CCHD Screening in the NICU: New Jersey's Experience

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Critical Congenital Heart Disease Screening Program

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CCHD Screening in New Jersey

- Includes NICU
- No opt out for confirmed prenatal diagnosis
- No opt out for echocardiogram prior to screening

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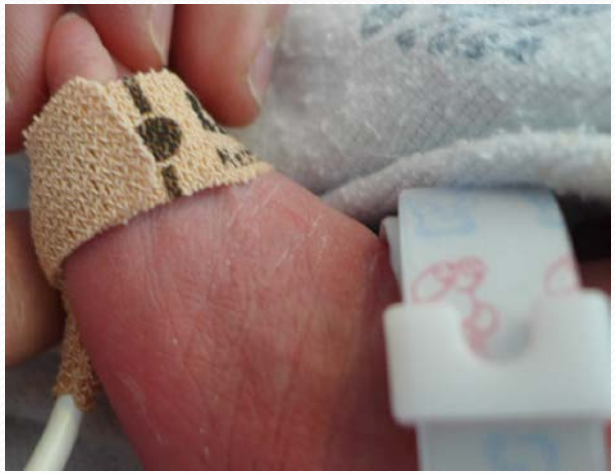
Characteristics of Failed Screens*

- Protocol adherence
- Gestational age
- Prenatal diagnosis
- Echo prior to screening



*As reported to the NJ Birth Defects Registry through 12/31/13

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Characteristics of Failed Screens

Location

- 61% (n=84) in NICU/SCN

Gestational Age

- 64% (n=54) term
- 20% (n=17) preterm/premature (<37 weeks; 1000-2500 gms)
- 16% (n =13) extremely premature (<1000 grams)

Protocol Adherence

- 37% followed the recommended NJ algorithm*

*upper and lower values obtained, 1-3 screens as appropriate for cut-off values although screening intervals varied and did not necessarily adhere to 1 hour apart.

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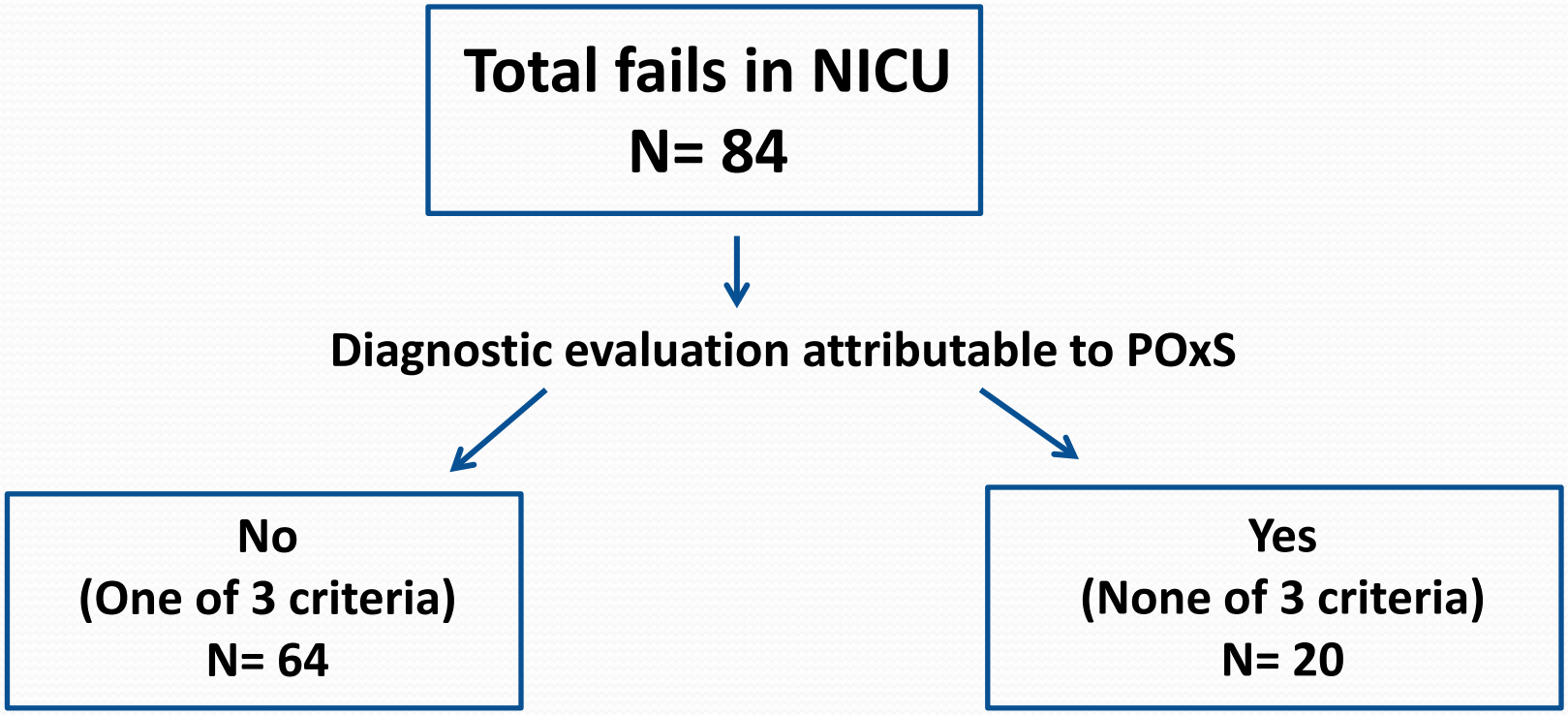
Pulse Ox Screening (POxS) Fails



