

System and leakage (l/min)	Delivered CPAP		Amplitude of Pressure Swings	
	Mean Pressure cm H <sub>2</sub> O (95% CI)		Mean Pressure cm H <sub>2</sub> O (95% CI)	
	Before Leakage	During Leakage	Before Leakage	During Leakage
AVEA	1 4.55 (4.52-4.58) a	4.53 (4.50-4.55) a	5.48 (5.44-5.52)	5.59 (5.51-5.67) 3
	2 4.36 (4.34-4.37)	4.20 (4.19-4.21)	5.39 (5.37-5.41)	5.50 (5.45-5.55) 3
	3 4.39 (4.37-4.40)	4.27 (4.23-4.30)	5.42 (5.40-5.44)	5.74 (5.68-5.79) 4
	4 4.40 (4.39-4.41)	4.10 (4.04-4.16)	5.40 (5.38-5.42)	5.78 (5.72-5.85) 4
Evita XL	1 3.47 (3.46-3.48)	3.23 (3.22-3.23)	2.94 (2.87-3.01) c	2.82 (2.71-2.92) c, 5
	2 3.51 (3.51-3.52)	3.04 (3.03-3.04)	2.96 (2.91-3.00) c	2.90 (2.81-2.99) c, 5
	3 3.50 (3.49-3.50)	2.79 (2.78-2.79)	2.95 (2.89-3.01)	3.05 (2.97-3.12) 6
	4 3.50 (3.49-3.51)	2.56 (2.55-2.57)	3.00 (2.85-3.15) c	3.10 (3.04-3.17) c, 6
Fabian	1 4.46 (4.45-4.48)	4.42 (4.40-4.44)	1.38 (1.35-1.41)	1.58 (1.55-1.61)
	2 4.47 (4.45-4.49) b	4.43 (4.39-4.48) b, 1	1.36 (1.33-1.40)	1.85 (1.80-1.89)
	3 4.42 (4.41-4.44) b	4.42 (4.38-4.46) b, 1	1.34 (1.31-1.37)	2.01 (1.95-2.07) 7
	4 4.39 (4.37-4.41)	4.30 (4.28-4.31)	1.32 (1.29-1.36)	2.06 (2.03-2.08) 7
Engström	1 5.05 (5.04-5.06)	4.66 (4.63-4.69)	5.76 (5.75-5.76)	5.95 (5.93-5.98)
	2 5.04 (5.04-5.05)	4.20 (4.12-4.28)	5.75 (5.74-5.76)	6.36 (6.30-6.41)
	3 5.06 (5.05-5.06)	3.71 (3.59-3.83)	5.76 (5.75-5.78)	7.07 (6.98-7.17)
	4 5.03 (5.03-5.03)	3.02 (2.85-3.18)	5.76 (5.75-5.77)	8.59 (8.42-8.76)
Leoni Plus	1 3.46 (3.45-3.46)	3.36 (3.33-3.39)	8.37 (8.35-8.39)	8.80 (8.65-8.94) 8
	2 3.48 (3.48-3.48)	3.24 (3.24-3.25)	8.45 (8.44-8.47)	9.12 (9.10-9.15)
	3 3.44 (3.44-3.44)	2.92 (2.91-2.92)	8.51 (8.48-8.53)	8.71 (8.68-8.74) 8
	4 3.45 (3.45-3.46)	2.65 (2.65-2.66)	8.53 (8.50-8.57)	8.16 (8.13-8.18)
SERVO-i	1 4.12 (4.11-4.13)	3.99 (3.98-4.00)	3.02 (2.97-3.07)	3.28 (3.19-3.37) 9
	2 4.11 (4.10-4.12)	3.83 (3.81-3.86) 2	3.07 (3.05-3.10)	3.51 (3.40-3.61) 10
	3 4.17 (4.16-4.17)	3.81 (3.81-3.82) 2	2.92 (2.89-2.95)	3.39 (3.37-3.42) 9
	4 4.13 (4.13-4.14)	3.67 (3.64-3.71)	3.01 (2.94-3.08)	3.61 (3.46-3.76) 10
VN500	1 4.55 (4.54-4.55)	4.41 (4.39-4.43)	4.39 (4.32-4.45)	4.04 (3.99-4.08)
	2 4.55 (4.54-4.55)	4.28 (4.21-4.35)	4.34 (4.28-4.40)	4.47 (4.26-4.69)
	3 4.56 (4.56-4.57)	4.15 (4.08-4.22)	4.40 (4.34-4.47) d	5.35 (5.17-5.52) d
	4 4.55 (4.55-4.55)	3.89 (3.81-3.97)	4.32 (4.25-4.39)	6.26 (6.02-6.51)

**Supplementary Table 2:** Change in delivered CPAP and pressure swing amplitude during leakage. Data from ten consecutive breaths (n=10) before and during leakage. **Effect of leakage: Comparison of before and during leakage for each simulation:** Delivered CPAP was reduced for all systems except AVEA (1 l/min, NS (not statistically significant) indicated by 'a') and Fabian (2 and 3 l/min, NS indicated by 'b'). Change in pressure swing amplitude statistically significant in all comparison except Evita XL (1, 2 and 4 l/min, NS indicated by 'c') and VN500 (2 l/min, NS indicated by 'd'). Pressure swings decreased with leakage in two simulations (Leoni Plus, 4 l/min and VN500, 1 l/min). **Effect of leakage: Comparison of increasing levels of leakage for each system:** Delivered CPAP was reduced with increasing level of leakage except for AVEA (3 l/min), Fabian (1, 2 and 3 l/min, NS indicated by '1') and SERVO-i (2 and 3 l/min, indicated by '2'). Amplitude of pressure swings were increased for Engström and VN500. Other ventilators showed either no change or a small increase (NS indicated by '3' to '10').