Patient size	PIP / PEEP (init)	**Set NO flow (ball)**	Set FiO2	Meas NO flow	Ball	NO flow	Press comp	PIP / PEEP (with NO)	V_T	Bias Flow	**Delivered FiO2**	FiO2 offset	FiO2 Calc 1	FiO2 Calc 2	FiO2 Calc 3	**Delivered NO**	Delivered NO2	NO Calc 1	NO Calc 2	NO Calc 3
		F_{NOset}	$FiO2_{SET}$	F_{NOpre}		F_{NO}				Fb	**FiO_2d**	FiO2d-$FiO2_{SET}$				**NOd**	NO_2d			
4 kg	25 / 5	**2**	0.60	2.8	2.0	3.0	Y	25 / 5	23.6	11.4	**0.67**	0.07	0.66 (0.01)	0.65 (0.02)	0.65 (0.02)	**12**	0.2	17 (-5)	13 (-1)	15 (-3)
4 kg	25 / 5	**2**	0.80			3.0	Y	25 / 5	23.6	11.4	**0.82**	0.02	0.82 (0.00)	0.82 (0.00)	0.82 (0.00)	**12**	0.2	17 (-5)	13 (-1)	15 (-3)
4 kg	25 / 5	**2**	1.00			3.0	Y	25 / 5	23.6	11.1	**0.97**	-0.03	0.98 (-0.01)	0.98 (-0.01)	0.98 (-0.01)	**13**	0.2	17 (-4)	13 (0)	15 (-2)
4 kg	25 / 5	**4**	0.60	5.2	3.8	5.2	N	26 / 6	24.5	11.4	**0.71**	0.11	0.69 (0.02)	0.68 (0.03)	0.69 (0.02)	**22**	0.3	25 (-3)	22 (0)	25 (-3)
4 kg	25 / 5	**4**	0.80			5.2	N	26 / 6	24.5	11.4	**0.84**	0.04	0.83 (0.01)	0.83 (0.01)	0.83 (0.01)	**22**	0.3	25 (-3)	22 (0)	25 (-3)
4 kg	25 / 5	**4**	1.00			5.2	N	26 / 6	24.5	11.1	**0.96**	-0.04	0.97 (-0.01)	0.97 (-0.01)	0.97 (-0.01)	**22**	0.3	26 (-4)	23 (-1)	25 (-3)
4 kg	25 / 5	**6**	0.60	8.1	5.8	8.2	N	27 / 6	24.4	11.4	**0.74**	0.14	0.73 (0.01)	0.71 (0.03)	0.72 (0.02)	**30**	0.3	33 (-3)	30 (0)	32 (-2)
4 kg	25 / 5	**6**	0.80			8.2	N	27 / 6	24.4	11.4	**0.85**	0.05	0.84 (0.01)	0.84 (0.01)	0.84 (0.01)	**30**	0.4	33 (-3)	30 (0)	32 (-2)
4 kg	25 / 5	**6**	1.00			8.2	N	27 / 6	24.4	11.1	**0.96**	-0.04	0.96 (0.00)	0.96 (0.00)	0.96 (0.00)	**31**	0.4	34 (-3)	30 (1)	32 (-1)
4 kg	25 / 5	**8**	0.60	10.6	7.4	11.1	N	28 / 8	24.7	11.3	**0.76**	0.16	0.75 (0.01)	0.73 (0.03)	0.74 (0.02)	**35**	0.4	40 (-5)	35 (0)	38 (-3)
4 kg	25 / 5	**8**	0.80			11.1	N	28 / 8	24.7	11.3	**0.86**	0.06	0.85 (0.01)	0.84 (0.02)	0.85 (0.01)	**36**	0.5	40 (-4)	35 (1)	38 (-2)
4 kg	25 / 5	**8**	1.00			11.1	N	28 / 8	24.7	11.1	**0.95**	-0.05	0.95 (0.00)	0.96 (-0.01)	0.95 (0.00)	**36**	0.5	40 (-4)	36 (0)	38 (-2)
4 kg	25 / 5	**10**	0.60	13.7	9.1	14.2	N	29 / 10	24.8	11.5	**0.78**	0.18	0.77 (0.01)	0.75 (0.03)	0.76 (0.02)	**40**	0.5	44 (-4)	39 (1)	42 (-2)
4 kg	25 / 5	**10**	0.80			14.2	N	29 / 10	24.8	11.2	**0.86**	0.06	0.86 (0.00)	0.85 (0.01)	0.85 (0.01)	**41**	0.6	45 (-4)	40 (1)	42 (-1)
4 kg	25 / 5	**10**	1.00			14.2	N	29 / 10	24.8	10.9	**0.94**	-0.06	0.94 (0.00)	0.95 (-0.01)	0.95 (-0.01)	**41**	0.6	45 (-4)	40 (1)	42 (-1)
10 kg	18 / 5	**2**	0.60	2.7	1.9	2.7	N	19 / 6	60.5	11.3	**0.68**	0.08	0.66 (0.02)	0.65 (0.03)	0.65 (0.03)	**11**	0.3	15 (-4)	13 (-2)	15 (-4)
10 kg	18 / 5	**2**	0.80			2.7	N	19 / 6	60.5	11.3	**0.81**	0.01	0.82 (-0.01)	0.82 (-0.01)	0.82 (-0.01)	**12**	0.3	15 (-3)	13 (-1)	15 (-3)
10 kg	18 / 5	**2**	1.00			2.7	N	19 / 6	60.5	11.2	**0.97**	-0.03	0.98 (-0.01)	0.98 (-0.01)	0.98 (-0.01)	**12**	0.2	16 (-4)	13 (-1)	15 (-3)
10 kg	18 / 5	**4**	0.60	5.1	3.7	5.1	N	20 / 6	60.3	11.4	**0.71**	0.11	0.69 (0.02)	0.68 (0.03)	0.69 (0.02)	**21**	0.3	25 (-4)	22 (-1)	25 (-4)
10 kg	18 / 5	**4**	0.80			5.1	N	20 / 6	60.3	11.3	**0.83**	0.03	0.83 (0.00)	0.83 (0.00)	0.83 (0.00)	**21**	0.3	25 (-4)	23 (-2)	25 (-4)
10 kg	18 / 5	**4**	1.00			5.1	N	20 / 6	60.3	10.9	**0.96**	-0.04	0.97 (-0.01)	0.97 (-0.01)	0.97 (-0.01)	**22**	0.3	26 (-4)	23 (-1)	25 (-3)
10 kg	18 / 5	**6**	0.60	7.9	5.7	8.1	N	20 / 7	60.9	11.3	**0.74**	0.14	0.73 (0.01)	0.71 (0.03)	0.72 (0.02)	**29**	0.3	33 (-4)	30 (-1)	32 (-3)
10 kg	18 / 5	**6**	0.80			8.1	N	20 / 7	60.9	11.2	**0.84**	0.04	0.84 (0.00)	0.84 (0.00)	0.84 (0.00)	**30**	0.4	34 (-4)	30 (0)	32 (-2)
10 kg	18 / 5	**6**	1.00			8.1	N	20 / 7	60.9	11.1	**0.96**	-0.04	0.96 (0.00)	0.96 (0.00)	0.96 (0.00)	**30**	0.4	34 (-4)	30 (0)	32 (-2)
10 kg	18 / 5	**8**	0.60	10.6	7.4	11.0	N	21 / 8	60.7	11.4	**0.76**	0.16	0.75 (0.01)	0.73 (0.03)	0.74 (0.02)	**36**	0.4	39 (-3)	35 (1)	38 (-2)
10 kg	18 / 5	**8**	0.80			11.0	N	21 / 8	60.7	11.2	**0.84**	0.04	0.85 (-0.01)	0.84 (0.00)	0.85 (-0.01)	**36**	0.5	40 (-4)	35 (1)	38 (-2)
10 kg	18 / 5	**8**	1.00			11.0	N	21 / 8	60.7	10.9	**0.95**	-0.05	0.95 (0.00)	0.96 (-0.01)	0.95 (0.00)	**36**	0.5	40 (-4)	36 (0)	38 (-2)
10 kg	18 / 5	**10**	0.60	13.0	9.1	14.1	N	22 / 10	61.8	11.3	**0.77**	0.17	0.77 (0.00)	0.75 (0.02)	0.76 (0.01)	**40**	0.5	44 (-4)	40 (0)	42 (-2)
10 kg	18 / 5	**10**	0.80			14.1	N	22 / 10	61.8	11.1	**0.86**	0.06	0.86 (0.00)	0.85 (0.01)	0.85 (0.01)	**40**	0.5	45 (-5)	40 (0)	42 (-2)
10 kg	18 / 5	**10**	1.00			14.1	N	22 / 10	61.8	10.9	**0.94**	-0.06	0.94 (0.00)	0.95 (-0.01)	0.95 (-0.01)	**41**	0.6	45 (-4)	40 (1)	42 (-1)
20 kg	18 / 5	**2**	0.60	2.8	2.0	2.8	N	18 / 6	122	11.4	**0.67**	0.07	0.66 (0.01)	0.65 (0.02)	0.65 (0.02)	**12**	0.2	16 (-4)	13 (-1)	15 (-3)
20 kg	18 / 5	**2**	0.80			2.8	N	18 / 6	122	11.2	**0.81**	0.01	0.82 (-0.01)	0.82 (-0.01)	0.82 (-0.01)	**12**	0.2	16 (-4)	13 (-1)	15 (-3)
20 kg	18 / 5	**2**	1.00			2.8	N	18 / 6	122	11.0	**0.97**	-0.03	0.98 (-0.01)	0.98 (-0.01)	0.98 (-0.01)	**13**	0.2	16 (-3)	13 (0)	15 (-2)
20 kg	18 / 5	**4**	0.60	5.2	3.8	5.3	N	19 / 6	120	11.3	**0.71**	0.11	0.70 (0.01)	0.68 (0.03)	0.69 (0.02)	**22**	0.3	26 (-4)	23 (-1)	25 (-3)
20 kg	18 / 5	**4**	0.80			5.3	N	19 / 6	120	11.1	**0.83**	0.03	0.83 (0.00)	0.83 (0.00)	0.83 (0.00)	**22**	0.3	26 (-4)	23 (-1)	25 (-3)
20 kg	18 / 5	**4**	1.00			5.3	N	19 / 6	120	10.9	**0.96**	-0.04	0.97 (-0.01)	0.97 (-0.01)	0.97 (-0.01)	**22**	0.3	26 (-4)	23 (-1)	25 (-3)
20 kg	18 / 5	**6**	0.60	7.8	5.6	8.1	N	20 / 7	121	11.2	**0.74**	0.14	0.73 (0.01)	0.71 (0.03)	0.72 (0.02)	**29**	0.3	34 (-5)	30 (-1)	32 (-3)
20 kg	18 / 5	**6**	0.80			8.1	N	20 / 7	121	11.2	**0.84**	0.04	0.84 (0.00)	0.84 (0.00)	0.84 (0.00)	**30**	0.4	34 (-4)	30 (0)	32 (-2)
20 kg	18 / 5	**6**	1.00			8.1	N	20 / 7	121	10.9	**0.96**	-0.04	0.96 (0.00)	0.96 (0.00)	0.96 (0.00)	**30**	0.4	34 (-4)	30 (0)	32 (-2)
20 kg	18 / 5	**8**	0.60	10.4	7.4	10.7	N	20 / 8	120	11.2	**0.76**	0.16	0.75 (0.01)	0.73 (0.03)	0.74 (0.02)	**35**	0.4	39 (-4)	35 (0)	38 (-3)
20 kg	18 / 5	**8**	0.80			10.7	N	20 / 8	120	11.1	**0.85**	0.05	0.85 (0.00)	0.84 (0.01)	0.85 (0.00)	**35**	0.5	39 (-4)	36 (-1)	38 (-3)
20 kg	18 / 5	**8**	1.00			10.7	N	20 / 8	120	10.8	**0.95**	-0.05	0.95 (0.00)	0.95 (0.00)	0.95 (0.00)	**36**	0.5	40 (-4)	36(0)	38 (-2)

