**INTRODUCTION**

- In acetaminophen overdose without signs of hepatotoxicity, general recommendations are to check liver transaminases (LFTs), acetaminophen level, and coagulation studies upon initial assessment and just prior to the conclusion of N-acetyl cysteine (NAC) 21-hour infusion protocol (2 sets).
- The continuation of infusion depends on the elevation of LFTs or the continued presence of acetaminophen at the end of the NAC protocol.
- This chart review assesses the number of laboratory evaluations and if any changes in NAC dosing occur prior to the conclusion of the initial infusion protocol secondary to these frequent laboratory assessments.
- Despite these recommendations, many clinicians continue to trend these levels with multiple sets of labs, during the initial NAC protocol.

**Purpose:** The primary aim was to evaluate if multiple lab evaluations, during the NAC protocol, changed the management or patient outcomes.

**MATERIALS & METHODS**

- A retrospective chart review from 02/2010 to 11/2021 of adult and pediatric patients presenting to a tertiary care hospital for acetaminophen ingestion requiring N-acetyl cysteine without initial evidence of hepatotoxicity (AST or ALT > 1000 U/L) was completed to evaluate the number of laboratory occurrences during the 21-hour NAC protocol.
- Secondary outcomes evaluated were patient dispositions (discharge, transfer to a liver transplant facility, or death), if changes in NAC dosing occurred, and if an extension of NAC infusion was required.
- The study was certified exempt by institutional IRB.

**RESULTS**

- One hundred thirty cases met the inclusion criteria.
- The average (mean) number of sets of labs drawn was 5, with a range of 1 to 22 sets, during NAC infusion.
- Thirty out of 130 cases required NAC beyond the 21-hour protocol.
- Two were given NAC at a higher rate, after 21-hour NAC protocol.
- Of those requiring an extension of NAC infusion: 14 had an elevation in liver transaminases, 8 with acetaminophen still present, 3 had an elevation of transaminases and persistent acetaminophen level, 4 were continued for unknown reasons, and 1 was continued at the recommendation of toxicology.
- Ten patients developed hepatotoxicity, but all incurred an elevation of transaminases from baseline on laboratory evaluation prior to the scheduled discontinuation of 21-hour NAC protocol.
- Two patients required transfer to a liver transplant facility (1 transferred after 54 hours from admission and the other after 82 hours), 128 were discharged (home or inpatient psychiatry), and no deaths occurred.
- Using Fisher’s Exact test, there is a significant association between following recommended lab protocol (2 sets) and change in management (P<0.01). Specifically, cases following recommended lab protocol are less likely to have a change in management (extension of NAC protocol), compared to those that did NOT follow protocol.

<table>
<thead>
<tr>
<th>Labs ordered per protocol (2 sets)</th>
<th>&gt; 2 sets of labs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension of NAC infusion</td>
<td>1</td>
</tr>
<tr>
<td>No extension of NAC infusion</td>
<td>27</td>
</tr>
</tbody>
</table>

**Table 1. Number of laboratory occurrences and NAC infusion**

**ACKNOWLEDGEMENTS**

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**REFERENCES**


**DISCUSSION**

- There is great variability between clinicians on the frequency of monitoring transaminases and acetaminophen levels in acetaminophen overdose.
- Cases following lab protocol (2 sets) were less likely to have an extension of NAC infusion, compared to those with more than 2 sets of labs, as this may be due to clinical symptoms in the patient or other comorbidities. But all cases requiring extension of NAC, had changes at the recommended final lab draw.
- Of patients developing hepatotoxicity, all had an elevation of transaminases on lab work just prior to the scheduled cessation of the 21-hour NAC protocol.
- The multiple labs drawn in-between initial laboratory evaluation and the labs drawn just prior to discontinuing NAC, did not change the rate of administration or disposition.
- The determination for continuing NAC infusion is determined by the lab work drawn just prior to the end of the NAC infusion.
- Limitations: this is a retrospective chart review that is subject to selection bias and the accuracy of the medical record.
- Streamlining the administration of NAC and providing a standard order set for laboratory evaluation for acetaminophen overdose may decrease costs and save the patient from unnecessary phlebotomy.