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0001

Prediction model for nosocomial pulmonary aspiration in patients needing ICU admission

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INTRODUCTION. Pulmonary aspiration syndrome is the principal cause of ARDS and nosocomial pneumonia, which increase hospital morbidity, mortality and healthcare costs. Previous attempts to identify the risk factors for overt nosocomial aspiration were not systematic.
OBJECTIVES. To derive and validate comprehensive prediction model for overt nosocomial pulmonary aspiration. We hypothesized that such prediction model will show adequate discrimination and calibration in historical patient cohorts.
METHODS. A retrospective case-control study of consecutive adults admitted to Mayo Clinic hospital in Rochester, MN from 2006 through 2015. Nosocomial aspiration was defined using a novel electronic medical record-based diagnostic algorithm (termed "aspiration sniffer") based on natural language processing of clinical notes[1]. The patients who screened positive for aspiration and who were either in the ICU within 48 hours before aspiration or required ICU care within 48 hours after aspiration, were enrolled and split into the derivation and the validation cohorts. An equal number of controls were selected from among those who screened negative for aspiration, matching for age, sex, and year of hospitalization. A blinded manual chart review was performed on a random sample to assess the sniffer's accuracy for aspiration/non-aspiration. Predictor variables included a comprehensive list of demographic characteristics, comorbidities, prognostic scores (Charlson, SOFA, APACHE), and clinical variables (all present or have occurred before aspiration). We performed LASSO regression analysis to select the variables for the model. All variables with P< 0.15 contributed to the final multivariable conditional logistic regression model. The model's discrimination was assessed with the receiver operating characteristic curve.
RESULTS. Out of 45,115 patients, 917 fulfilled the aspiration enrollment criteria and after adding matched controls were split into the derivation (458 pairs) and validation (459 pairs) datasets. The random-sample manual chart review showed 100% accuracy of the sniffer-based aspiration/non-aspiration assignment. Variables selected for the final model are presented in Table 1. This aspiration prediction model showed very good discrimination. The concordance statistic using the point score for the derivation and validation models were 0.777 (95% CI 0.74, 0.82) and 0.78 (95% CI 0.74, 0.82). Using the best discrimination cutoff of 4.5, sensitivity and specificity were 71.2/72.3 and 72.5/69.9 in the derivation/validation models, respectively.
CONCLUSIONS. We derived and validated electronic prediction model for overt nosocomial pulmonary aspiration, programmable for automated identification of hospitalized patients' at risk, in whom potential prevention strategies can be developed and tested.

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1. Bansal et al. Retrospective Derivation and Validation of a Computable Phenotype of Nosocomial Aspiration. Crit Care Med 2016;44(12):343.

Table 1 (abstract 0001). Conditional Logistic Regression Model of the Selected Model

