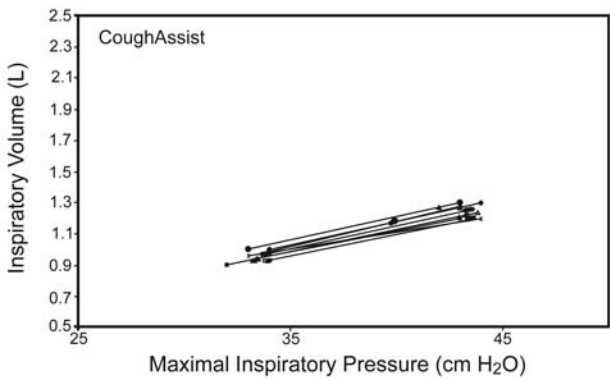
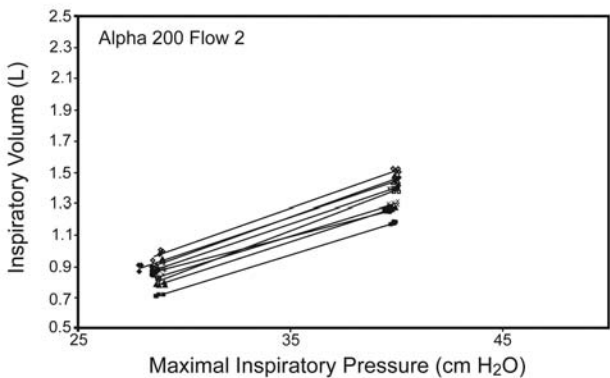
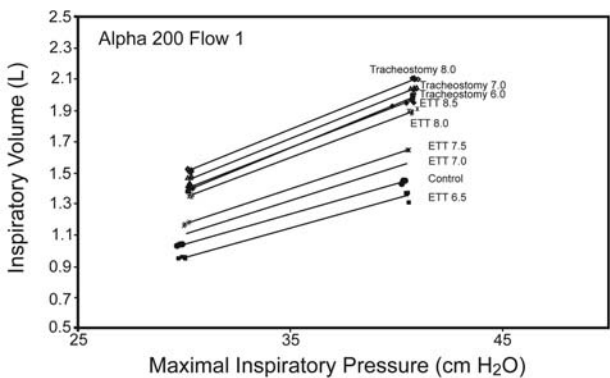


Supplementary Fig. 1. Relationship of inspiratory volume to inspiratory maximal measured pressure in the C30R5 condition (compliance of 30 mL/cm H<sub>2</sub>O and resistance of 5 cm H<sub>2</sub>O/L/s) with CoughAssist and Alpha 200 in the control condition (reference) and in the presence of endotracheal tube (ETT) or tracheostomy cannula. The lines are the regression lines for each artificial airway.

Supplementary Fig. 2. Relationship of inspiratory volume to inspiratory maximal measured pressure in the C30R5 condition (compliance of 60 mL/cm H<sub>2</sub>O and resistance of 5 cm H<sub>2</sub>O/L/s) with CoughAssist and Alpha 200 in the control condition (reference) and in the presence of endotracheal tube (ETT) or tracheostomy cannula. The lines are the regression lines for each artificial airway.



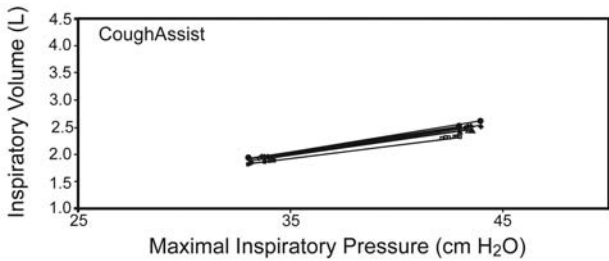
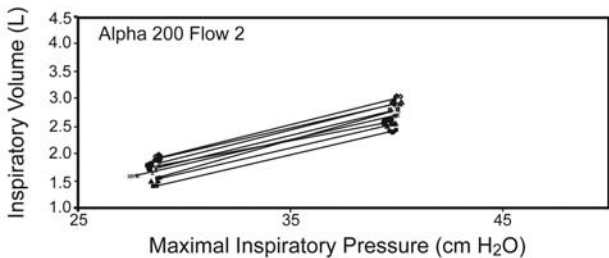
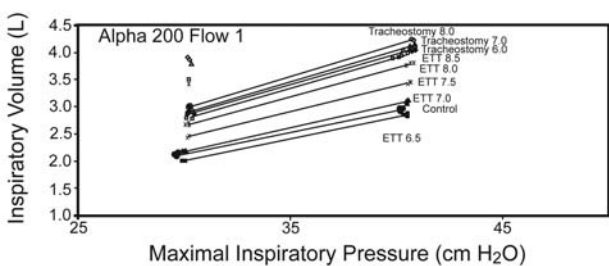


