

Critical Congenital Heart Disease Screening: Concerns, Challenges, and Opportunities from the Clinical Perspective

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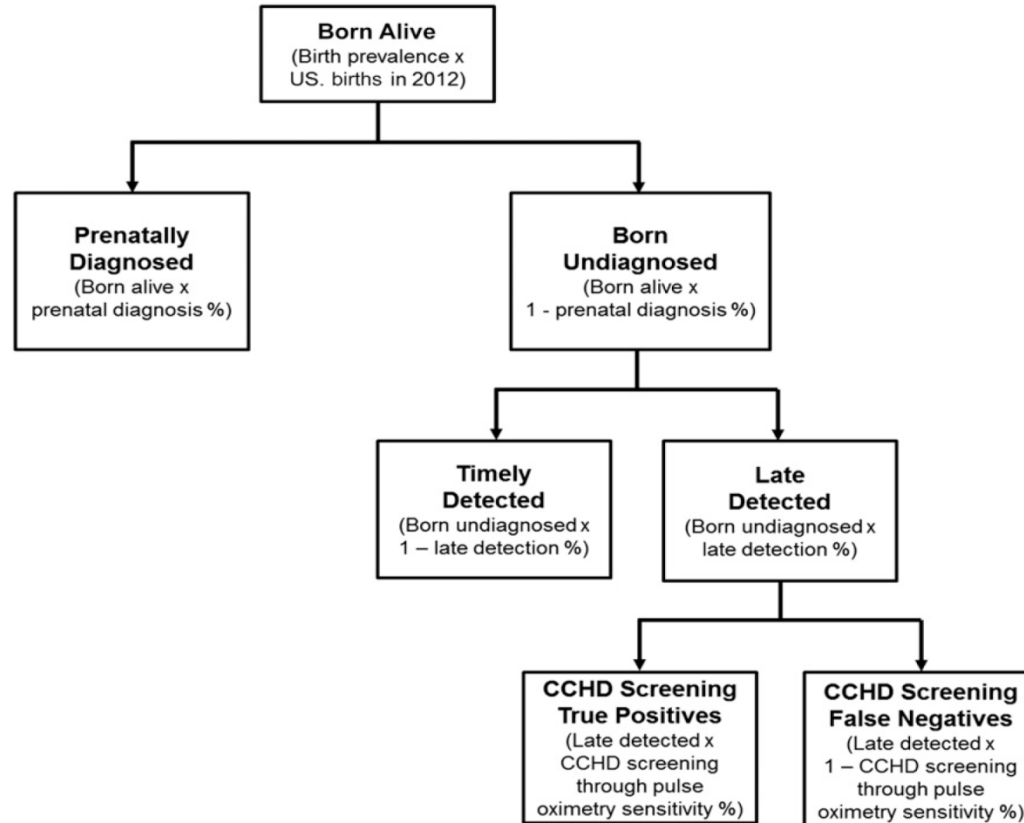
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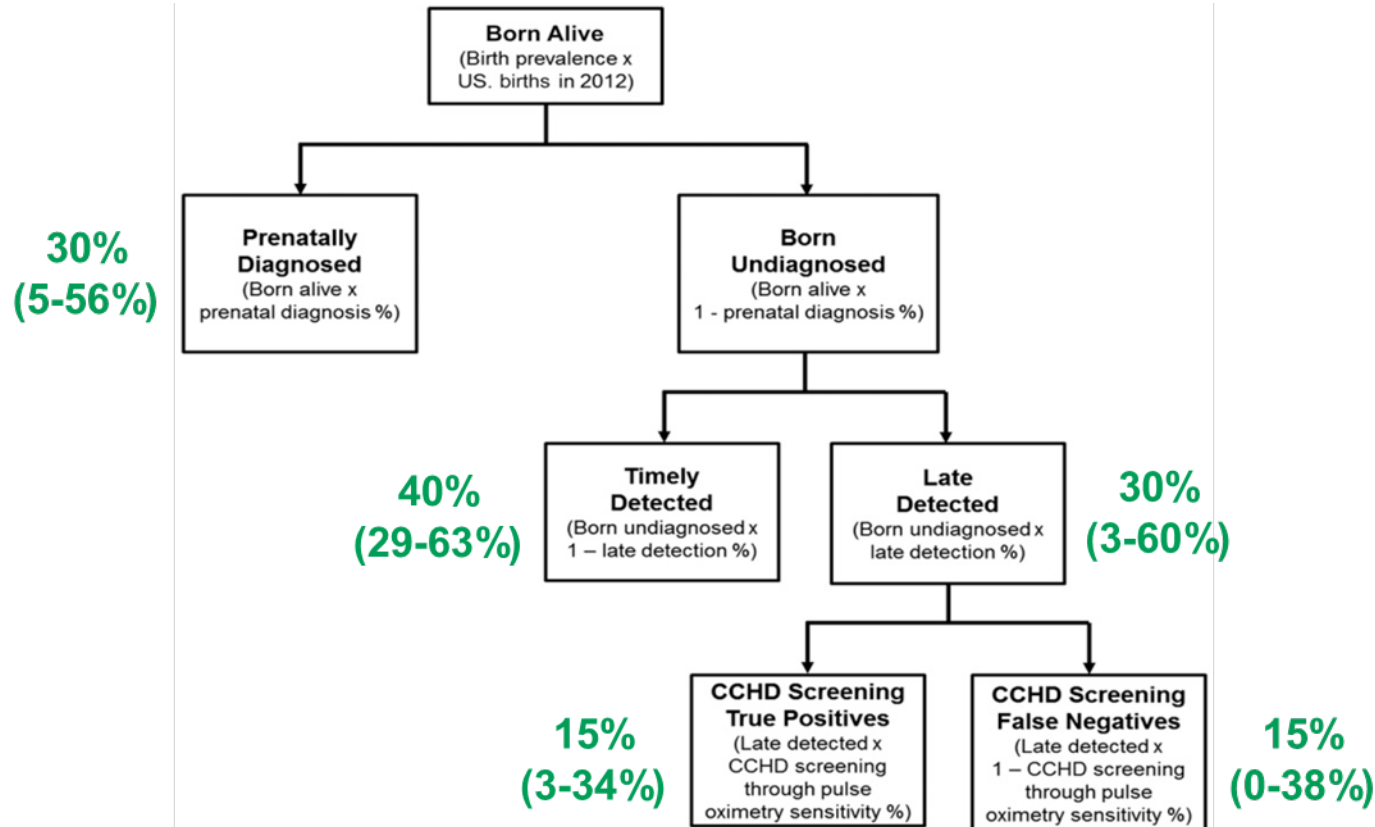
Concerns

