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Letter to the Editor

Comparison of negative pressure performance between certified and counterfeit suction-based devices

To the editor,

Suction-based devices represent an alternative method for relieving foreign body airway obstruction (FBAO).[1–3] Unlike guideline-advised maneuvers,[4] which generate positive pressure within the airway, these devices create negative pressure in the oral cavity proximal to the obstruction.[5,6] In recent years, thousands of counterfeit suction-based devices have been sold on online marketplaces, with notable differences from certified suction-based devices in their construction, appearance, and labeling.[7] The aim of this study was to compare the suction generated by certified suction-based device and uncertified counterfeit alternative.

We conducted an experimental study using a Little Anne manikin (Laerdal Medical, Norway) whose airway was modified to allow negative pressure measurements. An oxygen connector tube was firmly attached to the manikin's airway, and the junction was sealed with silicone to create an airtight system. The distal end of the tube was connected to a digital pressure sensor integrated into a computer-based measurement system (Vernier, USA). The sensor was linked to a laptop computer (Hewlett-Packard, USA) running Logger Pro 3.16.2 data-acquisition software (Vernier, USA), which recorded negative pressure relative to atmospheric pressure during device activation. We tested a certified LifeVac suction-based device (LifeVac, USA) and a visually similar uncertified counterfeit alternative. Ten laypeople performed ten obstruction-removal attempts with both devices. Negative pressure was sampled at 0.01 s intervals (100 Hz). For each maneuver, the pressure–time curve was inspected, and the peak negative pressure was manually identified using Logger Pro 3.16.2 (Vernier, USA). The pressure drop relative to atmospheric pressure was expressed as Δp, and the primary outcome was the absolute value of the peak pressure drop (peak $|\Delta p|$). For each participant and device, the mean peak $|\Delta p|$ across ten trials was calculated and used for statistical comparisons. Participant-level means ($n = 10$ paired observations) were compared using a paired t-test (two-tailed, $\alpha = 0.05$). Statistical analyses and graphing were performed using OriginPro 8.5 (OriginLab Corporation, USA).

The certified LifeVac device generated substantially higher peak $|\Delta p|$ values than the counterfeit device (20.5 ± 7.6 kPa vs. 8.2 ± 3.9 kPa; mean difference 12.3 kPa, 95 % CI 9.2–15.4 kPa; paired t-test, $t(9) = 8.9$, $p < 0.001$), corresponding to 154 ± 57 mmHg vs. 62 ± 29 mmHg. Thus, LifeVac produced approximately 2.5-fold higher suction than the counterfeit suction-based device (Fig. 1).

Recent simulation studies[5,6] have reported suction negative pressures for the LifeVac that are similar to ours but not as high as those observed in cadaver models[8] or could not be reliably measured in cadavers because they lack dynamic airway pressures, secretions, and esophageal tone needed for effective negative-pressure generation.[9] To our knowledge, no previous study has measured the suction performance of counterfeit suction-based devices, for which we demonstrated substantially lower values. Given their inadequate negative pressure performance, counterfeit suction-based devices may fail to function effectively[7,10] and could potentially push the obstruction further into the airway.

CRediT authorship contribution statement

Nino Fijačko: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Visualization, Writing – original draft, Writing – review & editing. **Špela Metličar:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. **Inja Dokl:** Conceptualization, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review & editing. **Aleš Fajmut:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Visualization, Writing – original draft, Writing – review & editing.

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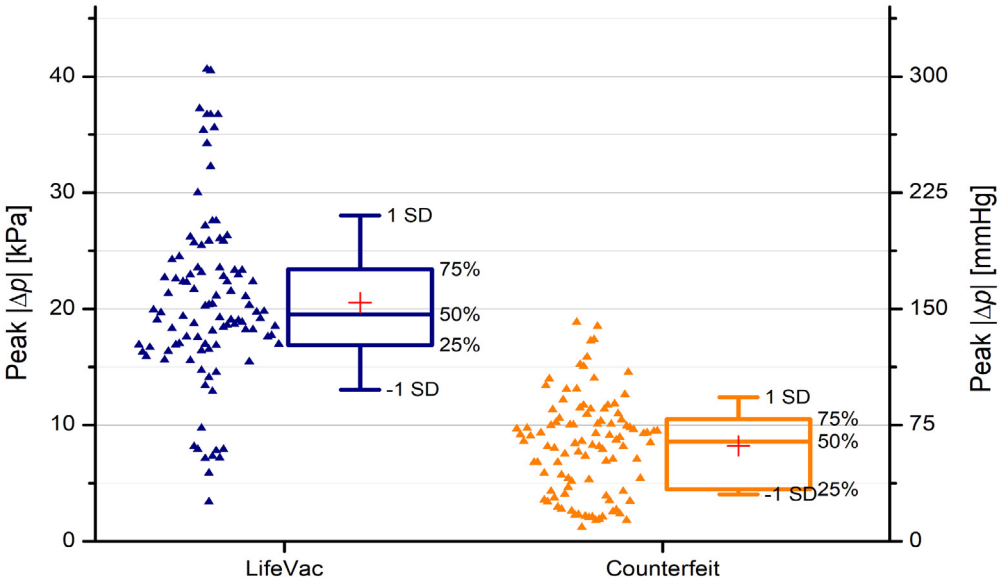