Table 1 ESM. Values of estimates of coefficients of the linear regression between inspired volume and maximal inspiratory pressure in 2 mechanical conditions between Alpha 200 and Cough Assist without artificial airways.

Coefficients	C30R5	C60R5
Cough Assist vs. Alpha 200 flow 1		
Intercept with Alpha 200 (L)	1.277 (0.001) ***	2.595 (0.003) ***
Slope with Alpha 200 (L.cmH <sub>2</sub> O <sup>-1</sup> )	0.039 (0.0001) ***	0.078 (0.001) ***
Deviation of intercept with cough assist (L)	-0.187 (0.002) †	-0.507 (0.004) †
Deviation of slope with cough assist (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.009 (0.0001) †	-0.015 (0.001) †
Cough Assist vs. Alpha 200 flow 2		
Intercept with Alpha 200 (L)	1.131 (0.002) ***	2.297 (0.004) ***
Slope with Alpha 200 (L.cmH <sub>2</sub> O <sup>-1</sup> )	0.036 (0.0001) ***	0.074 (0.001) ***
Deviation of intercept with cough assist (L)	-0.041 (0.002) †	-0.208 (0.006) †
Deviation of slope with cough assist (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.006 (0.0001) †	-0.011 (0.001) †
The intercept is the inspired volume at a pressure of 36 cm H <sub>2</sub> O. Values are mean (standard error) † P < 0.001 vs. other device *** P < 0.001 vs. zero		

Table 2 ESM. Values of the estimates of the coefficients of the linear regression analysis between inspired volume and maximal inspiratory pressure across the fixed effects of device (Cough Assist vs. Alpha 200 at each Flow) and artificial airways (presence vs. absence) in the C30 R5 condition.

Effect	Coefficients	mean	SE
Reference = Alpha 200 Flow 1 with no artificial airway	Intercept (L) *	1.277	0.047
	Slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) *	0.039	0.009
Effect of Cough Assist Relative to reference	Deviation of Intercept (L) ††	-0.188	0.069
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.009	0.013
Effect of artificial airways Relative to reference	Deviation of Intercept (L) †††	0.310	0.050
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	0.012	0.009
Effect of artificial airways Relative to Cough Assist	Deviation of Intercept (L) †††	-0.369	0.073
	Deviation of Slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.013	0.014

Effect	Coefficients	mean	SE
Reference = Alpha 200 Flow 2 with no artificial airway	Intercept (L) *	1.131	0.022
	Slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) *	0.036	0.004
Effect of Cough Assist Relative to reference	Deviation of Intercept (L)	-0.041	0.032
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.006	0.006
Effect of artificial airways Relative to reference	Deviation of Intercept (L) †	0.059	0.024
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †	0.010	0.004
Effect of artificial airways Relative to Cough Assist	Deviation of Intercept (L) †††	-0.119	0.034
	Deviation of Slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.012	0.006

SE = standard error  
 \* P < 0.001 as compared to zero † P < 0.05 †† P < 0.001 ††† P < 0.0001 relative to reference

Table 3 ESM. Values of the estimates of the coefficients of the linear regression analysis between inspired volume and maximal inspiratory pressure across the fixed effects of device (Cough Assist vs. Alpha 200 at each Flow) and artificial airways (presence vs. absence) in the C60 R5 condition.

