anterior horn cell loss begins in early infancy and may possibly account for distal hypotonia and hyperlaxity. Hyperlaxity, especially of upper limb joints may persist till adulthood in more than half of patients [4]. It is perplexing to see that this finding was not captured in major prospective cohorts of SMA type 2 and 3, which predominantly addressed the weakness and ambulation. This finding needs to be further confirmed in large cohorts not only because of diagnostic significance but also for rehabilitation point of view, considering the improved outcomes with newer therapies in SMA.

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resuscitation was developed. The 15-minute simulation was run

NeoBox - A Multipurpose Aerosol Box for Neonatal Care DuringCOVID-19 Pandemic

Safety of the newborn and the protection of healthcare workers (HCWs) from aerosol exposure are extremely important during the current severe acute respiratory illness coronavirus 2 (SARS-CoV-2) pandemic. Use of personal protective equipment (PPE) has been shown to be associated with a reduced risk of infection [1]. As per WHO guidelines, it is mandatory to use personal protective equipment (PPE) while performing aerosol-generating procedures like suction, intubation, chest compression *etc.* [2,3]. However, despite the use of PPE, there remains a possibility that aerosols can contaminate nearby surfaces [4]. An aerosol box acts as a physical barrier against the aerosol spread [4,5]. PPE with a barrier enclosure like an aerosol box can be an effective measure to minimize aerosol spread and exposure during this pandemic [2,4].

Recent literature reports that when an aerosol box was used for airway management, the inner surface of the box and the laryngoscopist's gloves and gowned forearms were observed to be contaminated [4], but no macroscopic contamination outside the box was observed [4]. Unlike adult resuscitation, the focus of newborn resuscitation is effective ventilation of baby's lungs which includes aerosol-generating procedures like suction, PPV, using continuous positive airway pressure, intubation, chest compression, etc. [6,4]. To see the feasibility of using the standard aerosol box as a barrier enclosure while performing aerosol-generating procedures on neonates, a novel simulation session integrating a newborn delivery of a suspect or confirmed COVID-19 mother with a subsequent need for neonatal with two resident doctors, an embedded simulation nurse, and a low fidelity manikin in the delivery room setting. The 'newborn' was a low fidelity simulator (Laerdal Medical). During simulation sessions, accessing the neonate and performing resuscitation steps in the squared aerosol box was observed to be impossible. After completion of each session, the learners were debriefed using the PEARLS Healthcare Debriefing Tool with plus/delta and advocacy enquiry format by a trained simulation leader [8,9]. Difficulties were encountered at all steps of resuscitation like - attaching pulse oximeter, performing positive pressure ventilation, intubation, chest compression and umbilical catheterization, etc. These difficulties were addressed and the need for a modified aerosol box for neonates was informed to the biomedical department of our institute. The box underwent multiple modifications based on the feedbacks received. The final design specifications were given (Web Table I) and the NeoBox was developed (Fig.1).

The NeoBox is made up of a transparent polycarbonate (3 mm thick). The material required was procured and necessary fabrications were done by the local acrylic / polycarbonate sheet fabricator. The average time required to make one NeoBox was approximately 4 hours. The cost was Rs 6500. An alcohol based disinfectant (Ethanol 70%) with a contact time of minimum 1 minute is used to clean the NeoBox [10].

The NeoBox was primarily designed as a physical barrier to prevent aerosol exposure and spread while performing aerosolgenerating procedures during resuscitation in delivery room. While running simulation sessions, its wider application for neonatal care like transporting a suspected or confirmed COVID-19 neonate from one place to another (intra hospital transport) and caring for them in the neonatal intensive care unit (NICU) while performing aerosol-generating procedures was recognized. Use of NeoBox in addition to PPE helped boosting HCWs confidence for managing suspected or confirmed COVID-19 neonates. We found that the NeoBox would require training before use in the treatment of patients. Wearing PPE is

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Fig. 1 NeoBox with dimensions.

must for HCWs while performing aerosol-generating procedures in a suspected or confirmed COVID-19 neonate. NeoBox works as a physical barrier to prevent aerosol spread. However, in case of difficulty it is advised to remove the NeoBox and perform intubation.

We propose the NeoBox as an additional protection, and suggest that it may be considered to be an adjunct to standard PPE for managing suspected COVID-19 newborns in delivery room (*Fig.* 2). It can also be used as a barrier enclosure during intrahospital transport and while performing aerosol-generating procedures in the NICU.

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Fig.2 NeoBox in delivery room – resuscitator managing airway.

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Simulation scenario	Delta	Development of NeoBox				
Scenario 1	Size of the box was too big to fit under radiant warmer	NeoBox's base dimensions were determined by taking measurements of warmer bed (NeoBox base dimensions : Warmer bed length - 10 cm, Warmer bed breadth - 10 cm)				
Scenario 2	Difficulty in accessing newborn's air- way due to the straight front surface.	The aerosol box was flattened and angulated at the top to provide clear vision to the person performing intubation.				
	Difficult to access newborn's airway due to it's inconveniently located ports	The lower border of two semicircular ports on the front side was lowered.				
Scenario 3	Need for extra ports on both sides in case baby needs advanced resuscitation	Two ports were incorporated on either side of the box. The distal port was designed to be bigger (oval in shape) than the proximal one (circular in shape) for the easy access during procedures.				
	Confusion in positions of the resusci- tator while performing resuscitation	If the baby needs initial steps of resuscitation: The resuscitator stands at the head end and the assistant if any stands on the right side.				
		 If the baby needs advanced steps of resuscitation: (i) Instead of AMBU bag, T piece resuscitator will be used as the bag would need lot of space. (ii) Intubation will be performed from the head end. (iii) The resuscitator will shift to the left side while providing PPV through ET. (iv) Second resuscitator will provide chest compressions from head end. (v) Third resuscitator will perform umbilical catheterization from right side 				
Scenario 4	How to cover ports to minimize aerosol spread during intra hospital transport?	Polycarbonate flaps were prepared to cover side ports and a square polycarbonate sheet was made to cover front side. One can use polyethylene wrap to cover the ports and front side.				

Web	Table	I Difficulties	Encountered b	y Learners	During	Simulation	Sessions	and Develop	pment of Neo	Box