



HOW DOES THE ICU REQUIREMENT SCORE COMPARE TO TOXICOLOGISTS IN PREDICTING THE NEED FOR ICU CARE IN POISONED PATIENTS?

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Introduction

- Approximately 40% of poisoned patients admitted to the Intensive Care Unit (ICU) do not require ICU care.
- Identifying poisoned patients who do not need ICU treatment will reduce unnecessary admissions.
- The ICU Requirement Score (IRS) predicts which reported or suspected poisoned patients require ventilatory or hemodynamic support in the first 24 hours after presentation.
- In a retrospective study in the Netherlands, IRS reduced ICU admissions by 33%.

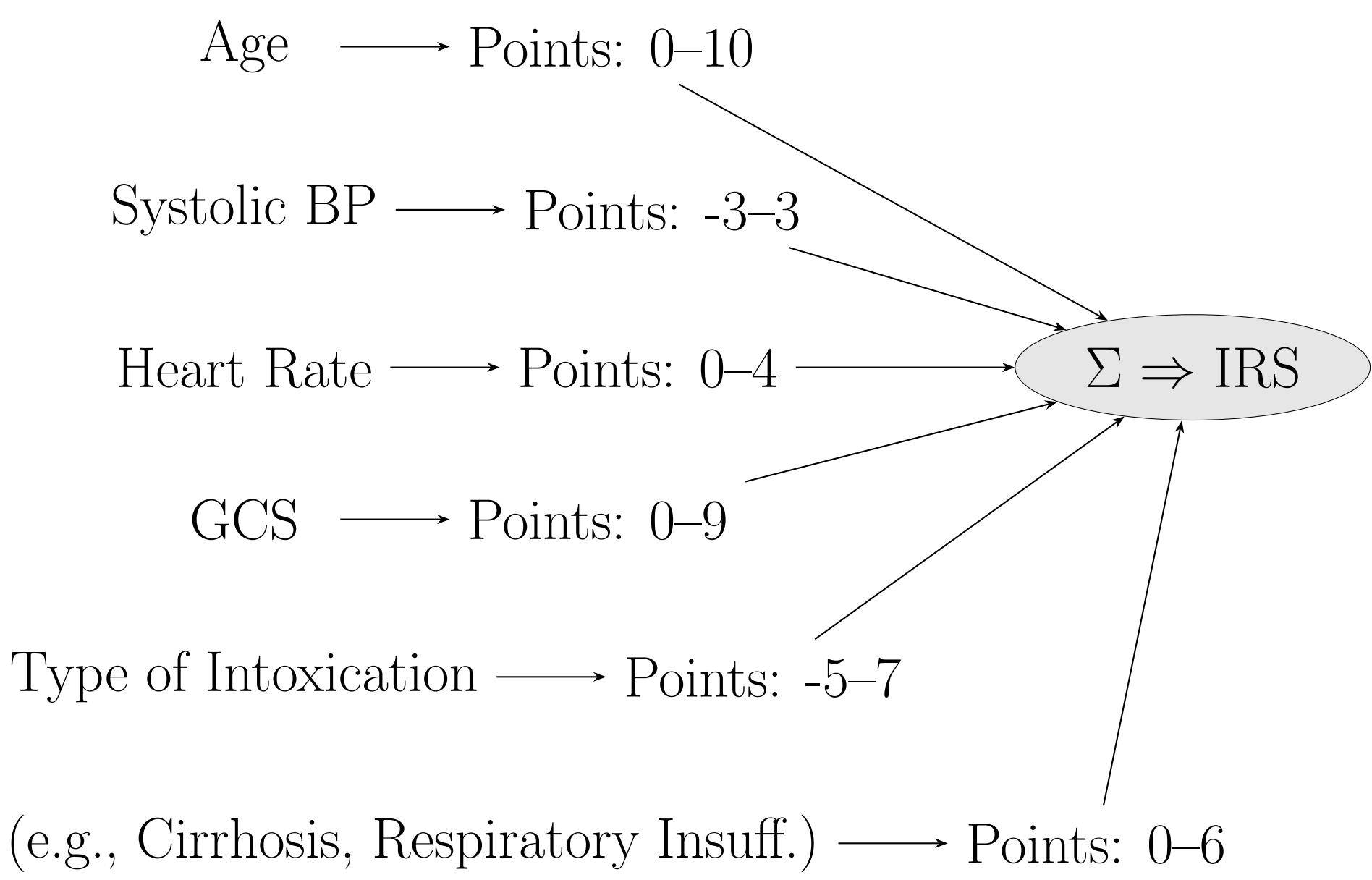
Objective

Determine IRS performance in the United States.