- Do we really need this?
- How are we going to pay for this?
- Will this overwhelm the system?

Do we really need this?



Do we really need this?



How are we going to pay for this?

- Screening bundled as part of newborn care
- Further testing paid same as would be for symptomatic child

Will this overwhelm the system?

- Delayed discharges?
 - Rare
 - Parents not upset
- Excessive burden on pediatric cardiologists?
 - Absolutely not
- Unnecessary transports?
 - Exceedingly rare, and what's “unnecessary”?

Challenges

- What does a negative result mean?
- Why are we still missing some cases?
- How do we adapt to special settings?

What does a negative result mean?

Pediatr Cardiol

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LETTER TO THE EDITOR

Misinterpretation of Negative Pulse Oximetry Screening as Absence of Critical Congenital Heart Disease

“We...urge the (American) Academy (of Pediatrics) to mandate that nurseries document the cardiac conditions specifically ruled out by virtue of a negative screen on every discharge summary”

What does a negative result mean?

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LETTER TO THE EDITOR

Screening for Critical Congenital Heart Disease: A Matter of Sensitivity

**Matthew E. Oster · Tiffany Colarusso ·
Jill Glidewell**

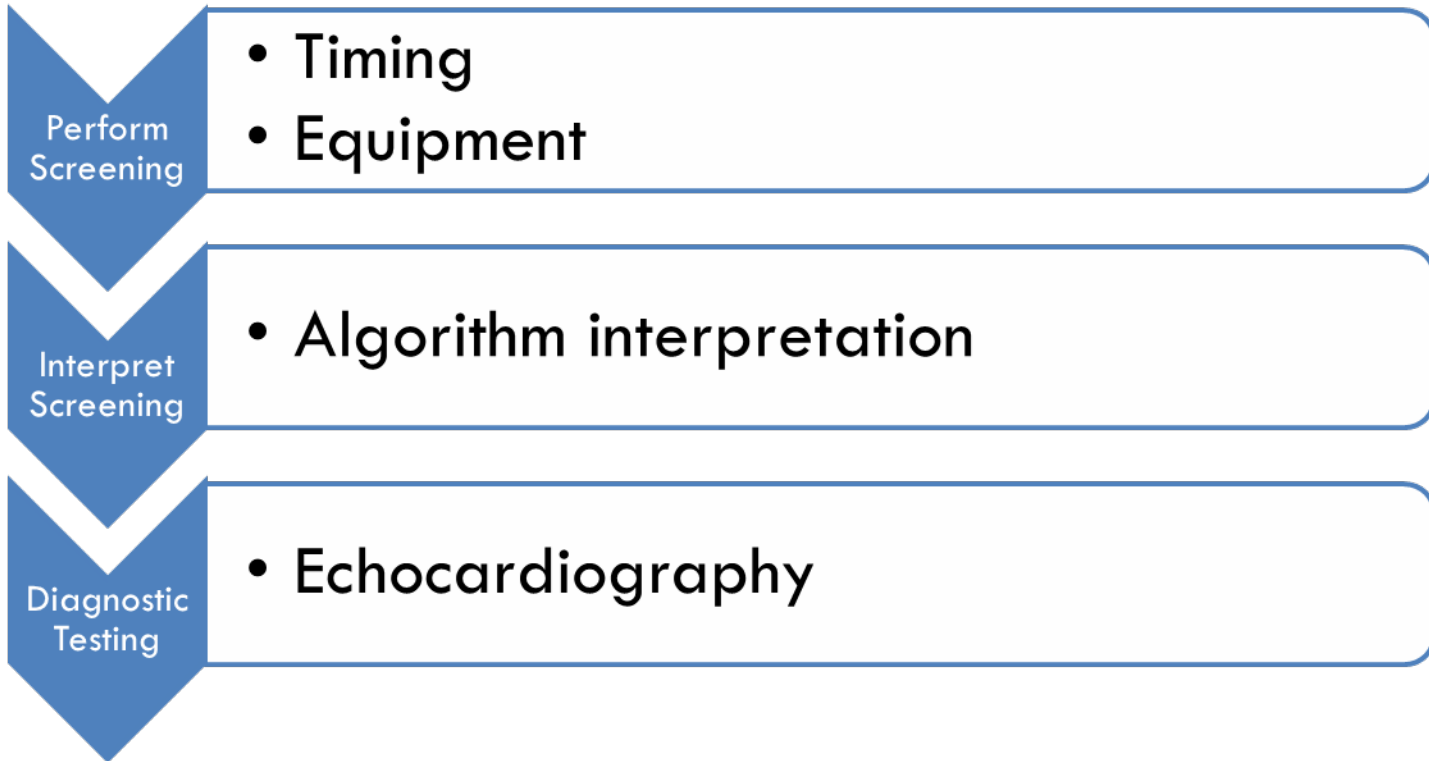
What does this mean for clinical care? Until there is a screening test for CCHD that has close to 100 % sensitivity, we believe that pulse oximetry screening should be used as one additional tool to detect CCHD, but it should not preclude routine clinical examinations, nor should it be used to rule out heart disease, including any type of CCHD.

Why are we still missing some cases?

- Low sensitivity compared to other screening tests
 - Overall 50-75% (depending on definitions used for CCHD)
 - >85% if you add in clinical examination

