



# Outcomes After the Use of Hydroxocobalamin

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## Introduction

- Combustion of synthetic materials, vinyls, and plastics produces cyanide
- Hydrogen cyanide interferes with O<sub>2</sub> utilization at cytochrome level
  - Contributes to early death from acute inhalation injury
- Hallmark sign of cyanide toxicity – persistent acidosis despite adequate resuscitation
- Hydroxocobalamin binds cyanide to form cyanocobalamin, which is renally excreted
- Proposed mechanism of acute kidney injury (AKI): Oxalate crystal formation in kidneys
  - 2 case reports of subjects having mild acute tubular necrosis (ATN) with calcium oxalate crystals in the lumens of numerous renal tubules on renal biopsy
- Hydroxocobalamin has been shown to significantly increase odds of AKI and need for RRT
  - Comparator group was not exposed to smoke
  - AKI due to hydroxocobalamin, or other inhaled toxic gases?

## Objectives

- Describe the population in which hydroxocobalamin is used
- Assess outcomes in patients who receive hydroxocobalamin
  - Mortality
  - Need for RRT

## Methods

- Approved PI project
- Retrospective chart review
- Inclusion criteria:
  - Admission between July 1, 2016 and April 30, 2019
  - Receipt of hydroxocobalamin after ICU admission

## Results

- Thirty five subjects were included
- The median ICU LOS was 15 days (IQR 5, 28 days)
- 63% of subjects developed an AKI within 72 hours of hospital admission
  - Median time to AKI was 15.1 hours
- 60% of subjects required continuous renal replacement therapy (CRRT) during ICU admission, with 42.8% of subjects required CRRT within 24 hours
- All subjects had renal recovery during ICU admission
- The average time to lactate clearance was 34.6 ± 18 hours
  - 11 (31.4%) subjects did not clear lactate within 72 hours of admission
- Serum cyanide levels not measured
- One (2.9%) subject had a carboxyhemoglobin level >10% on admission

Table 1. Demographic characteristics

Characteristic	N=35
Male gender	23 (65.7%)
Age (years)	46 (34.5, 65.8)
Burn size (% TBSA)	18 (8.25, 32.5)
Inhalation injury	29 (82.9%)
Grade 1	10 (28.9%)
Grade 2	13 (37.1%)
Grade 3	4 (11.4%)
Grade 4	2 (5.7%)
24-hour fluid resuscitation requirements (mL/kg/%TBSA)	7.4 (4.6, 12.7)
Admission lactate (mmol/L)	4.4 ± 2.3
Receipt of >1 dose of hydroxocobalamin	4 (11.4%)

## Conclusions

- Most patients who receive hydroxocobalamin after ICU admission developed AKI within the first 72 hours
- 42.8% of patients required CRRT during the initial resuscitation period
- Further studies on the relationship between the administration of hydroxocobalamin and the development of AKI and in-hospital mortality are warranted
- Further studies are needed to determine the relationship between AKI, oxalate nephritis, exposure to hydroxocobalamin
- Not enough evidence to change recommendations for the administration of hydroxocobalamin

Table 2. Renal outcomes

Outcome	N=35
Development of AKI during first 72 hours	22 (63%)
Time to AKI (hours)	15.1 (11.8, 21.3)
Need for CRRT during hospital stay	21 (60%)
Time to CRRT (h)	15 (10.6, 121.3)
Need for CRRT during first 24 hours	15 (42.8%)
Time to CRRT (h)	13 (10.4, 22.1)
Indications for CRRT	
Acidemia	12 (34.3%)
Volume management	10 (28.6%)
Hyperkalemia	8 (22.9%)
Uremia	4 (11.4%)

## References

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