Methods

- A retrospective study of bedside toxicology consultations at one urban quaternary care center from 2023 to 2024.
- Our **outcome measures** were the **accuracy** of IRS in predicting the need for ventilatory or hemodynamic support and the **agreement** between IRS and toxicologist's recommended disposition, quantified by Cohen's kappa.
- Our study was powered to detect a change in ICU admissions of 15.

Calculation of INTOXICATE RISK SCORE (IRS)



Interpretation: If IRS > 6, ICU care is likely required. This score is derived by summing assigned points from age, vitals, GCS, toxin type, and comorbidities.

Model Performance

Toxicologist INTOXICATE		
ICU	20	61
Not ICU	81	42

Table 1: INTOXICATE recommended ICU admission more frequently than the bedside toxicologist.

Toxicologists and IRS Disagree

	Adolescent			Adult		
	Pred.	Total		Pred.	Total	
Actual						
ICU	2	2	4	11	4	15
Not ICU	9	11	20	39	23	62
Total	11	13	24	50	27	77

Cohen's κ estimates:
Adolescents: 0.029 (95% CI: -0.29 to 0.35)
Adults: 0.05 (95% CI: -0.08 to 0.19)

Table 2: Using the threshold derived from an ICU cohort, we found that there is no significant agreement between INTOXICATE and the bedside toxicologist's recommendations. CI: 95% confidence interval. Pred., predicted disposition.

Acknowledgments

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Description of Patient Population

Characteristic	Adolescent, n = 24	Adult, n = 77	P-value
Age	15 (14, 16)	35 (27, 50)	<0.001
Gender			0.3
Female	13 (54%)	39 (51%)	
Male	10 (42%)	38 (49%)	
Nonbinary	1 (4.2%)	0 (0%)	
Pulse	99 (89, 110)	90 (71, 106)	0.068
SBP	116 (106, 119)	120 (112, 140)	0.033
Actual Disposition			0.5
Discharge	18 (75%)	48 (62%)	
General Medical Floor	2 (8.3%)	14 (19%)	
ICU	4 (17%)	15 (19%)	
Respiratory Insufficiency	2 (8.3%)	16 (21%)	0.2
Cirrhosis	0	2 (2.6%)	>0.9
Dysrhythmia	12 (50%)	28 (36%)	0.3
Secondary Reason for ICU Admission	0	1 (1.3%)	>0.9
GCS			0.024
3	0	3 (3.8%)	
5	0	1 (1.3%)	
10	3 (13%)	0 (0%)	
11	0	1 (1%)	
12	0	1 (1.3%)	
13	0	2 (2.6%)	
14	3 (13%)	2 (2.6%)	
15	18 (75%)	67 (87%)	
Exposure Category			0.11
Alcohol	2 (8.3%)	4 (5.2 %)	
Analgesic	6 (25%)	11 (14%)	
Antidepressants	6 (25%)	11 (14%)	
CO, As, CN	0	9 (12%)	
Combination	1 (4.2%)	15 (19%)	
Sedatives	0	6 (7.8%)	
Street Drugs	5 (21%)	10 (13%)	
Unknown	4 (17%)	11 (14%)	
Confirmed Exposure			0.4
Confirmed - Yes	15 (63%)	48 (62%)	
Confirmed - No	1 (4.2%)	11 (14%)	
Unconfirmed	8 (33%)	18 (23%)	

Table 3: Description of Data Source Adolescents and adults have similar patterns of exposure and clinical outcomes. IQR, interquartile range. P-values calculated for continuous variables with Wilcoxon rank sum test, for categorical data, Fisher's exact test if category counts less than 5, Pearson's χ^2 otherwise.

Agreement Improves with Adjusting Threshold

	Adolescent			Adult		
	Pred.	Total		Pred.	Total	
ICU Not						
Actual						
ICU	1	3	4	7	8	15
Not ICU	0	20	20	1	61	62
Total	1	23	24	15	62	77

Cohen's κ estimates:
Adolescents: 0.258 (-0.164 to 0.878)
Adults: 0.55 (0.294 to 0.801)

Table 4: Using the threshold derived from ROC analysis, there is significant agreement between INTOXICATE and the bedside toxicologist's recommendations for adults or adolescent in the study. Pred., predicted disposition

Discussion

- The distribution of xenobiotics was comparable to IRS validation studies.
- The primary team followed the toxicologist's recommendations in all cases.
- All consults were staffed with a board-certified toxicologist.
- In the United States, more critical care may happen in the Emergency Department.

Conclusions

- Compared to toxicologist's recommendations, IRS increased United States ICU admissions, admitting patients that did not require ICU care.
- There was minimal agreement between IRS and toxicologist's recommendations without model recalibration.