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ACCEPTABILITY OF CONVENTIONAL AND UPRIGHT NEONATAL RESUSCITATORS

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INTRODUCTION

The World Health Organization (WHO) recommends using a self-inflating bag and mask for neonatal resuscitation in resource-limited settings.[1] Previous studies have suggested that an innovative upright resuscitator offers advantages over conventional designs.[2,3] At peripheral health centers, health workers have limited opportunities to practice neonatal resuscitation in live settings. We conducted a comparative user evaluation to determine if less experienced health workers in a resource-limited setting could benefit from the innovative upright resuscitator design over the standard in delivering adequate ventilations.

METHODS

Health workers from peripheral health centers in UP, India compared the performance and acceptability of the new Laerdal® 320-mL Upright Resuscitator, with a redesigned mask size 1, against a conventional resuscitator design, the 500-mL pediatric model of the Laerdal® Silicone Resuscitator with mask size 1. A 500-mL resuscitator is representative of resuscitators currently used in peripheral health centers in India. Participants were either inexperienced or experienced users. They evaluated both devices in random order on a manikin connected to a test lung that simulated a 3-kg asphyxiated newborn in two consecutive lung settings: fluid-filled lungs (low compliance) and lungs after fluid absorption (normal compliance).

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2. Coffey P, Saxon EA, Narayanan I, DiBlasi RM. Performance and acceptability of two self-inflating bag-mask neonatal resuscitator designs. *Respiratory Care*. 2015;60(9):1227–1237.

3. Thallinger M, Ersdal HL, Ombay C, Eilevstjønn J, Størdal K. Randomized comparison of two neonatal resuscitation bags in manikin ventilation. *Archives of Disease in Child Fetal & Neonatal Edition*. 2016;101(4):F299–F303.

RESULTS

Sixty health workers participated in the study. There were no significant differences in the overall performance of the devices (peak inspiratory pressure, mean tidal volume, mean ventilation rate) when analyzing both lung conditions together, and both designs provided the required minimum tidal volumes. During normal compliance, both resuscitators delivered excessive tidal volumes (>45 mL) compared to during low compliance. The upright resuscitator was easier to use, had significantly higher acceptability across all 14 ergonomic measures by both types of users, and was identified as the preferred device by the majority of users.

Acceptability of devices

	Device acceptability (mean ± standard deviation)		
Variable	Upright	Conventional	P value
Apparent durability	4.4 ± 0.7*	3.6 ± 0.7*	< .001†
Size of bag	4.5 ± 0.7*	3.3 ± 0.8	< .001†
Orientation of bag to mask stem	4.5 ± 0.6*	3.2 ± 0.8	< .001†
Size of mask	4.5 ± 0.7*	3.3 ± 0.8	< .001†
Shape of mask	4.5 ± 0.7*	3.3 ± 0.8	< .001†
Feel of material	4.4 ± 0.7*	3.5 ± 0.8	< .001†
Ease of holding mask	4.6 ± 0.6*	3.1 ± 1.0	< .001†
Ease of holding bag	4.8 ± 0.5*	3.3 ± 1.0	< .001†
Comfort during use	4.7 ± 0.5*	3.3 ± 0.9	< .001†
Ease of use (general)	4.7 ± 0.5*	3.4 ± 0.8	< .001†
Ease of ventilation	4.6 ± 0.6*	3.6 ± 1.0	< .001†
Ease of rate	4.5 ± 0.6*	3.5 ± 1.0	< .001†
Ability to observe chest rise	4.5 ± 0.7*	3.8 ± 0.9	< .001†
Fatigue during use	4.5 ± 0.6*	3.3 ± 1.2	< .001†

Device acceptability was rated on a scale of 1 to 5: 1 = very poor and 5 = excellent, except for the variable "fatigue during use," for which 1 = too much and 5 = none (N = 60).

* Data missing for one participant.

† Significant p values (P < .05). Comparison of means between devices was determined using unpaired t-test.

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Laerdal® Silicone Resuscitator, 500-mL pediatric model (left); 320-mL Laerdal® Upright Resuscitator (right).

CONCLUSIONS

Both the 320-mL upright and conventional 500-mL resuscitators are able to deliver minimum required tidal volumes; however, WHO currently recommends bag volumes of 200 mL to 320 mL for neonatal resuscitation.[4] Their overall similar performance suggests that either resuscitator is suitable for all types of users. The high acceptability of the upright resuscitator among the study population and its simpler maintenance features suggest that the upright is especially suitable for inexperienced users within the India context and, potentially, in other resource-limited settings.

DISCLOSURE

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4. World Health Organization. *WHO Technical Specifications of Neonatal Resuscitation Devices*. Geneva: WHO; 2016. Available at: apps.who.int/medicinedocs/documents/s22389en/s22389en.pdf.