Conditional Logistic Regression Model of the Selected Model				
Characteristic	Controls N=458	Cases N=458	Odds Ratio (95% CI)	p-value
Cardiac Arrhythmia				**0.086**
No	194 (60.2%)	128 (39.8%)	1.00 (ref)	
Yes	264 (44.4%)	330 (55.6%)	1.42 (0.95, 2.11)	
Charlson Index				**<.001**
Per 1 unit increase	3.1 (3.1)	4.7 (3.7)	1.12 (1.06, 1.18) ***	
Depression				**0.048**
No	309 (55.3%)	250 (44.7%)	1.00 (ref)	
Yes	149 (41.7%)	208 (58.3%)	1.42 (1.00, 2.01) *	
SOFA				**<.001**
Per 1 unit increase	3.6 (3.0)	5.6 (3.4)	1.19 (1.13, 1.25) ***	
Delirium				**0.007**
No	454 (51.3%)	431 (48.7%)	1.00 (ref)	
Yes	4 (12.9%)	27 (87.1%)	5.59 (1.61, 19.37) **	
NG OG Tubes Preceding Aspiration				**0.006**
No	449 (52.1%)	413 (47.9%)	1.00 (ref)	
Yes	9 (16.7%)	45 (83.3%)	4.12 (1.51, 11.22) **	
Schizophrenia and other psychotic disorders				**0.001**
No	429 (53.0%)	380 (47.0%)	1.00 (ref)	
Yes	29 (27.1%)	78 (72.9%)	2.56 (1.44, 4.55) **	
				0.001
Pneumonia				
No	415 (48.9%)	433 (51.1%)	1.00 (ref)	
Yes	43 (63.2%)	25 (36.8%)	0.33 (0.17, 0.64) **	
Endotracheal tube				**<.001**
No	345 (46.2%)	401 (53.8%)	1.00 (ref)	
Yes	113 (66.5%)	57 (33.5%)	0.28 (0.17, 0.47) ***	
Non-invasive Vent				**0.432**
No	438 (51.3%)	415 (48.7%)	1.00 (ref)	
Yes	20 (31.7%)	43 (68.3%)	1.38 (0.62, 3.09)	
Pneumonia/Endo Tube Interaction				**0.015**
Not both	452 (49.9%)	453 (50.1%)	1.00 (ref)	
Both	6 (54.5%)	5 (45.5%)	8.49 (1.52, 47.32) *	
Endo tube/Non-invasive interaction				**0.014**
Not both	455 (50.7%)	442 (49.3%)	1.00 (ref)	
Both	3 (15.8%)	16 (84.2%)	8.44 (1.53, 46.66) *	

Numbers indicate N (%) for categorical variables and mean (SD) for continuous variables
Multivariable conditional logistic regression model contained all covariates listed in the table.
* P <.05 ** P <.01 *** P <.001

0002

Protocol driven management improves outcomes in acute respiratory distress syndrome

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INTRODUCTION. Acute respiratory distress syndrome (ARDS) remains under-recognized, under-treated and is associated with a high mortality. There is a potential for improvement in the management of these patients.

cannula on a Luer port downstream of the oxygenator. We performed an analysis per patient and per dialysis sessions.
16 ECMO VA and 9 ECMO VV were evaluated, thus 69 filters (34 ECMO VA and 35 ECMO VV). The median lifespan of a filter was 39 IQR [15-65] hours. 74% of all filters were ceased prematurely (< 72hours), mainly due to excessive pressure (24%) among which transmembrane pressure (3%), filter pressure (20%), outlet pressure (1%). The median rate the RRT's blood flow and of dialysis dose for all ECMO's combined was respectively: 150[140-181]ml/min, 34[23-39]ml/kg/h. Patients presented mostly hemorrhagic complications (n=10). No case of air embolism was noticed
The combination of RRT and ECMO as described in our study may be efficient. Further comparative studies seem necessary in order to recommend such practice.

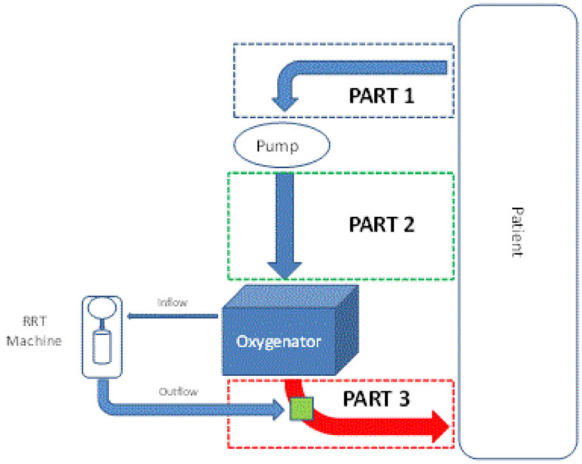

Fig. 1 (abstract 0296). RRT on ECMO according to our protocole

Table 1 (abstract 0296). Population of the study

Patients	Total n=25	ECMO VA n=16	ECMO VV n=9
Age (years)	64[54-71]	67[62-72]	54[49-56]
Gender (male)(n(%))	14(56)	8(50)	4(44)
IGS 2 on admission	60[49-67]	61[53-70]	52 [43-59]
Length of stay in ICU (days)	15[5-33]	8[3-18]	39[15-52]
Survival in ICU (%)	52	38	66