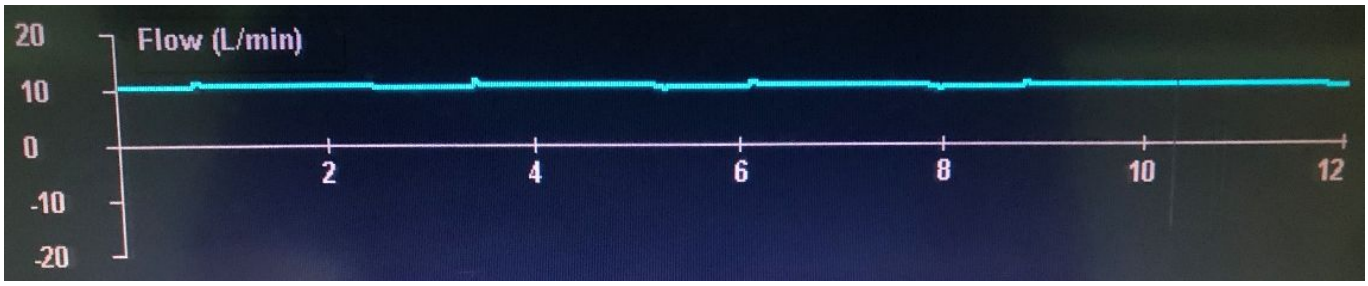
20 kg	18 / 5	**10**	0.60	13.5	9.1	14.1	N	22 / 10	118	11.1	**0.78**	0.18	0.77 (0.01)	0.75 (0.03)	0.76 (0.02)	**40**	0.5	45 (-5)	40 (0)	42 (-2)
20 kg	18 / 5	**10**	0.80			14.1	N	22 / 10	118	11.1	**0.86**	0.06	0.86 (0.00)	0.85 (0.01)	0.85 (0.01)	**40**	0.5	45 (-5)	40 (0)	42 (-2)
20 kg	18 / 5	**10**	1.00			14.1	N	22 / 10	118	10.8	**0.94**	-0.06	0.94 (0.00)	0.95 (-0.01)	0.95 (-0.01)	**41**	0.6	45 (-4)	41 (0)	42 (-1)

