A META-ANALYSIS OF DIAGNOSTIC ACCURACY USING ROX INDEX TO PREDICT HIGH-FLOW NASAL CANNULA (HFNC) THERAPY FAILURE IN PEDIATRIC PATIENTS

Diane Sharon Ty, MD
Alice Ilagan-Herico, MD, FPPS, FSPCCMP

Philippine Children's Medical Center

Optimizing respiratory support strategies is paramount in achieving improved clinical outcomes in pediatric critical care. While the use of HFNC has led to a decreased number of patients using invasive ventilation, its use may delay appropriate intervention leading to a poorer prognosis. Here lies the challenge in identifying the point at which HFNC is no longer effective. Roca et al developed the ROX index to objectively assess HFNC failure risk. Currently, there is yet to be a universally accepted protocol for ROX use in pediatrics.

A literature search was performed in electronic databases for reports published until September 2023. Reports were screened, examined, and validated by 2 independent reviewers. QUADAS-2 was used to analyze risk for bias.

Keywords:
High flow nasal cannula, respiratory failure, ROX index, pediatric, accuracy

A total of 120 citations were identified, only five reports were included for analysis. Below is the summary table of pooled data based on different time-points. The results for the 6th hour of HFNC therapy revealed the highest accuracy with high sensitivity. This is consistent with other studies on adults which observed significant implications for the 6th hour ROX index. The results also show that as HFNC duration increased, the accuracy of ROX index increased. This is consistent with the observation of Roca et al that patients who failed HFNC therapy had only minimal improvement in their ROX index over time.

Time Point	Sensitivity	I^2	Specificity	I^2	Accuracy
1st hour	0.53 (0.43-0.63)	89.44	0.75 (0.53-0.88)	97.4	0.62 (0.58-0.66)
2nd-4th hour	0.98 (0.28-1.00)	98.7	0.49 (0.36-0.63)	88.9	0.61 (0.57-0.66)
6th hour	0.85 (0.63 to 0.95)	98.1	0.452 (0.29 to 0.74)	98.8	0.75 (0.71-0.7)
>6 hours	0.69 (0.38 to 0.88)	98	0.452 (0.53-0.81)	95.7	0.74 (0.69-0.77)

This study shows that the ROX index may be used to predict HFNC failure in children. It is more beneficial to record the ROX index at 3 time points, observe for variations and decide on the 6th hour whether or not to escalate therapy.