Effect	Coefficients	mean	SE
Reference = Alpha 200 Flow 1 with no artificial airway	Intercept (L) *	2.595	0.090
	Slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) *	0.078	0.017
Effect of Cough Assist Relative to reference	Deviation of Intercept (L) ††	-0.507	0.133
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.015	0.023
Effect of artificial airways Relative to reference	Deviation of Intercept (L) †††	0.619	0.096
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	0.027	0.018
Effect of artificial airways Relative to Cough Assist	Deviation of Intercept (L) †††	-0.682	0.141
	Deviation of Slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.035	0.025

Effect	Coefficients	mean	SE
Reference = Alpha 200 Flow 2 with no artificial airway	Intercept (L) *	2.297	0.044
	Slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) *	0.074	0.007
Effect of Cough Assist Relative to reference	Deviation of Intercept (L) †	-0.208	0.063
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.011	0.011
Effect of artificial airways Relative to reference	Deviation of Intercept (L)	0.087	0.046
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †	0.022	0.008
Effect of artificial airways Relative to Cough Assist	Deviation of Intercept (L) †	-0.150	0.066
	Deviation of Slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) ††	-0.030	0.011

SE = standard error  
 \* P < 0.001 as compared to zero † P < 0.05 †† P < 0.001 ††† P < 0.0001 relative to reference

Table 4 ES M. Coefficients (intercept and slope) of the linear regression analysis pertaining to inspired volume to maximal inspiratory pressure across the fixed effects of device (Cough Assist vs. Alpha 200 flow 1) and artificial airways (every size) in the C30 R5 condition.

Effect	Coefficients	Mean	SE
Reference = Alpha 200 flow 1 with no artificial airways	Intercept (L) ***	1.277	0.003
	Slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) ***	0.039	0.001
Effect of cough assist relative to the reference	Deviation of intercept (L) †††	-0.187	0.004
	Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	-0.009	0.001
	ETT 8.5 Deviation of intercept (L) †††	0.439	0.004
	ETT 8.0 Deviation of intercept (L) †††	0.373	0.004
Effect of artificial airways on the intercept of the reference	ETT 7.5 Deviation of intercept (L) †††	0.166	0.004
	ETT 7.0 Deviation of intercept (L) †††	0.087	0.004
	ETT 6.5 Deviation of intercept (L)	-0.092	0.004
	TRACH 8.0 Deviation of intercept (L) †††	0.558	0.004
	TRACH 7.0 Deviation of intercept (L) †††	0.441	0.004
	TRACH 6.0 Deviation of intercept (L) †††	0.508	0.007
	ETT 8.5 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	0.014	0.001
	ETT 8.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	0.013	0.001
	ETT 7.5 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	0.007	0.001
	ETT 7.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	0.005	0.001
	ETT 6.5 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	0.007	0.001
	TRACH 8.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	0.016	0.001
	TRACH 7.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	0.016	0.001
	TRACH 6.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	0.018	0.001
Effect of artificial airways on the intercept of Cough Assist	ETT 8.5 Deviation of intercept (L) †††	-0.469	0.006
	ETT 8.0 Deviation of intercept (L) †††	-0.437	0.006
	ETT 7.5 Deviation of intercept (L) †††	-0.196	0.006
	ETT 7.0 Deviation of intercept (L) †††	-0.126	0.006
	ETT 6.5 Deviation of intercept (L)	-0.011	0.006
	TRACH 8.0 Deviation of intercept (L) †††	-0.610	0.006
	TRACH 7.0 Deviation of intercept (L) †††	-0.575	0.006
	TRACH 6.0 Deviation of intercept (L) †††	-0.544	0.006
	ETT 8.5 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	-0.014	0.001
	ETT 8.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	-0.021	0.001
	ETT 7.5 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	-0.007	0.001
	ETT 7.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †	-0.002	0.001
	ETT 6.5 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> )	-0.002	0.001
	TRACH 8.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	-0.017	0.001
TRACH 7.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	-0.017	0.001	
TRACH 6.0 Deviation of slope (L.cmH <sub>2</sub> O <sup>-1</sup> ) †††	-0.020	0.001	

ETT=endotracheal tube; TRACH=tracheotomy canula.

\*\*\* P < 0.0001 vs. zero.

† P < 0.05

††† P < 0.0001 vs. reference