Nephrotoxic Medication Associated Acute Kidney Injury leads to Chronic Kidney Disease Development at 6 Months
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Abstract
Background: Nephrotoxic medication exposure is a common cause of Acute Kidney Injury (NTMx-AKI) in hospitalized children. Longitudinal data exist regarding post-hospitalization kidney outcomes after NTMx-AKI.

Design: We did a retrospective outcome assessment for non-critically ill children (pt) exposed to an IV aminoglycoside for ≥3 days or ≥3 NTMx simultaneously, from June 2011 to May 2012. Data was collected on those who developed AKI by the prIFLE criteria, and those who had exposure but did not develop AKI. All had daily serum creatinine (SCr) monitored during hospitalization as part of institutional practice.

Methods
Follow-up data > 6 months after exposure to NTMx were retrieved from medical records.

Results: 100 pt (mean age 9.3 ± 6.9 yrs) with NTMx-AKI were identified. Mean pre-AKI eGFR (mL/min/1.73m²) was 118.8 ± 14.9, and was between 90-150 for all. Mean AKI duration was 11.4 ± 9.8 days. 92 pt survived to discharge. Mean eGFR at discharge was 105.1 ± 27.2; 28 (30%) had eGFR <90. At 6 months post-NTMx-AKI, data were available for 77 pt (6 had no follow up, 6 deceased, 3 had no SCr). Mean eGFR was 113.3 ± 30.6. 18 (23.3%) pt had eGFR <90, 2 <60 and 9 (11%) had eGFR >150. Mean pre-AKI eGFR was 118.8 ± 14.9. All were between 90-150 mL/min/1.73m². Duration of AKI: 11.4 ± 9.8 days

Baseline: 100 patients with NTMx-AKI
Mean Age: 9.3 ± 6.9 yrs
Pre-AKI eGFR: 118.8 ± 14.9 mL/min/1.73m²
All were between 90-150 mL/min/1.73m²
Duration of AKI: 11.4 ± 9.8 days

Follow up data > 6 months after NTMx-exposure retrieved from medical records.

Subjects with AKI (n=77)
Controls (NTMx-exposure without AKI) (n=57)
p value
Age (yrs) 8.87 (7.09) 7.13 (6.11) 0.14
Males (%) 66.2 50.9 0.07
Baseline eGFR 118 (15.14) 119.98 (15.41) 0.48
≥ 1 NTMx at follow up (%) 54.5 40.4 0.1
eGFR at 6 months 114.07 (30.96) 123.46 (14.54) 0.04
GFR by Cys C 80.21 (23.47) 111.64 (24.37) <0.001
Up/c >0.2 (%) 35.1 10.5 <0.001
Up/c at 6 months 0.9 (1.14) 0.27 (0.21) 0.04
Subjects with hypertension 29 (37.7) 11 (19.3) 0.01
Subjects with at least 1 sign of CKD or hypertension 59 (76.6) 17 (29.8) 0.001

Conclusions
After NTMx-exposure, pts who develop AKI are more likely to have residual kidney damage at 6 months, in the form of reduced GFR, hyperfiltration, proteinuria or hypertension, than those who do not. However less than 50% undergo a complete evaluation for CKD and only 20% are seen by a nephrologist. With studies showing an association between AKI and CKD, we suggest systematic comprehensive follow up is essential to assess for CKD in children after an episode of NTMx-AKI.

References
3. Acute kidney injury and increasing nephrotoxic medication exposure in noncritically-ill children, CJASN April 2011 vol. 6 no. 4 856-863

Methods
• Retrospective outcome assessment
• Subjects: All non-critically ill pts exposed to IV aminoglycoside for ≥3 days or ≥3 NTMx simultaneously who developed AKI by pRIFLE criteria
• Controls: age and primary service matched pts with NTMx-exposure but no AKI
• Follow-up data > 6 months after NTMx-exposure retrieved from medical records

Follow up after AKI

Table 1: Pre and post AKI Comparison
<table>
<thead>
<tr>
<th></th>
<th>Pre-AKI</th>
<th>6 month Follow Up</th>
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<tbody>
<tr>
<td>eGFR (mL/min/1.73m²)</td>
<td>118.4 ± 15.4</td>
<td>112.3 ± 31.9</td>
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<tr>
<td>eGFR between 90-150</td>
<td>100%</td>
<td>64.9%</td>
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<tr>
<td>Cystatin C GFR (mL/min/1.73m²)</td>
<td>NA</td>
<td>80.2 ± 23.4 (n=52).</td>
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<tr>
<td>Urine p/c &gt; 0.2</td>
<td>0/15</td>
<td>27/34</td>
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Table 2: Comparison with controls

Results

Background
Nephrotoxic medications (NTMx) are a common cause of AKI in hospitalized children1. This is associated with longer hospital stay and higher costs2. 33% of children receiving IV Aminoglycoside ≥ 5 days have AKI by pRIFLE criteria2. Patients with AKI have higher NTMx exposures, doses, and days of NTMx therapy than patients without AKI3.

Objectives
- To assess 6 month kidney outcomes after Nephrotoxic medication associated AKI (NTMx-AKI)
- To compare renal outcomes between those who develop AKI after NTMx-exposure

Conclusions
- After NTMx-exposure, pts who develop AKI are more likely to have residual kidney damage at 6 months
- Less than 50% of them undergo a complete evaluation for CKD
- Only 20% are seen by a nephrologist
- Systematic comprehensive follow up is essential to assess for CKD in children after an episode of NTMx-AKI