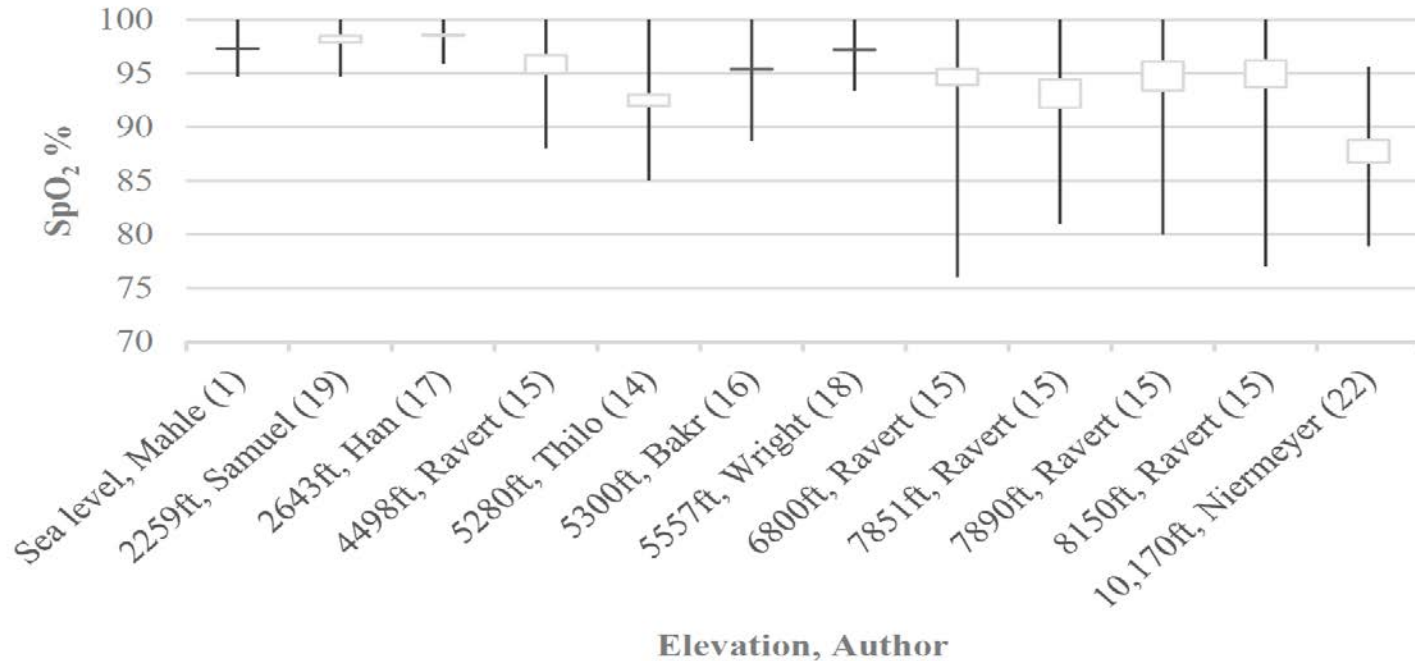
- Determinants of hypoxemia
 - Timing of test
 - Flow across PDA
 - Severity of disease

Why are we still missing some cases?



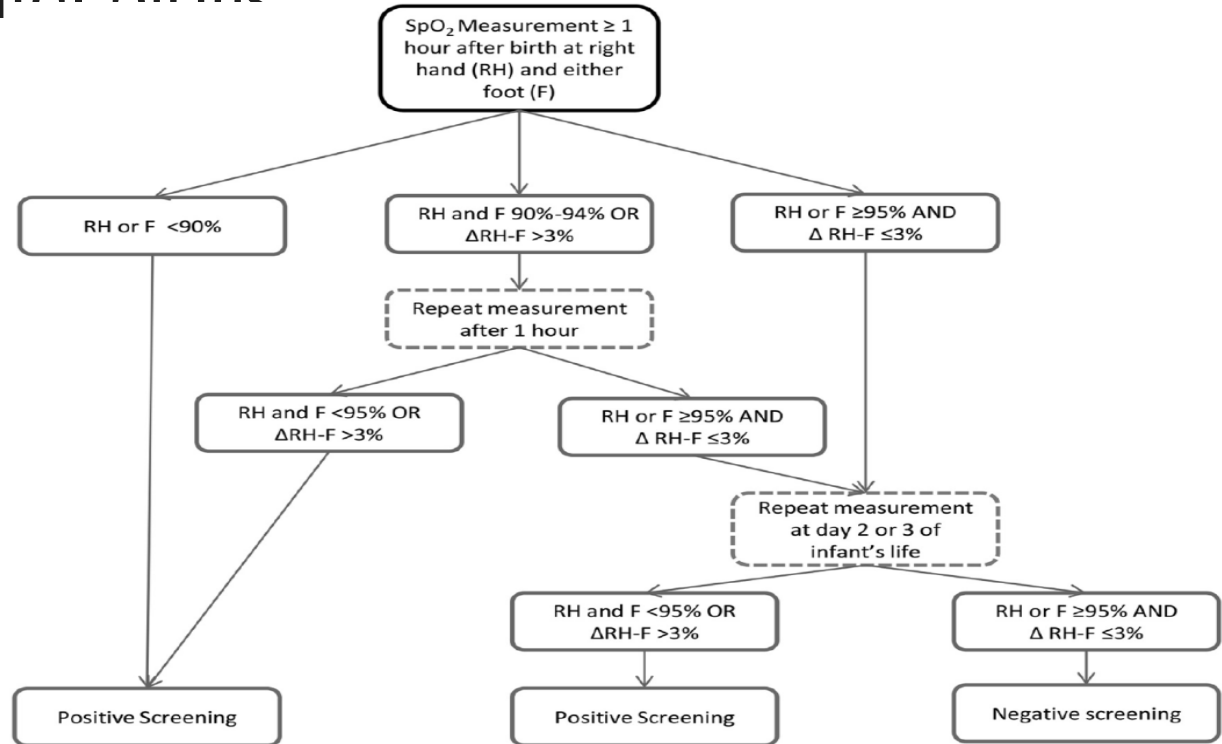
How do we adapt to special settings?