Supplementary Table 1. Full bench test results using a volume targeted (6 mL/kg) ventilation strategy. See text for full list of abbreviations and details of calculations. The 4 kg simulation was performed at 30 bpm while the 10 kg and 20 kg simulations were performed at 20 bpm. Units in table: NO and NO_2 - ppm, flow - L/min, V_T - mL. Principle settings and results are in bold and calculated values are shaded. Labels are provided in the second row where appropriate. Patient size = simulated patient size. PIP/PEEP (init) = Initial PIP and PEEP pressures required without NO flow present to achieve the targeted 6 mL/kg tidal volumes. Meas. = measured. Delivered NO flows (F_{NOpre}) only measured once for each INOBlender flow setting. Ball = INOblender flow as read from the top of the flowmeter ball after connecting tubing. Press comp = indicates if pressures delivered by babyPAC could be compensated for, Y = Yes, N = No. PIP/PEEP (with NO) = PIP and PEEP pressures required with NO flow present when unable to compensate to original pressure with PEEP set to the lowest achievable PEEP and PIP set to that required to achieve the targeted 6 mL/kg tidal volumes. F_iO_2 offset (measured - set) = $F_iO_{2d} – F_iO_{2SET}$. F_iO_2 error (measured - calculated) = $F_iO_{2d} - F_iO_{2th}$. NO error (measured - theoretical) = $NO_d - NO_{th}$.

