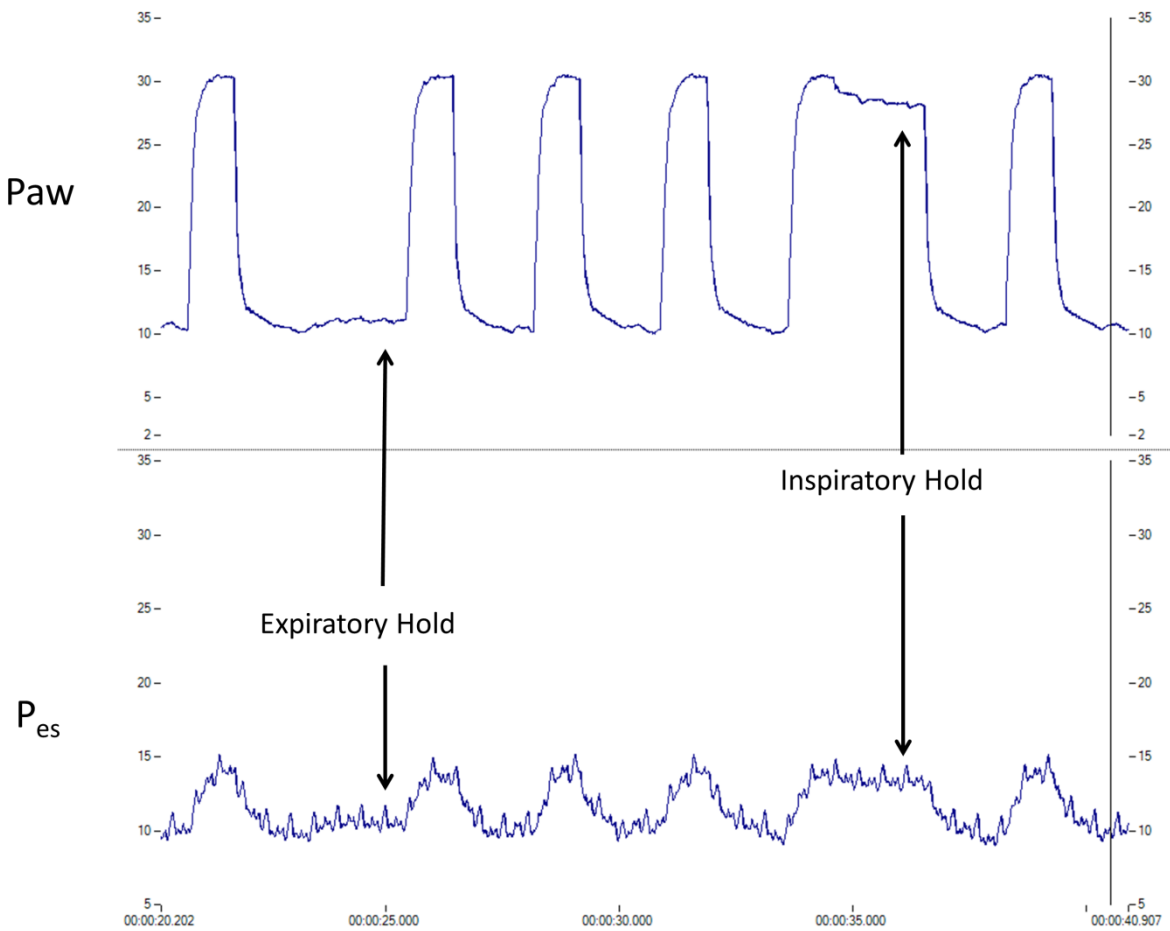
P_{es} -inflation volume curve for a data sample derived from data in ESM1. The dotted line represents the calculated optimal filling volume.

3.

Study# Study Day	Gender Age Catheter Size Catheter Position	Height Weight BMI	ARDS Trigger	PIP	PEEP	FiO ₂	Compliance (Dynamic) (ml/delta P/kg)	Minimal Filling Volume, median Instability Index for all inflation volumes Malpositioned Catheter Vs. Good placement	PLexp [with optimal filling volume] (minimum, maximum with manufacturer range) Malpositioned Catheter Vs. Good placement	PLinsp [with optimal filling volume] (minimum, maximum with manufacturer range) Malpositioned Catheter Vs. Good placement
29 Day 1	Male 16 years 8Fr High Esophagus	146cm 48kg 22.5(kg/m ²)	Pneumonia	36	12	0.5	0.25	0.4 ml Vs. 0.8 ml	[9.3] (-3.8, 7.8) Vs. [-2.0] (-1.5, -7.1)	[29.1] (15.2, 29.0) Vs. [17.9] (11.7, 18)
21 Day 1	Female 22 months 6Fr Stomach	75cm 8.3kg 14.8(kg/m ²)	Pneumonia	42	10	0.6	0.27	0.4 ml Vs. 0.2 ml	[-1.3] (-7.0, -2.4) Vs. [5.5] (-7.0, 2.7)	[28.5] (22.0, 27.7) Vs. [20.9] (9.8, 18.4)

ESM 3. Excluded patient files due to poor catheter position observed on xray. For these the two children with ARDS in the clinical study, demographics, clinical data, derived minimal filling volume, PLexp and PLinsp for both optimal filling volume and minimum and maximum values using the manufacturer recommended range, and values obtained from the malpositioned catheter vs. values obtained from when the catheter is in good position are shown for each subject and study day. Manufacturer's range: for the 6Fr pediatric catheter (0.5-1.25ml), and for the 8Fr adult catheter (0.5-2.25ml).

4.



ESM 4. Sample recordings of simultaneous P_{aw} and P_{es} during an expiratory hold and inspiratory hold. Note that P_{es} remains fairly consistent throughout the holds and the values are similar to that achieved during both end-exhalation and end-inspiration without holds (within ± 1 cm H_2O).