- Altitude



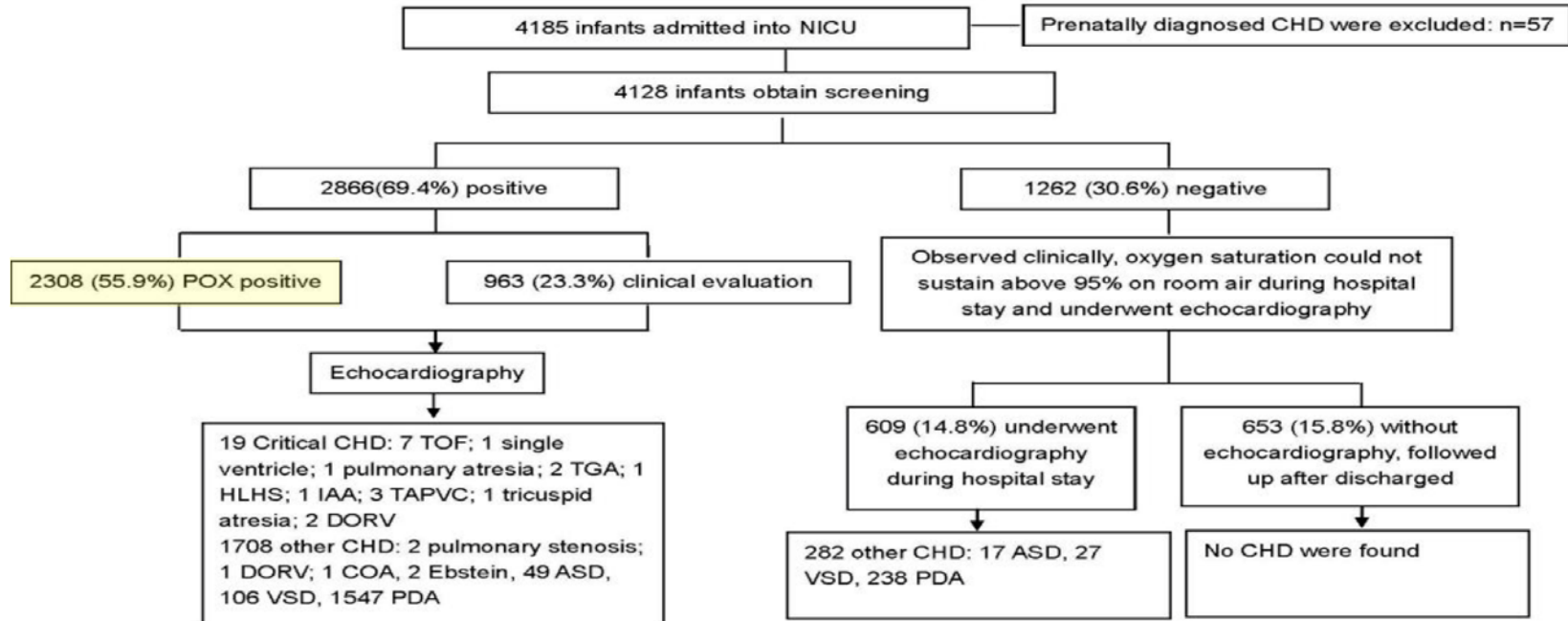
How do we adapt to special settings?

