Discussion Every turbine ventilator was within the 10 % accuracy range to deliver VT except for Monnal that over delivered the targeted VT. VT delivered by ICU ventilator was systematically lower than expected within the 10 % range except for the ARDS condition. In the children lung configuration, Astral 150 was very accurate to deliver VT as low as 50 ml.
ConclusionThere were differences in VT delivery across ventilators. Some ventilators were particularly accurate in delivering low VT.

Competing interests None.

P188

Efficiency of ventilators for intermediate care to deliver adequate FIO_2. A bench study

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Introduction There is an ongoing development of home-care turbine-powered ventilators. These can be used in the intermediate care environment at the hospital. The capability for these home-care ventilators to deliver adequate FIO_2 is an important endpoint for patient's safety. Therefore, our goal was to measure FIO_2 delivered on the bench by such ventilators when non-vented (double-limb) circuit was used.
Materials and methods The following home-care turbine-powered ventilators, Astral 150, Elisée 150, Trilogy 200 and Monnal T50, equipped with non-vented double-limb circuit or equivalent, were set in volume-controlled mode (tidal volume 500 ml, breathing frequency 15 cycles/min, inspiratory time 0.8 s, constant flow inflation shape, positive end expiratory pressure 5 cmH2O) and connected to ASL 5000 lung model set in a condition mimicking COPD patient (compliance 75 ml/cmH2O, inspiratory and expiratory airways resistance 15 and 25 $cmH_2O/L/s$, respectively). Oxygen was supplemented by plugging the low-pressure oxygen port at the rear of ventilator to the wall oxygen supply via a flowmeter. Three oxygen flow rates were delivered: 0, 3 and 15 L/min. FIO_2 was measured with Citrex H4™ (imtmedical, Switzerland) and continuously monitored on the screen of the device. Once FIO_2 reached a plateau, oxygen administration was maintained for an additional 1 min and FIO_2 was measured over the last 10 breaths of the recording at the steady state defined as a change in FIO_2 of less than 10 % from the previous sampling window. The sampling rate was 200 Hz. Citrex H4™ device was calibrated before each experiment. The values of FIO_2 were expressed as mean ± SD. As we anticipated very low variability across the measurement at the steady state, we decided not to perform formal statistical comparisons between the values.
Results The values of FIO_2 are shown in the table below. The baseline values of FIO_2 were similar across the ventilators. The FIO_2 was greater with Astral and Elisé 150 at 15 L/min.
Mean values of FIO_2 between ventilators at different oxygen supply rates

	0 L/min	3 L/min	15 L/min
Astral 150	22 ± 0.0	42 ± 0.0	99 ± 0.0
Elisée 150	21 ± 0.0	35 ± 0.0	94 ± 0.0
Monnal T 50	21 ± 0.0	40 ± 0.0	86 ± 0.0
Trilogy 200	22 ± 0.0	30 ± 0.0	62 ± 0.0

Conclusion FIO_2 generated by home-care turbine-driven ventilators fed by low-pressure oxygen port was different across ventilators. At the highest oxygen supply rate, the values of FIO_2 are close to 100 % with some ventilators.

Competing interests None.

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In vitro comparison of inspiratory-synchronized and continuous nebulization modes during noninvasive ventilation: analysis of inhaled and lost doses

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Introduction A breath-synchronized nebulization option that could potentially improve drug delivery by limiting drug loss during exhalation is currently not available on bi-level ventilators. The aim of this in vitro study was to compare aerosol delivery of amikacin with an experimental vibrating mesh nebulizer coupled to a single-limb circuit bi-level ventilator, using a conventional continuous (Conti-Neb) and an experimental inspiratory-synchronized (Inspi-Neb) nebulization modes.
Materials and methods Using an adult lung bench model of noninvasive ventilation, we tested a vibrating mesh device coupled with a bi-level ventilator in both nebulization modes. Inspi-Neb delivered aerosol during only the whole inspiratory phase, whereas Conti-Neb delivered aerosol continuously. The nebulizer was charged with amikacin solution (250 mg/3 mL) and placed at two different positions: before and after the exhalation port (starting from the lung model). Inhaled, expiratory wasted and circuit lost doses were assessed by residual gravimetric method.
Results Irrespective of the nebulizer position, Inspi-Neb produced higher inhaled dose ($p < 0.01$; +6.3 to +16.8 % of the nominal dose), lower expiratory wasted dose ($p < 0.05$; −2.7 to −42.6 % of the nominal dose) and lower total lost dose ($p < 0.05$; −6.3 to 20.6 % of the nominal dose) than Conti-Neb.
Conclusion During simulated noninvasive ventilation with a single-limb circuit bi-level ventilator, the nebulization mode of the vibrating mesh device impacts significantly the aerosol delivery of amikacin. The use of an inspiratory synchronized nebulization mode improves inhaled dose by reducing drug loss of amikacin compared to continuous nebulization mode.

Competing interests None.

P190

Short-term physiological effects of nasal high flow in patients with respiratory distress. Impact of flow rates on the work of breathing

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Introduction Nasal high flow (NHF) is increasingly used in the management of acute respiratory failure. Recent clinical data support its use as a first-line therapy in the treatment or prevention of hypoxemic respiratory failures. However, little is known about its impact on respiratory effort, which could explain some of the benefits in terms of comfort and efficiency.
Materials and methods We conducted a randomized controlled crossover study in patients with respiratory distress in order to evaluate the short-term effects of NHF. Patients were included if they met the following criteria: respiratory rate >20 breaths/min, associated