Ventilation on a PEEP/FIO_2 Combination Table in Children with Pediatric Acute Respiratory Distress Syndrome

Herng Lee Tan[1]; Yi-Jyun Ma[1]; Siew Wah Lee[3], Apollo Bugarin Aguilan[1]; Yee Hui Mok[1,2]; Jan Hau Lee[1,2]; Judith Ju-Ming Wong[1,2]
[1]Children's Intensive Care Unit, Department of Pediatric Subspecialties, KK Women's and Children's Hospital. [2]Duke-NUS Medical School, Singapore. [3]Pediatric Intensive Care Unit, Hospital Kuala Lumpur, Malaysia.

Introduction

- Limited data evaluating the use of PEEP/FIO_2 combinations in pediatric patients
- Aim: Describe PEEP/FIO_2 use in pediatric ARDS (PARDS) patients in relation to a PEEP/FIO_2 table modified from the ARDSNet protocol in the first 7 days of PARDS

Methods

- Post-hoc analysis of data from a before-and-after comparison study of lung protective mechanical ventilation (MV) strategy in children with PARDS
  - Study period January 2016 to June 2019
- Time-matched PEEP and FIO_2 combinations for the first 7 days of ARDS were described in relation to the protocol
- Modified PEEP/FIO_2 table

FIO_2	0.30	0.40	0.40	0.50	0.50	0.60	0.70
PEEP	5	5	8	8	10	10	10
FIO_2	0.70	0.70	0.80	0.90	0.90	0.90	1.0
PEEP	12	14	14	14	16	18	18

- PEEP/FIO_2 score = Median difference between the set PEEP and recommended PEEP for a given FIO_2 was calculated
- Logistic regression was used for the main outcome of PICU mortality adjusting for low tidal volume ventilation (3-6mL/kg)

Results

- 115/137 (83.9%) children with PARDS required at least one conventional MV day
- Median OI on day 1 was 9.4 (IQR: 7.1, 14.4)
- There were a total of 522/814 (64.2%) conventional MV days
- PEEP/FIO_2 score was on target in 25/115 (21.7%), below target in 33/115 (28.7%) and above target in 57/115 (49.6%)
- After adjustment for low tidal volume ventilation, the PEEP/FIO2 score was not significantly associated with mortality [OR 0.83 (95%CI 0.68, 1.03)]

Table 1. Patients' Demographics

Characteristics	Adequate PEEP (n=82)	Inadequate PEEP (n=33)	P value
Age, years	2.8 (0.4, 10.5)	1.4 (0.5, 4.4)	0.397
Male	49 (59.8)	20 (60.6)	0.933
Comorbidities	54 (65.9)	24 (72.7)	0.475
Extrapulmonary	18 (22.0)	8 (24.2)	0.790
PIM 2	7.1 (3.8, 16.9)	8.4 (3.3, 20.3)	0.778
PELOD	10 (2, 21)	4 (2, 12)	0.355
OI on D2	**5.9 (4.3, 9.5)**	**10.4 (6.8, 21.2)**	**<0.001**
HFOV	**10 (12.2)**	**17 (51.2)**	**<0.001**
Pulmonary vasodilator	**6 (7.3)**	**14 (42.4)**	**<0.001**
Prone	27 (32.9)	9 (27.3)	0.554
Steroids	39 (47.6)	20 (60.6)	0.206
Neuromuscular blockade	**17 (20.7)**	**15 (45.5)**	**0.007**
Transfusion	**42 (51.2)**	**26 (78.8)**	**0.007**
Air leak	5 (6.1)	5 (15.2)	0.119
Multiorgan dysfunction	65 (79.3)	29 (87.9)	0.280
Mortality	15 (18.3)	9 (27.3)	0.284
Ventilator duration, days	6 (4, 12)	9 (4, 19)	0.224
PICU duration, days	9.5 (5, 15)	11 (5, 26)	0.623

Discussion

- Patients who had a greater oxygenation deficit were getting PEEP below what was recommended.
- PEEP below recommended may be at higher risk of mortality

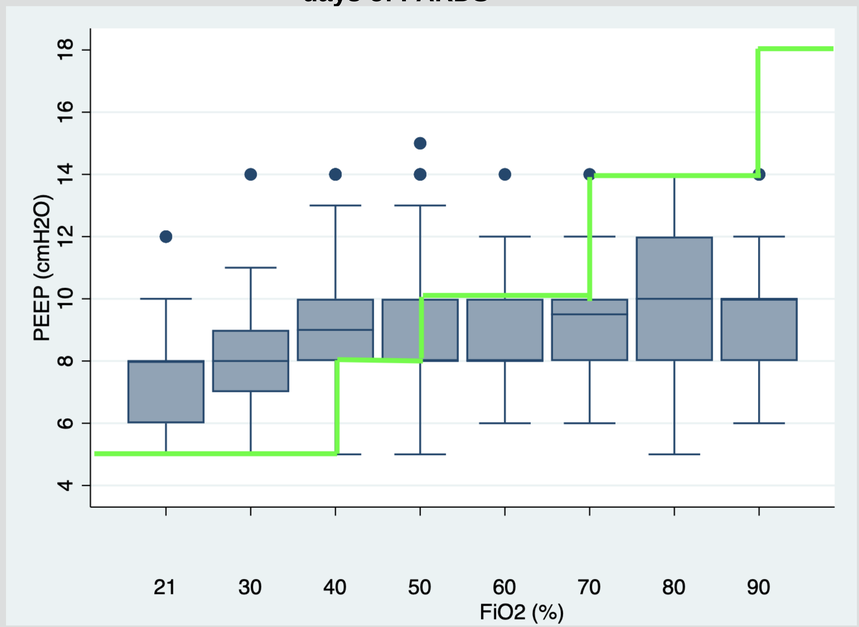
Conclusion

- A PEEP/FIO_2 combination table adapted from the ARDSNet protocol was not associated with improved survival

Disclosure

- All authors have no conflict of interest and nil financial support to declare

Figure 1. Time-matched PEEP/FIO_2 combinations over the first 7 days of PARDS



Green line – superimposed PEEP/FIO_2 combination recommended by the modified ARDSNet protocol

Figure 2. Distribution of Median PEEP/FIO_2 Scores and Mortality