



Interpreting Newborn Screening Results

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Interpreting NBS Results

- Clear and consistent communication
 - NBS laboratory
 - NBS follow-up
 - Clinical consultants
- Screening not equal to diagnostic testing
 - False negatives (sensitivity)
 - False positives (specificity, positive predictive value)



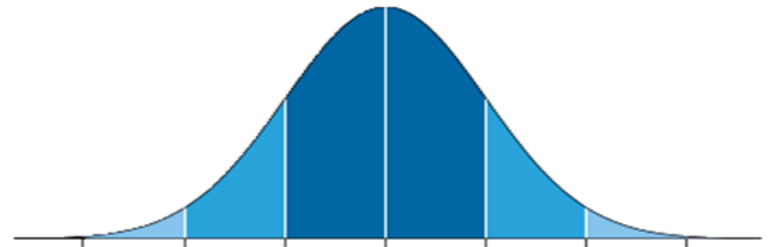
NBS Laboratory Testing

Ideal

Normal



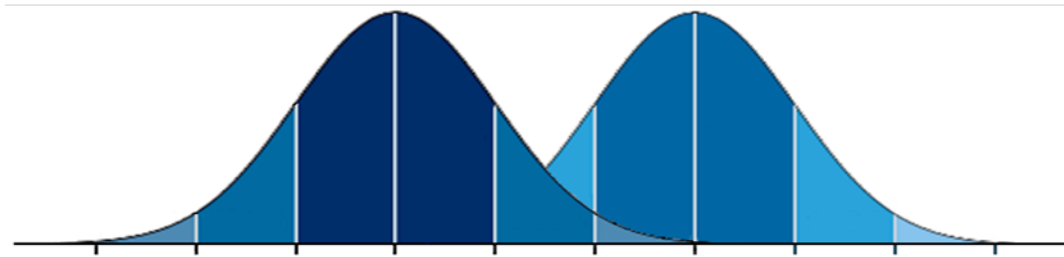
Cases



Common

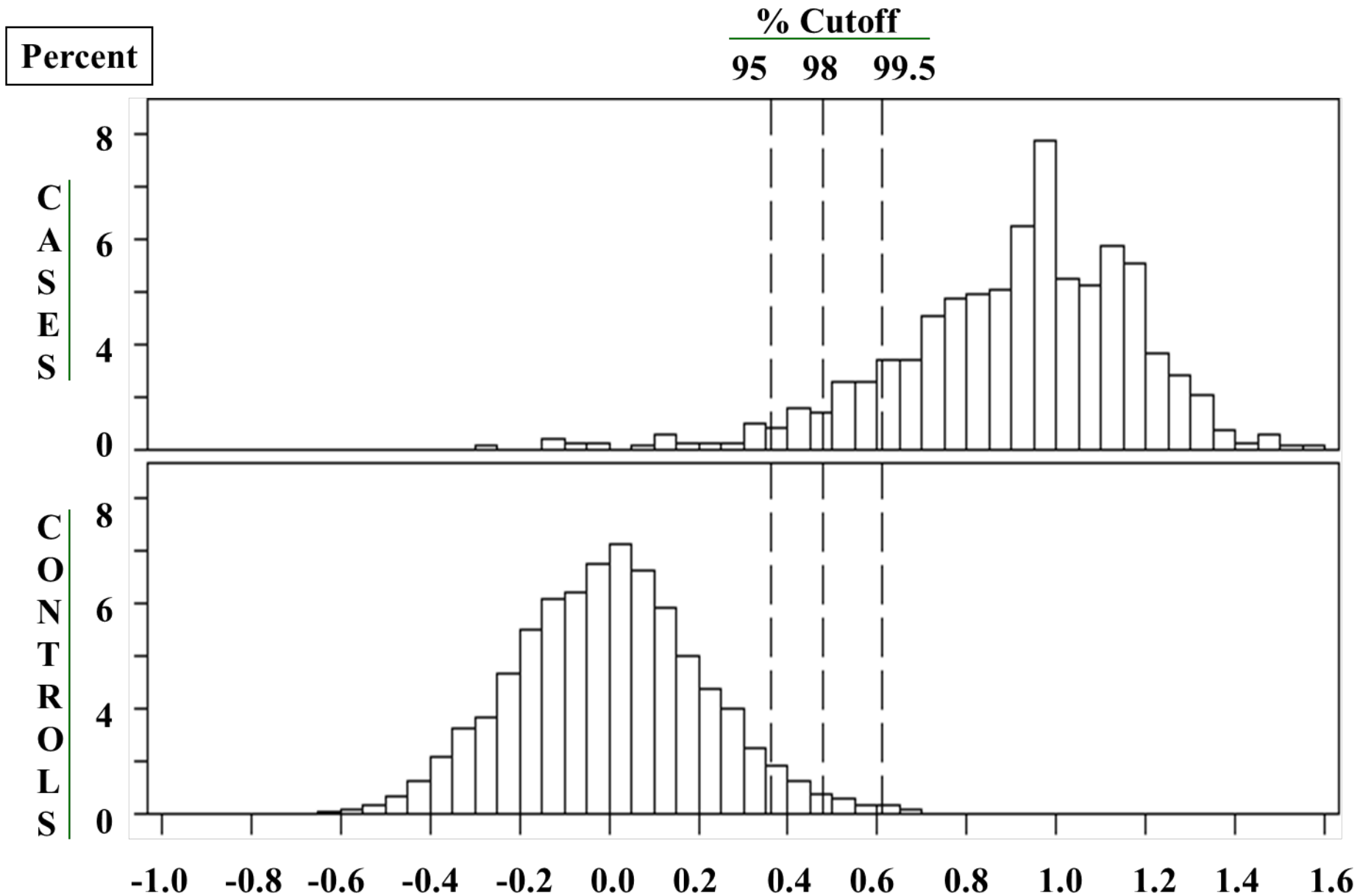
Normal

Cases

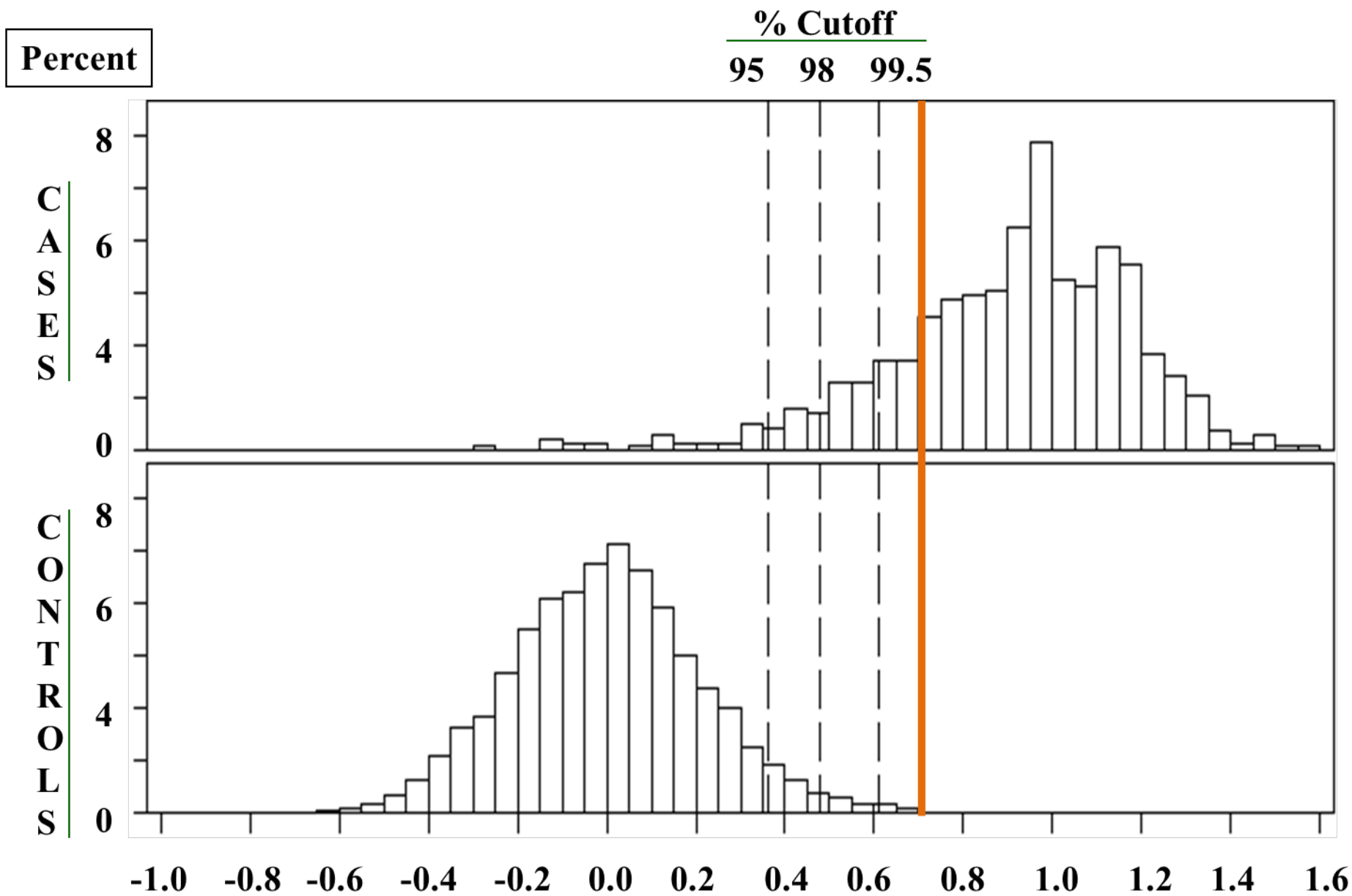