- Out-of-hospital births



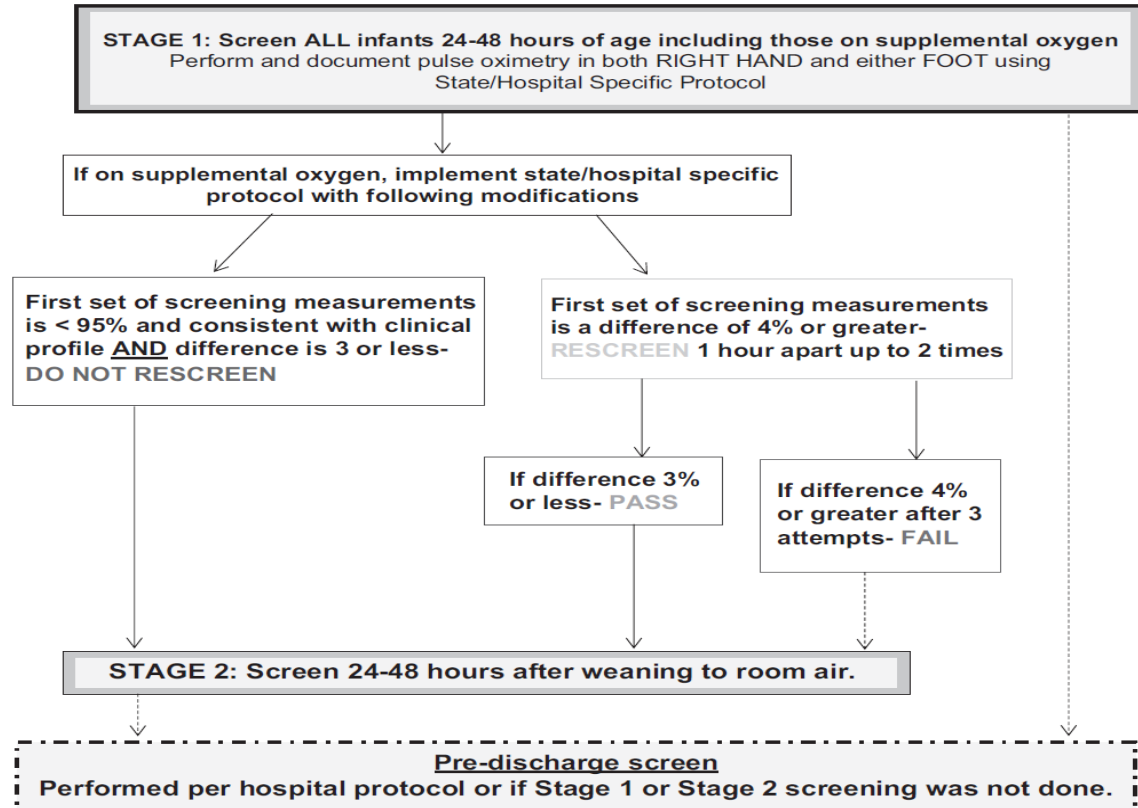
How do we adapt to special settings?

- NICU



How do we adapt to special settings?

- NICU



Opportunities

- What algorithm to use?
- What do we do with “false” positives?
- Is there something better than oxygen saturation level?

What algorithm to use?

