ESTABLISHING A RISK SCORE TO PREDICT VENTILATOR DEPENDENCE AFTER PEDIATRIC LIVER TRANSPLANTATION.

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BACKGROUND

Children with end stage liver disease and multi system organ failure may require prolonged mechanical ventilation (PMV) after liver transplantation (LT), which is associated with higher morbidity and mortality.
Though well studied in adults, incidence, risk factors and outcomes of PMV are not well characterized after pediatric LT.

PURPOSE

1. To characterized incidence and outcomes of PMV after pediatric LT.
2. To identify preoperative risk factors for PMV after pediatric LT.
3. To develop and validate a risk score to predict PMV after pediatric LT

METHODS

- **Type of Study:** Retrospective cohort analysis.
- **Inclusion criteria:** All children (<18 years) who received LT between 2014-2019 at a quaternary children's hospital with a dedicated liver intensive care unit (ICU).

- **Definitions:**
  - PMV= Ventilation >7days post-LT.

- **Analysis:**
  - **Fisher Exact and Mann-Whitney tests** to measure the strength of univariable associations.
  - Independent risk factors were identified using **multivariable logistic regression** and the regression coefficients were applied to assign risk scores. The scores were adjusted by proportion to the beta coefficient in the regression model.
  - **The receiver operating characteristic (ROC) curves** were generated to calculate AUC in the derivation group (LTs done in 2014-2019) and to evaluate the performance of risk score among the validation group (LTs done in 2012-13, 2020-21).

Table: Independent risk factors for PMV after pediatric LT.

n=195	Multivariable	Score
Variable	OR (95% CI)	Range= 0-6
Pre-LT CRRT	5.8 (1.5 – 22) *	1.5
Age < 1 year	5.8 (2 – 16) *	1.5
Cirrhosis	3.3 (1.2 – 8.9) *	1
MIH before LT	9.3 (3.4 – 25.6) *	2

*p < 0.05; CI: confidence intervals; OR: Odds Ratio.

Figure-A: **ROC Curve** depicting AUC 0.86 in the derivation cohort (left) and 0.81 in the validation cohort (right) when the risk score was applied; p=<0.05.

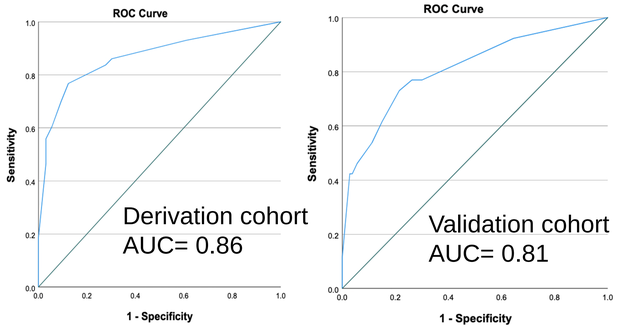
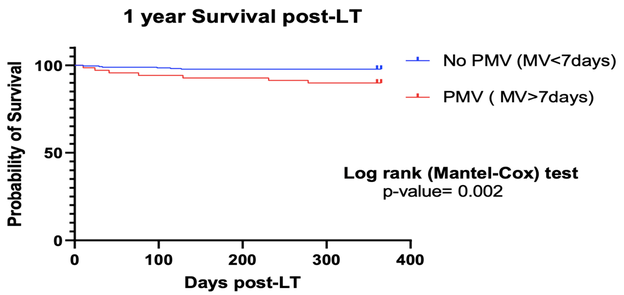


Figure-B: **Kaplan-Meier Curve** depicting lower 1-year probability of survival among patients who required PMV (MV>7days) after pediatric LT .



RESULTS

- Total patients in derivation cohort=195; ♀ = 54%; Median age at LT= 45 mo [14-131].
- 18% (n=37) were < 1-year age, 48% (n=95) had cirrhosis, 10% (n=20) required continuous renal replacement therapy (CRRT) and 31% (n=62) required medical management in hospital (MIH) before LT.
- Incidence of PMV= 26% (n=51); 7% (n=14) required tracheostomy post-LT.

- On multivariable logistic regression, cirrhosis, preoperative CRRT, age <1 year and MIH before LT were significantly associated with the need of PMV (**Table**).
- **Scores assignment:** Cirrhosis=1-point, preoperative CRRT= 1.5-points, age <1-year= 1.5-points and MIH before LT= 2-points (score range= 0-6). Score of >3.5-points had 100% sensitivity and 88% specificity to predict PMV. (**Table**).

- When the risk score was applied, AUC in the derivation group was 0.86 (p< 0.05) and in the validation group (n=126) was 0.81 (p< 0.05). **(Figure-A).**
- PMV group was associated with prolonged ICU length of stay (LOS) (34 [19-69] vs 3 [2-5] days, p<0.05), hospital LOS (103 [50-149] vs 13 [8-21] days, p<0.05), and lower 1-year post LT survival (86.3% vs 98.6%, p< 0.05) **(Figure-B).**

CONCLUSION

- Independent risk factors for PMV after pediatric LT are cirrhosis, preoperative CRRT, age < 1 year and MIH before LT.
- The risk score can be used to identify patients at high risk of PMV before LT.
- Larger, multi-institutional prospective studies may be required to validate this score for prediction of PMV.

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