



# Intraoral vs. Extraoral Suction Devices

## A review of the effectiveness of equipment on capturing aerosols

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Studies<sup>1,2,3,4,5,6</sup> have clearly demonstrated that dental procedures create splatter and aerosols. Studies also have been conducted comparing intraoral and extraoral suction devices. Extraoral vacuum aspirators (EOVAs) have been shown to have superior capture compared to intraoral devices. No study has demonstrated 100 percent capture of aerosolized particles. Efficacy of aerosol capture is highly sensitive to the position of the EOVA relative to the operative field where aerosol is being generated.

EOVAs may address one layer in capturing the majority of the aerosols created during the manipulation of oral hard and soft tissues using high-speed rotary or ultrasonic handpieces, lasers, cautery and irrigation. These devices coupled with others used to purify the remaining room air – and potentially the air traversing through the HVAC system – should provide the highest possible air quality control and mitigation of disease transmission.

There are various products available on the market, but the general cost range is \$2,000-\$3,000. These products all feature a vacuum motor, an arm with tubing or articulation with the ability to bring the vacuum close to the operative site. They all include HEPA filtration, and some have included UVC lighting. Maintenance and cleaning procedures vary from one manufacturer to another. These units are louder than room air purification systems, typically between 50-75 decibels. They also occupy a significant amount of space, so consideration of the operatory floor plan is necessary.

Additional references and studies are provided that have effectively demonstrated the foundation for the rationale behind using extraoral vacuum aspirators as one of several strategies to decrease the amount of airborne pathogens, such as the SARS-CoV-2 virus.

### Extraoral vacuum aspirator (EOVA) products

Company Name	Model Name	Model Number	Suction Rate	Voltage	Power	Noise	Dimensions	HEPA Efficiency	Other
<b>ADS (Ajax)</b>	EOS Extraoral Suction System		2973 L/min (10 levels)	AC110 60 Hz	1160W	58 dB	10.8 x 10.8 x 38.9 inches	H14 99.995%	UVC light
<b>DentAirVac</b>	Turbo Aerosol Evac System	DAV VII	770 cfm	60 Hz		68 dB	12 x 12 x 15 inches	HEPA	
<b>Dynamic</b>	Extraoral Suction Unit	DS1000	3000 L/min	110-120V	1200W	<60 dB	12.9 x 12.9 x 33.5 inches	99.97%	Plasma sterilization (80 million)
<b>JK Dental Group</b>	Chairside Aerosol Suction		3900 L/min (1-12 levels)	120V 50/60 Hz	1500W	69 dB	10.6 x 11.4 x 29.5 inches	HEPA13, Super BioFilter	UVC + Plasma light
<b>Quatro</b>	MedEvac	ME500-16	1700 L/min			“Whisper quiet”	26 x 13 x 16 inches	HEPA	Lab application
<b>Vaniman</b>	Vanguard Gold Mobile	10337	2831 L/min (3 levels)	120V		53 dB	14 x 10.5 x 14.5 inches	HEPA	

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<sup>1</sup> **A pilot study of bioaerosol reduction using an air cleaning system during dental procedures.** C. Hallier,1 D. W. Williams,2 A. J. C. Potts,3 and M. A. O. *Br. Dent J.* 2010; 209(8): E14.

<sup>2</sup> **Aerosols and splatter in dentistry.** A brief review of the literature and infection control implications. S. K. Harrel, John Molinari, PhD. *J Am Dent Assoc.* 2004 Apr; 135(4): 429–437.

<sup>3</sup> **Effectiveness Evaluation of Different Suction Systems.** Jonas Junevičius, Algimantas Šurna, Rimas Šurna *Stomatologija. Baltic Dental and Maxillofacial Journal.* 7:52-7. 2005.

<sup>4</sup> **The usefulness of the modified extra-oral vacuum aspirator (EOVA) from household vacuum cleaner in reducing bacteria in dental aerosols.** Teanpaisan R1, Taeporamaysamai M, Rattanachone P, Poldoung N, Srisintorn S. *Int Dent J.* 2001 Dec;51(6):413-6.

<sup>5</sup> **How much Extra-Oral Suction (EOS) can prevent dental aerosols?** Motegi et al. *Dental Outlook.* Vol 115, No. 6. 2010-6.

<sup>6</sup> **Airborne Contamination in the Dental Operating Room.** Tamazawa et al. *The Japanese Journal of Medical Instrumentation.* Vol. 84, No. 5 (2014).