Use of urine NGAL for AKI screening following triggering of Baby NINJA

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Background

- Nephrotoxic medication exposure in neonates is common in the neonatal intensive care unit (NICU)
- Aims of Baby NINJA (Nephrotoxic Injury Negated by Just-in-time Action) include:
  - Reduce nephrotoxic medication (NTM) exposure
  - AKI prevalence and intensity
- Serum creatinine (sCr) screening has limitations and frequent lab draws are a known cause of iatrogenic anemia in neonates
- Urine neutrophil gelatinase-associated lipocalin (uNGAL) has previously been associated with neonatal AKI and offers a less invasive alternative AKI screening mechanism

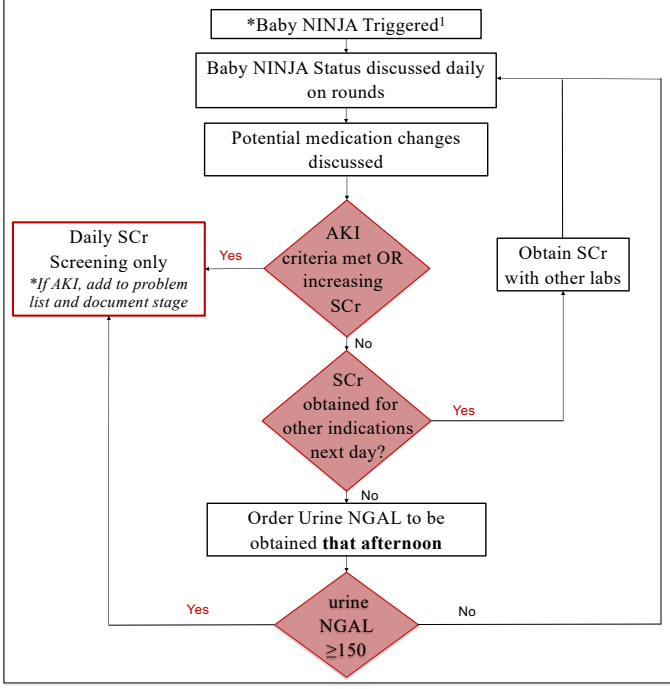
Methods

- In June of 2021, our Level IV NICU elected to change to an alternative approach to screening for Baby NINJA utilizing uNGAL (Figure 1)
- We aimed to understand the impact on screening compliance, nephrotoxic medication use and AKI following implementation
- Screening compliance was defined as:

$$\frac{exposure\ day\ SCr\ or\ uNGAL\ obtainement}{nephrotoxic\ medication\ exposure\ days} * 100\%$$

- Exposure days includes 2 days past the end of nephrotoxic medication use
- For comparison, the postimplementation era was compared to the 13 months prior when Baby NINJA was well established in our unit.
- Statistical analysis included descriptive statistics including median and interquartile range [IQR], Mann-Whitney U Test, and Kruskal-Wallis rank sum test

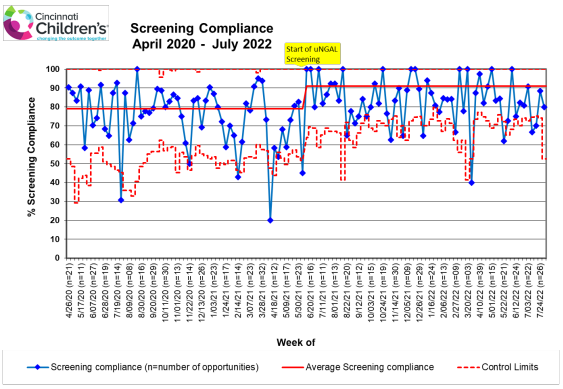
Figure 1. Cincinnati Children's Baby NINJA Screening Algorithm



Results

- AKI Screening increased following implementation (78% vs. 84%, p= 0.003, Figure 2 & Table 1)
- 37% of screening occurring by uNGAL

Figure 2. Screening compliance pre and post implementation



- 21 conversions to daily sCr monitoring occurred
- Median uNGAL on day of conversion was 263 ng/mL (IQR: 195-825 ng/mL)
- High-risk nephrotoxic medication exposure rates per 1000 NICU patient days decreased from 8% to 6%, p=0.0003 (Table 1)
- There was no statistical difference in AKI rates or intensity between eras (Table 1)

Table 1. Comparison of Pre & Post uNGAL Alternate pathway era

Variable	Pre – NGAL era	Post NGAL era	p value
Screening Compliance	78% (IQR: 67%, 87%)	84% (IQR: 77%, 92%)	0.003
High risk NTM exposure (per 1000 patient days)	8 (IQR: 5,12)	5 (IQR: 4, 8)	0.0003
AKI Rate (per 1000 NICU patient days)	0 (IQR: 0,0)	0 (IQR: 0,0)	0.63
Percent of High NTM Exposed Patients with AKI	0 (IQR: 0,0)	0 (IQR: 0,0)	0.49
AKI days per 100 High NTMx exposure days	0 (IQR: 0,0)	0 (IQR: 0,0)	0.82

AKI

- 8 subjects experienced a combined total of 18 days of AKI with 5 subjects experiencing AKI prior to baby NINJA trigger.
- Of the 3 remaining subjects uNGALs of 498, 859 and 2835 ng/dL triggered conversion
- 5 subjects with AKI had an outcome of death within 48 hours of meeting NINJA criteria

Conclusions

- Urine NGAL offers a less invasive AKI screening option for nephrotoxic medication exposure.
- Urine NGAL should not replace serum creatinine or urine output for diagnosis of AKI.

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