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**TITLE:** AIMING FOR ZERO! REDUCING UNPLANNED EXTUBATIONS IN A "GREENFIELD" SINGLE-FAMILY ROOM QUATERNARY NICU.

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**CONTENT:**

An unplanned extubation (UE) is defined as dislodgement of the endotracheal tube (ETT) from the trachea in a patient receiving invasive mechanical ventilation at a time not specifically intended. UE can result in significant adverse events, especially in neonates. The international benchmark for pediatric patients is <1 UE per 100 ventilator days. The rate of UE was unacceptably high following activation of Sidra Medicine NICU services. This was a “greenfield” NICU, integrating heterogeneous practices within a highly skilled, but multi-national workforce. Within a quality improvement project, factors associated with UE were identified and a “prevention of UE” care bundle was implemented.

All UE in NICU from March to November 2018 were retrospectively studied. A standardized assessment form was used to investigate each UE event and the most common risk factors for UE were identified by a multidisciplinary working group. Data collected included gestation, birth weight, position of ETT, route of intubation, fixation device, sedation, time of day and patient care activity at the time of the event. An UE prevention bundle was formalized which included a bedside ETT care checklist, uniform ETT securement along with staff education focused on appropriate positioning and management of agitation. A 3 month prospective review of the quality improvement measures was undertaken following the introduction of the prevention bundle, and the UE trends over the two epochs were compared.

44 UEs occurred in 182 intubated patients throughout the study period. There was no significant difference in the demographic characteristics of the patients intubated across the two epochs. Mean duration of ventilation per patient was 6.5 days. The most common risk factors associated with UE were suboptimal sedation, lack of personnel when performing complex procedures on the infant, inconsistent ETT securement and lack of regular surveillance of tube fixation. Following the implementation of the prevention bundle in December 2018, UE has decreased from a peak of 6.33 per 100 patient ventilated days in May 2018 to 0.7 in February 2019 (Fig 1).

High UE rates in a "greenfield" NICU can be reduced by implementing a bundle of interventions supplemented by intensive staff education and surveillance to decrease variability of care practices. A decrease in UE rates was noted over 3 consecutive time points and sustaining this trend is the next challenge. Establishing the right team culture towards patient safety was a key factor in the improvement of this critical quality of care metric.
Fig 1. Trend of unplanned extubation (UE) rate from March 2018 to February 2019. Yellow arrow refers to the time when UE prevention bundle was introduced.

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**TITLE:** INDIVIDUAL RISK PREDICTION FOR SIGHT-THREATENING RETINOPATHY OF PREMATURITY USING BIRTH CHARACTERISTICS AND LONGITUDINAL SCREENING DATA

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**CONTENT:**

Retinopathy of Prematurity (ROP) is a disease potentially leading to blindness which may be prevented by timely treatment. In Sweden, all infants born at a gestational age (GA) <31w are screened for ROP, only ~6% are treated. Recently, our group created and validated an easily accessible prediction model for ROP treatment, DIGIROP-Birth, based on infants’ birth characteristics aimed for use at an early stage of screening (www.digirop.com). As more screening data is gathered better individual predictions might be done. The aim of this study was to create and validate a statistical model, DIGIROP, predicting ROP treatment for GA 24-30w using both birth characteristics and ROP screening results.

Data was retrieved from the Swedish National Patient Registry for ROP (SWEPROP) (N=9135, 2007-2018). Of 7361 (80.6%) infants born at GA 24-30w, 129 (1.8%) were excluded for incomplete data, leaving 7232 (98.2%) in the analyses. Using multivariable Poisson regression for time-varying data momentary individual hazard functions and cumulative risks with 95% CI were estimated for ROP treatment. Predictors were postnatal age (PNA), GA at birth, sex, birth weight SDS, time-updated maximal ROP stage (no ROP/Stage 1+2/Stage 3), and significant interactions. Internal and external validation was performed by ROC analysis, cross-validation and calibration plots. Cut-offs to achieve 100% sensitivity were obtained. Comparison to other models was done and a ROP screening program suggested.

Of 7232 infants, 3956 (54.7%) were boys, mean GA was 28.3w, mean birth weight 1146g, 2104 (29.1%) had any ROP and 300 (4.1%) were treated. Nasal ROP at first diagnosis was observed in 735 (34.9%) infants. Among treated infants ROP progression through stages 1 or 2 to 3 was documented in 78 (26.0%). DIGIROP had an AUC of 0.97 in both internal (cut-off 0.0656 achieved 100% sensitivity and negative predictive value [NPV], 76.3% specificity, 15.5% positive predicted value [PPV]) and temporal validation compared to AUC 0.90 obtained in DIGIROP-Birth model using only birth characteristics (Figure 1). The AUC was 0.92 using data known up to 8w PNA (cut-off 0.0066 achieved 100% sensitivity and NPV, 51.4% specificity, 8.2% PPV), and 0.96 for data known up to 12w PNA (cut-off 0.0182 achieved 100% sensitivity and NPV, 62.1% specificity, 10.3% PPV).

An update of our DIGIROP-Birth individual prediction model for infants developing ROP needing treatment has been done, including longitudinal data on ROP progression, and successfully validated by internal and external validation. DIGIROP is a strong competitive ROP treatment prediction model compared to other models currently available.
Images:
https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=094c66214d8997697f5d11be67a1846-MjAxOS0wNSM1Y2UyNjY2YzkyNjQz

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