0297

Extracorporeal chloride removal to treat acidemia: in vitro evaluation of three techniques

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INTRODUCTION. Acidemia is a frequent disorder in critically ill patients. Blood chloride removal may increase blood pH. Extracorporeal chloride removal may be achieved through: 1. Electrodialysis (ED), a technique that selectively move anions from one solution to another through ion-exchange membranes using electricity (1); 2. ultrafiltration (UF) and postdilution with hypochlorous reinfusate; 3. UF through anion Exchange Resin (*a-ER*) which replaces chloride with bicarbonate ions.
OBJECTIVES. To evaluate, in-vitro, the chloride removal efficacy of these three different strategies.
METHODS. A standard reinfusate solution (CB 32, Novaselect) (technique 1) and a bicarbonate-based solution (Multibic®) (technique 2 and 3) were pumped through an hemodiafilter at 150 mL/min. The following strategies have been studied:

1. "ED group": the UF entered an ED chamber where chloride ions were replaced by hydroxide ions (OH-). Subsequently OH- ions were combined with CO2 to form bicarbonate within a membrane lung and the solution was reinfused in the main stream;
2. "Hypochlorous group": the UF was discarded and the same volume was reinfused in postdilution as sodium bicarbonate 140 mEq/L;
3. "a-ER group": the UF was pumped through an a-ER and then reinfused in postdilution.

In Hypochlorous and aER groups, UF flows of 11.4, 22.7 and 34.1 mL/min were tested. In the ED group, 3 different UF flows 15, 30 and 45 mL/min were tested, with a fixed amperage (4 Amp) and recirculating flow was set to equalize the UF tested, to achieve a theoretical removal of 1.25, 2.5, 3.75 mEq/min of chloride, respectively. Before the hemodiafilter and downstream after reinfusion the solution was sampled for UF gas analysis and then wasted. The change in chloride among the two sampling sites was calculated to quantify chloride removal. The experiment was repeated three times. Data are reported as mean±SD.
RESULTS.

1. In the "ED group", chloride removal was 0.47±0.06, 0.96±0.11 and 1.22±0.17 mEq/min at 15, 30 and 45 mL/min of UF flow, respectively.
2. In the "Hypochlorous group", chloride removal was 1.45±0.09, 2.65±0.09 and 4.50±0.15 mEq/min at 11.4, 22.7 and 34.1 mL/min of UF flow, respectively.
3. In the "a-ER group", chloride removal was 1.20±0.15, 2.05±0.09 and 3.35±0.09 at 11.4, 22.7 and 34.1 mL/min of UF flow, respectively (see Figure).

CONCLUSIONS. The three different extracorporeal techniques effectively removed chloride. Chloride removal proportionally increased with the rise of the UF flow. Further investigations will be required to confirm these findings and to prove safety and feasibility studies in-vivo.

REFERENCE(S)

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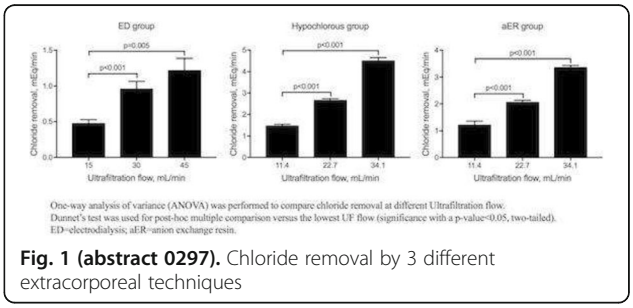

Fig. 1 (abstract 0297). Chloride removal by 3 different extracorporeal techniques