Set NO flow (ball)	Set FiO2	Meas NO flow	Ball	NO flow	Press comp	V_T	Bias Flow	**Delivered FiO2**	FiO2 offset	FiO2 Calc 1	FiO2 Calc 2	FiO2 Calc 3	**Delivered NO**	Delivered NO2	NO Calc 1	NO Calc 2	NO Calc 3
F_{NOset}	$FiO2_{SET}$	F_{NOpre}		F_{NO}			Fb	**FiO_2d**	$FiO2d-FiO2_{SET}$				**NOd**	NO_2d			
2	**0.21**	2.9	2	2.9	Y*	14.9	12.5	**0.35**	0.14	0.34 (0.01)	0.31 (0.04)	0.34 (0.01)	**12**	0.2	15 (-3)	12 (0)	15 (-3)
2	**0.40**			2.9	Y*	14.9	12.8	**0.54**	0.14	0.49 (0.05)	0.47 (0.07)	0.49 (0.05)	**12**	0.2	15 (-3)	12 (0)	15 (-3)
2	**0.60**			2.9	Y*	14.9	12.7	**0.69**	0.09	0.66 (0.03)	0.64 (0.05)	0.65 (0.04)	**13**	0.2	15 (-2)	12 (1)	15 (-2)
2	**0.80**			2.9	Y*	14.9	12.4	**0.82**	0.02	0.82 (0.00)	0.82 (0.00)	0.82 (0.00)	**13**	0.2	15 (-2)	12 (1)	15 (-2)
2	**1.00**			2.9	Y*	14.9	12.5	**0.94**	-0.06	0.98 (-0.04)	0.98 (-0.04)	0.98 (-0.04)	**13**	0.2	15 (-2)	12 (1)	15 (-2)
4	**0.21**			5.1	Y†	13.8	12.5	**0.43**	0.22	0.41 (0.02)	0.39 (0.04)	0.42 (0.01)	**20**	0.2	23 (-3)	21 (-1)	25 (-5)
4	**0.40**			5.1	Y†	13.8	12.6	**0.59**	0.19	0.54 (0.05)	0.53 (0.06)	0.55 (0.04)	**21**	0.2	23 (-2)	21 (0)	25 (-4)
4	**0.60**			5.1	Y†	13.8	12.4	**0.71**	0.11	0.69 (0.02)	0.68 (0.03)	0.69 (0.02)	**21**	0.2	23 (-2)	21 (0)	25 (-4)
4	**0.80**			5.1	Y†	13.8	12.6	**0.83**	0.03	0.83 (0.00)	0.83 (0.00)	0.83 (0.00)	**21**	0.2	23 (-2)	21 (0)	25 (-4)
4	**1.00**	5.1	3.9	5.1	Y†	13.8	12.4	**0.93**	-0.07	0.97 (-0.04)	0.97 (-0.04)	0.97 (-0.04)	**21**	0.3	23 (-2)	21 (0)	25 (-4)
6	**0.21**	7.8	5.5	7.8	Y‡	13.3	12.4	**0.48**	0.27	0.48 (0.00)	0.45 (0.03)	0.49 (-0.01)	**27**	0.2	31 (-4)	28 (-1)	32 (-5)
6	**0.40**			7.8	Y‡	13.3	12.5	**0.62**	0.22	0.59 (0.03)	0.57 (0.05)	0.60 (0.02)	**28**	0.3	31 (-3)	28 (0)	32 (-4)
6	**0.60**			7.8	Y‡	13.3	12.5	**0.72**	0.12	0.72 (0.00)	0.70 (0.02)	0.72 (0.00)	**28**	0.3	31 (-3)	28 (0)	32 (-4)
6	**0.80**			7.8	Y‡	13.3	12.6	**0.83**	0.03	0.84 (-0.01)	0.83 (0.00)	0.84 (-0.01)	**28**	0.3	31 (-3)	28 (0)	32 (-4)
6	**1.00**			7.8	Y‡	13.3	12.5	**0.92**	-0.08	0.96 (-0.04)	0.97 (-0.05)	0.96 (-0.04)	**28**	0.4	31 (-3)	28 (0)	32 (-4)
8	**0.21**			10.6	Y§	12.5	12.4	**0.53**	0.32	0.53 (0.00)	0.50 (0.03)	0.53 (0.00)	**33**	0.3	37 (-4)	33 (0)	38 (-5)
8	**0.40**			10.6	Y§	12.5	12.5	**0.65**	0.25	0.63 (0.02)	0.61 (0.04)	0.64 (0.01)	**33**	0.3	37 (-4)	33 (0)	38 (-5)
8	**0.60**			10.6	Y§	12.5	12.5	**0.75**	0.15	0.74 (0.01)	0.72 (0.03)	0.74 (0.01)	**33**	0.4	37 (-4)	33 (0)	38 (-5)
8	**0.80**			10.6	Y§	12.5	12.5	**0.84**	0.04	0.85 (-0.01)	0.84 (0.00)	0.85 (-0.01)	**34**	0.4	37 (-3)	33 (1)	38 (-4)
8	**1.00**	10.4	7.3	10.6	Y§	12.5	12.3	**0.91**	-0.09	0.95 (-0.04)	0.96 (-0.05)	0.95 (-0.04)	**34**	0.4	37 (-3)	34 (0)	38 (-4)
10	**0.21**	13.2	9.2	13.8	Y||	11.8	12.4	**0.57**	0.36	0.57 (0.00)	0.54 (0.03)	0.57 (0.00)	**38**	0.4	42 (-4)	38 (0)	42 (-4)
10	**0.40**			13.8	Y||	11.8	12.4	**0.67**	0.27	0.66 (0.01)	0.64 (0.03)	0.66 (0.01)	**38**	0.4	42 (-4)	38 (0)	42 (-4)
10	**0.60**			13.8	Y||	11.8	12.4	**0.76**	0.16	0.76 (0.00)	0.74 (0.02)	0.76 (0.00)	**38**	0.4	42 (-4)	38 (0)	42 (-4)
10	**0.80**			13.8	Y||	11.8	12.4	**0.84**	0.04	0.85 (-0.01)	0.85 (-0.01)	0.85 (-0.01)	**39**	0.5	42 (-3)	38 (1)	42 (-3)
10	**1.00**			13.8	Y||	11.8	12.3	**0.91**	-0.09	0.95 (-0.04)	0.95 (-0.04)	0.95 (-0.04)	**39**	0.5	42 (-3)	38 (1)	42 (-3)

