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Title: Measures of nebulizer performance – Comparing like with like

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Body: Within nebulizer literature and manufacturers' information leaflets, many different measures of nebulizer performance are reported: total emitted dose, respirable emitted dose, delivered dose (DD), respirable delivered dose (RDD), mass median aerodynamic diameter (MMAD), mass median diameter, fine particle fraction (FPF), etc. Comparing nebulizer performance can therefore be difficult. SideStream Reusable (Philips Respironics) and VixOne (Devilbiss) nebulizers were filled with 2.5 mL salbutamol sulphate (Salamol Steri-Neb, 2 mg/mL). DD with an adult breathing pattern (tidal volume=500 mL; breaths per minute=15; inhalation:exhalation ratio=1:1) was determined. Particle size was measured by a Next Generation Impactor at 15 L/min extraction.

Table 1: Performance measurements for the nebulizer systems (n=9).

	SideStream Reusable with Elegance compressor	VixOne with Devilbiss Pulmoneb compressor
DD (µg)	987	1202
MMAD (µm)	2.9	4.9
FPF (% <5 µm)	77	51
RDD (µg)	759	609

DD was lower from the SideStream Reusable, compared with the VixOne. If high DD is a measure of good performance, then VixOne could be regarded as the better system. However, aerosol quality (MMAD, FPF) is also important; based on these measures the SideStream Reusable was superior. RDD (DD×FPF) is representative of the amount of drug delivered in the respirable range and is probably the closest in vitro measure to in vivo performance. Results for RDD were more favorable from the SideStream Reusable. Only 4 possible measures of nebulizer performance were considered in this study, but performance results varied. Relative nebulizer comparisons must use the same measure; some measures may be more relevant to in vivo performance.