Fig. 1 – Peak |D*p*| (absolute value of the peak pressure drop relative to atmospheric pressure) generated by the certified LifeVac anti-choking suction device (blue) and a visually similar uncertified counterfeit device (orange). Each triangle represents one obstruction-removal attempt (10 participants × 10 trials per device; total 100 measurements per device). Boxplots, based on participant-level mean values (***n*** = 10 per device), show the median (horizontal line), interquartile range (25–75 %; box), and whiskers at ±1 SD; the red cross indicates the mean. The left ***y***-axis shows peak |Δ***p***| in kPa and the right ***y***-axis in mmHg. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Declaration of competing interest

Nino Fijačko is a member of the ERC BLS Science and Education Committee. Other authors declare that they have no conflict of interest.

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REFERENCES

1. Galarreta-Aperte S, Domínguez-Vías G, González-Díaz A, Lazo-Caparrós MD, Ramón-Arbués E, Gómez-Torres P. Efficacy of antichoking suction devices versus traditional techniques: a systematic review and meta-analysis. J Emerg Nurs 2025. https://doi.org/10.1016/j.jen.2025.10.003.
2. Paludi MA, Palermo N, Limonti F, Semeraro A, Ermanno D, Ganzino S, et al. A systematic review on suction-based airway clearance devices for foreign body airway obstruction. Int Emerg Nurs 2025;79:101575. https://doi.org/10.1016/j.ienj.2025.101575.
3. Couper K, Hassan AA, Ohri V, Patterson E, Tang HT, Bingham R, et al. Removal of foreign body airway obstruction: a systematic review of interventions. Resuscitation 2020;156:174–81. https://doi.org/10.1016/j.resuscitation.2020.09.007.
4. Djärv T, Rogers J, Semeraro F, Brädde L, Cassan P, Cimpoesu D, et al. European Resuscitation Council guidelines 2025 first aid. Resuscitation 2025;215. https://doi.org/10.1016/j.resuscitation.2025.110752.
5. Abelairas-Gómez C, Espinosa-Pereiro C, Carballo-Fazanes A, García-Martínez M, Beiroa R, Agra-Tuñas C, et al. How much negative pressure can anti-choking devices generate? A preliminary study comparing LifeVac, modified Dechoker, and Rescair. Resuscitation 2025;215:S187. https://doi.org/10.1016/S0300-9572(25)00731-2.
6. Hristonof MLS, Amantéa MC, Lazzaretti FJ, Bernardes MM, Xavier LF, Amantéa SL. Comparative efficacy of LifeVac® and Heimlich maneuver in simulated airway obstruction. J Pediatr (Rio J) 2025;101:473–8. https://doi.org/10.1016/j.jped.2025.02.002.
7. Metličar Š, Fijačko N. Counterfeit anti-choking suction devices: prevalence and risks on online marketplaces. Resusc Plus 2025;22:100899. https://doi.org/10.1016/j.resplu.2025.100899.
8. Juliano M, Domingo R, Mooney MS, Trupiano A. Assessment of the LifeVac, an anti-choking device, on a human cadaver with complete airway obstruction. Am J Emerg Med 2016;34:1673–4. https://doi.org/10.1016/j.ajem.2016.03.047.
9. Haupt TL, Chionis L, Wang KH. Clearing the airway? A pilot cadaveric study of the LifeVac™ device. Resusc Plus 2025;26:101099. https://doi.org/10.1016/j.resplu.2025.101099.
10. Product recall: counterfeit anti-choking devices (2405-0111). GOVUK; n.d. https://www.gov.uk/product-safety-alerts-reports-recalls/product-recall-counterfeit-anti-choking-devices-2405-0111 (accessed December 4, 2025).

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