Supplementary Table 2. Test results for 4 kg patient simulation using pressure controlled ventilation. Ventilation settings: PIP 20 cmH_2O, PEEP 5 cmH_2O and rate 30 bpm (inspiratory time 1 sec and expiratory time 1 sec). See text for full list of abbreviations and details of calculations. Units in table: NO and NO_2 - ppm, flow - L/min, V_T - mL. Principle settings and results are in bold and calculated values are shaded. Labels are provided in the second row where appropriate. Meas. = measured. Delivered NO flows (F_{NOpre}) only measured once for each INOBlender flow setting. Ball = INOblender flow as read from the top of the flowmeter ball after connecting tubing. Press comp = indicates if pressures delivered by babyPAC could be compensated for, Y = Yes, N = No. * PIP reset to 20 cmH_2O but PEEP could not be reduced below 6 cmH_2O. † PIP reset to 20 cmH_2O but PEEP could not be reduced below 7 cmH_2O. ‡ PIP reset to 20 cmH_2O but PEEP could not be reduced below 8 cmH_2O. § PIP reset to 20 cmH_2O but PEEP could not be reduced below 9 cmH_2O. || PIP reset to 20 cmH_2O but PEEP could not be reduced below 10 cmH_2O. F_iO_2 offset (measured - set) = $F_iO_{2d} – F_iO_{2SET}$. F_iO_2 error (measured - calculated) = $F_iO_{2d} - F_iO_{2th}$. NO error (measured - theoretical) = $NO_d - NO_{th}$.