3 Criteria

- **Prenatal diagnosis of CCHD,**
- **Signs/symptoms at the time of the screen, *or***
- **Cardiac consult or echocardiogram ordered or conducted prior to the screen**

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Failed screens in NICU

Of the 20 infants in NICU whose diagnostic evaluation ***was*** attributable to failed POxS

- CCHD = 0
- CHD = 2
- Other significant conditions = 0
- PFO/PDA as only finding = 7
- No known reason for failed screen= 11

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Failed screens in NICU

Of the 64 NICU infants whose diagnostic evaluation ***was not*** attributable to failed POxS

- 72% (n = 46) had either a prenatal diagnosis or echo prior to the screen
  - 28% (n=18) had prenatal diagnosis of CCHD
  - 63% (n=40) had an echo prior to the screen
    - 19% (n=12) had both a prenatal diagnosis of CCHD and an echo prior to the screen

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Failed screens in NICU

Characteristics of **11** infants with no known reason for failed POxS

- Time of screening ranged from day 1 - week 5.
- Gestational age -5 term, 5 preterm, 1 extremely preterm
- Protocol adherence- 2
- Kemper vs. NJ protocol
  - 6 would have passed Kemper (5 would fail both protocols)

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Failed screens in NICU

Characteristics of **17 preterm** infants

- Time of screening ranged from day 1 – month 3 .
- Pre-echo- 8
- Protocol adherence- 6
- Kemper vs. NJ protocol
  - 4 would have passed Kemper (13 would fail both protocols)

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Failed screens in NICU

Characteristics of **13 extremely preterm** infants

- Time of screening ranged from day 9 – month 5.
- Pre-echo- 10
- Protocol adherence- 5
- Kemper vs. NJ protocol
  - 1 would have passed Kemper (12 would fail both protocols)

NJ NICU Survey 2/2013: When do you screen?

- 15% (3) 24-48 hours after birth regardless of medical status.
- **50% (10) At a minimum of 24 h of age, timing variable.**
- 35% (7) Just prior to discharge home.

NJ NICU Survey 2/2013: Variable Timing of Screen

- Medically stable w/o O2, screened at 24-48 h: 57% (8)
- If unstable and/or on O2 before 48 h, ***as soon as possible*** when medically stable w/o oxygen after 48 h: 57% (8)
- If unstable and/or on O2 before 48 h, ***anytime*** after 48 h when stable w/o oxygen: 14% (2)
- Other -14% (2)
  - Closer to discharge (1)
  - When on oxygen at 24-48h and again when off (1)

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NICU Working Group

Questions for discussion:

- Do all NICU infants need to be screened?
- When to screen extreme preterm infants?
- Should infants who are receiving supplemental oxygen be screened?
- Does echocardiogram rule out the need for pulse ox screening?
- Screening vs. monitoring in the NICU? Screening before transfers?
- Is protocol applicable to all levels of SCN/NICUs?
- Communication of results to PCP?

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Variable NICU Screening Practices

Practice variation-examples from reported hospital practices and other state rules

- All at 24 hours-48 hours
- For asymptomatic NICU infants admitted at gestational age (GA) greater than or equal to 34 weeks, CCHD screening may be attempted at 24 to 48 hours of age
- All regardless of echo.
- All babies in the NICU prior to discharge unless they had a known defect that is under treatment. We do not count early echos for PDA's as ruling out CCHD.
- All at the same time as the car seat.
- All close to discharge
- Out of the incubator x 24 hours
- No respiratory issues x 24 hours
- Stable and all/mostly PO feedings
- Must be at least 35 weeks and off of any support
- Must be off oxygen for at least 24 hours
- For NICU infants admitted at GA less than 34 weeks, CCHD screening may be deferred until the pre-discharge period and cohorted with other newborn screening, e.g. hearing screening, and bloodspot metabolic screening.
- Perform screening on foot only. If 90-95%, then screen right hand.

Variable NICU Screening Practices

Screening Exclusions-examples from reported hospital practices and other state rules

- If the patient had a cardiac echo and CHD has been ruled out the physician can write an order for no screening.
- Exclude those with known defects and echo done already.
- If there is a confirmed cardiac issue and the baby was already being followed by peds cardiology.
- There are situations in which CCHD screening may not be indicated and a physician override is appropriate:
- Clinical evaluation and prior echocardiogram have already ruled out CCHD. The ductus arteriosus should be reported as closed or not present on that echocardiogram study.
- The newborn has confirmed CCHD on pre-natal testing
- The newborn has confirmed CCHD on post-natal testing, e.g. echocardiogram
- If the baby is going home on oxygen an ECHO should be completed to rule out CCHD, screening is not performed on babies on oxygen.
- For any baby in the NICU less than 8 days, screen using the standard protocol, in room air, prior to discharge. For all other patients in the NICU more than 7 days, screening with pre and post ductal oximetry is not required.
- We are screening only those babies who are being discharged to home $\leq$ 7 days of life. Of those babies, we only screen those who have not had a cardiac echo.

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NICU Working Group recommendations

- No changes; continue current protocol
- Limited research on NICU screening
- Further study warranted

What is optimal NICU Screening Protocol?

- Possible collaborative study?

Acknowledgements

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