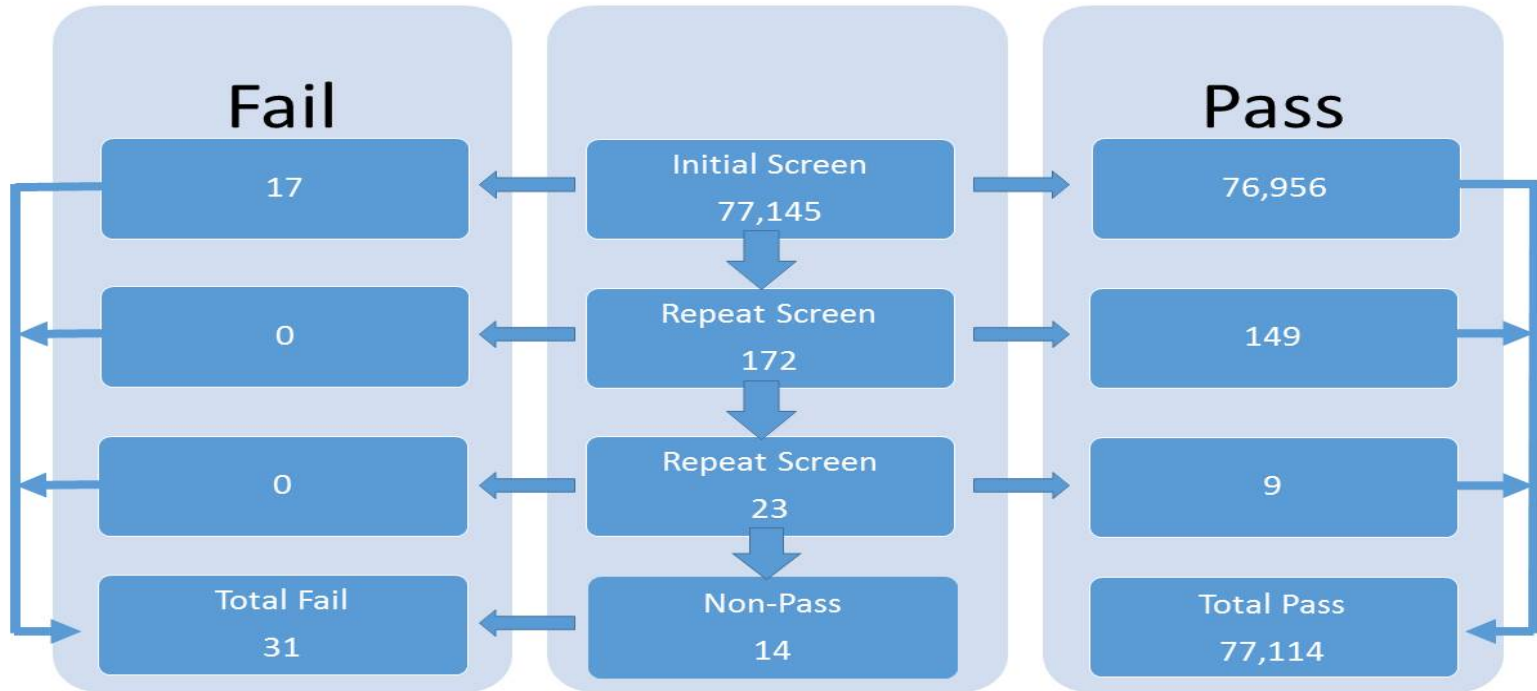
Algorithm Source	Cutoff for Passing With First Measurement	Retest Criteria for Subsequent Measurements	Fail Criteria
AAP	$O_2 \text{ sat} \geq 95\%$ (in either RH or F) AND hand-foot $O_2 \text{ sat} \leq 3\%$	$O_2 \text{ sat} < 95\%$ (in both RH and F) OR hand-foot $O_2 \text{ sat} > 3\%$	$O_2 \text{ sat} < 90\%$ (either RH or F) OR fail retest criteria $\times 3$
New Jersey	$O_2 \text{ sat} \geq 95\%$ (in both RH and F) AND hand-foot $O_2 \text{ sat} \leq 3\%$	$O_2 \text{ sat} < 95\%$ (in either RH or F) OR hand-foot $O_2 \text{ sat} > 3\%$	$O_2 \text{ sat} < 90\%$ (either RH or F) OR fail retest criteria $\times 3$
Tennessee	$O_2 \text{ sat} \geq 97\%$ (F)	$O_2 \text{ sat} < 95\%$ (in both RH and F) OR hand-foot $O_2 \text{ sat} > 3\%$	$O_2 \text{ sat} < 90\%$ (either RH or F) OR fail retest criteria $\times 3$

F, either foot; O_2 , oxygen; RH, right hand; sat, saturation.

Which algorithm to use?