A



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C

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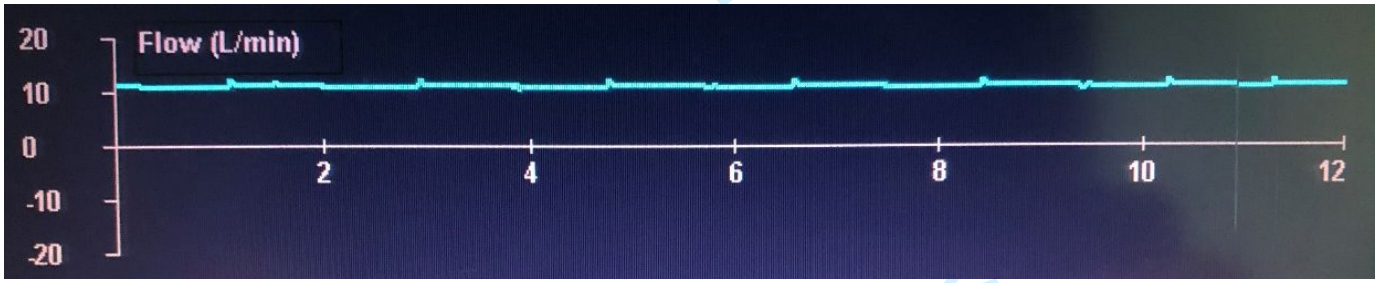

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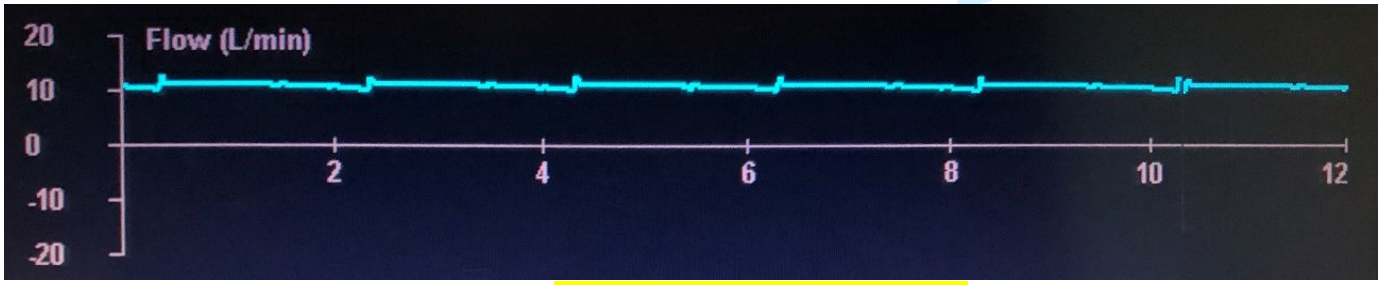
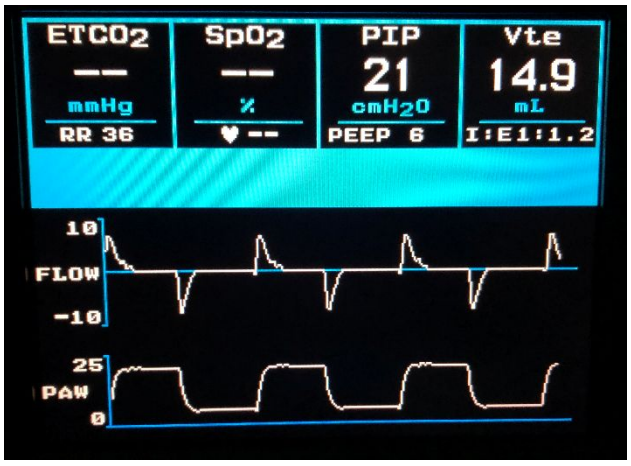


(see separate TIFF file for figure)

Supplementary Figure 1. Bias flow waveform examples. Photographs of sample bias flow waveforms at different rates (20 bpm and 40 bpm) and ventilation pressures (PIP 20 cmH_2O and 25 cmH_2O with PEEP 5 cmH_2O) at F_iO_2 of 0.60. Inspiration is indicated by the small decrease in flow with expiration marked by a small upwards deflection before stabilizing. A. 4 kg simulation with PIP 20 cmH_2O and PEEP 5 cmH_2O at 20 bpm. B. 4 kg simulation with PIP 20 cmH_2O and PEEP 5 cmH_2O at 40 bpm. C. 4 kg simulation with PIP 25 cmH_2O and PEEP 5 cmH_2O at 20 bpm. D. 10 kg simulation with PIP 20 cmH_2O and PEEP 5 cmH_2O at 40 bpm. E. 20 kg simulation with PIP 25 cmH_2O and PEEP 5 cmH_2O at 20 bpm.

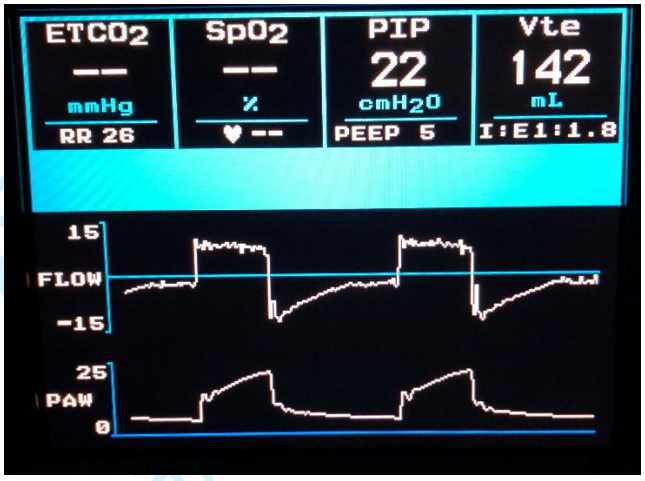
A

B



C

D



(see separate TIFF file for figure)

Supplementary Figure 2. Examples of flow and pressure waveforms. Photographs of sample flow and pressure waveforms measured between the circuit wye and test lung using a Respiratory Monitor (NM3 Respiratory Profile Monitor, Philips Respironics, Andover, MA, USA) for different size simulations and at different rates. Ventilator settings - PIP 20 cmH_2O, PEEP 5 cmH_2O. A. 4 kg simulation at 20 bpm. B. 4 kg simulation at 30 bpm. C. 10 kg simulation at 20 bpm. D. 20 kg simulation at 20 bpm (note the presence of some gas trapping).