	AAP	AAP Modified	NJ	NJ Modified	TN	TN Modified	Simple 1	Simple 2
UB SCREEN 0 >=					97	96		
LB SCREEN 0 <					90	90		
UB >=	95	95	95	94	95	95		
LB <	90	90	90	85	90	90	94	95
DIFF <=	3	5	3	6	3	4		
TRUE +	31	30	33	30	30	29	31	32
FALSE +	427	169	650	219	250	174	518	896
TRUE -	75264	75522	75041	75472	75441	75517	75173	74795
FALSE -	26	27	24	27	27	28	26	25
SENSITIVITY	0.54	0.53	0.58	0.53	0.53	0.51	0.54	0.56
1-SPECIFICITY	0.006	0.002	0.009	0.003	0.003	0.002	0.007	0.012
AREA UNDER CURVE	0.77	0.76	0.79	0.76	0.76	0.75	0.77	0.77

Which algorithm to use?



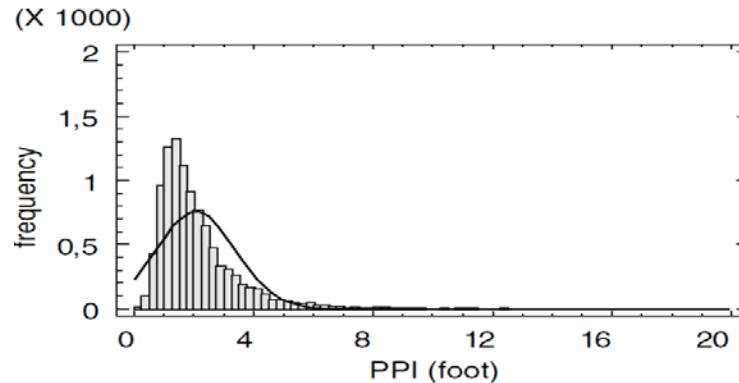
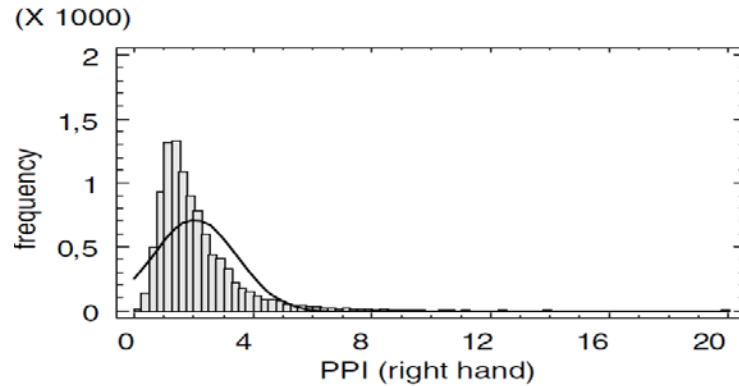
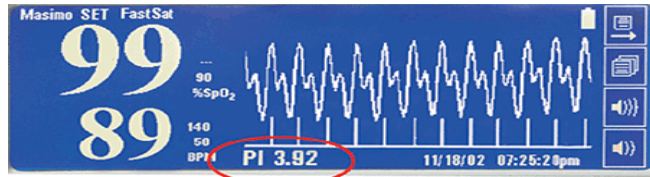
What do we do with “false positives”?

- Up to 70% of “false positive” cases may have some other explanation of hypoxia:
 - Pneumonia
 - PPHN
 - Pneumothorax
 - Sepsis
 - Meconium aspiration
 - TTN requiring oxygen

What do we do with “false positives”?

- “Additional evaluation and testing of the infant should be prioritized according to the conditions most relevant for each case, and such evaluation should not be delayed while awaiting an echocardiogram. ...The child should not be discharged without resolving the cause of desaturation or at least before excluding potentially life-threatening conditions. If a cause other than CCHD is identified and appropriately treated with resolution of hypoxemia, an echocardiogram might not be necessary.”

Is there something better than oxygen saturation level?



de-Wahl Granelli et al. 2007.

Conclusions

- Initial concerns have been allayed
- There are still some challenges to fully implementing CCHD screening
- Opportunities exist to improve CCHD screening further

Thank you



**Keep Calm
and
Put That
Pulse-Ox On**

MendedLittleHearts.org