Distribution of lab values

Overlap of IRT levels between affected and non-affected



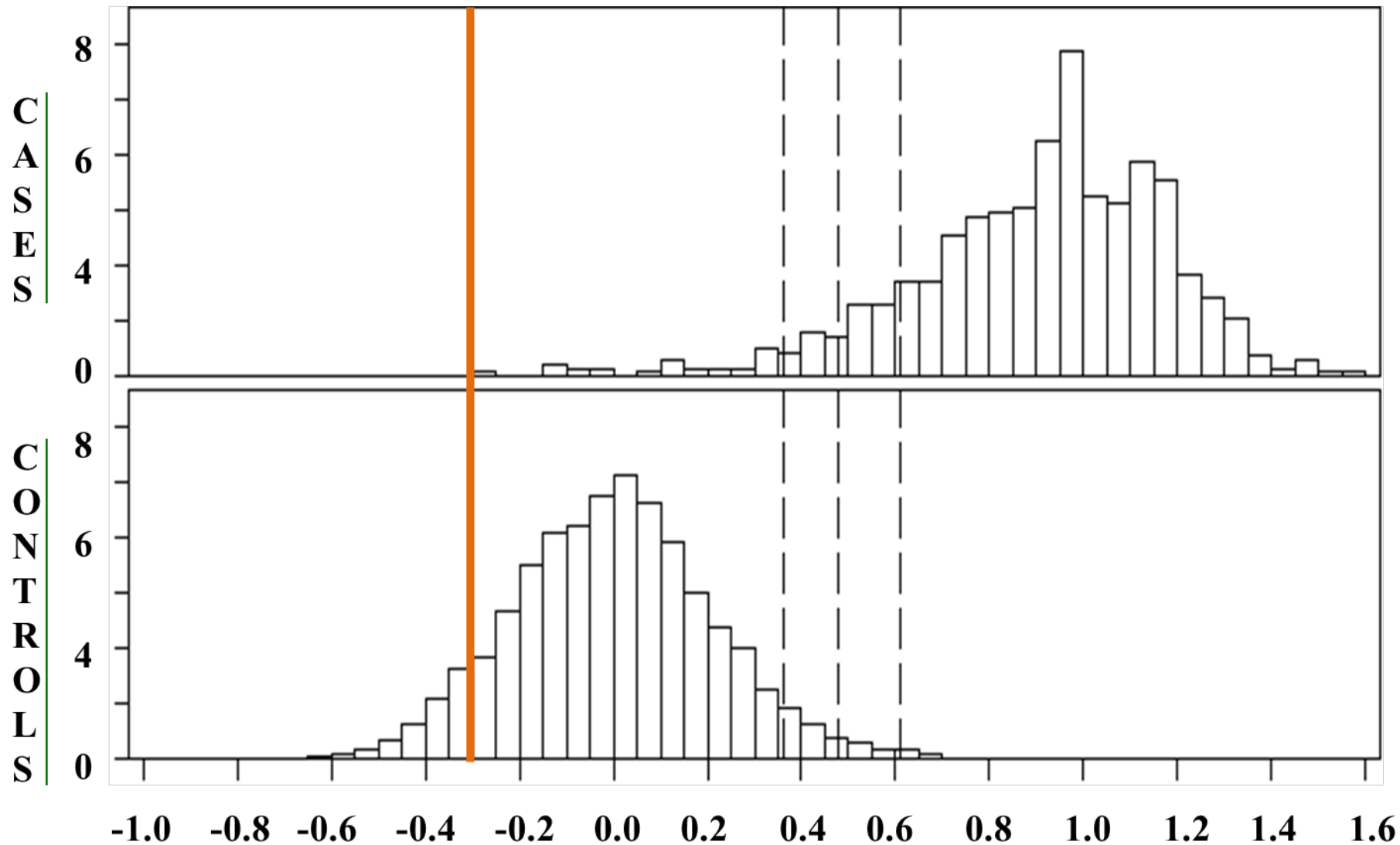
Overlap of IRT levels between affected and non-affected



Overlap of IRT levels between affected and non-affected

Percent

% Cutoff
95 98 99.5



NBS cutoff algorithms

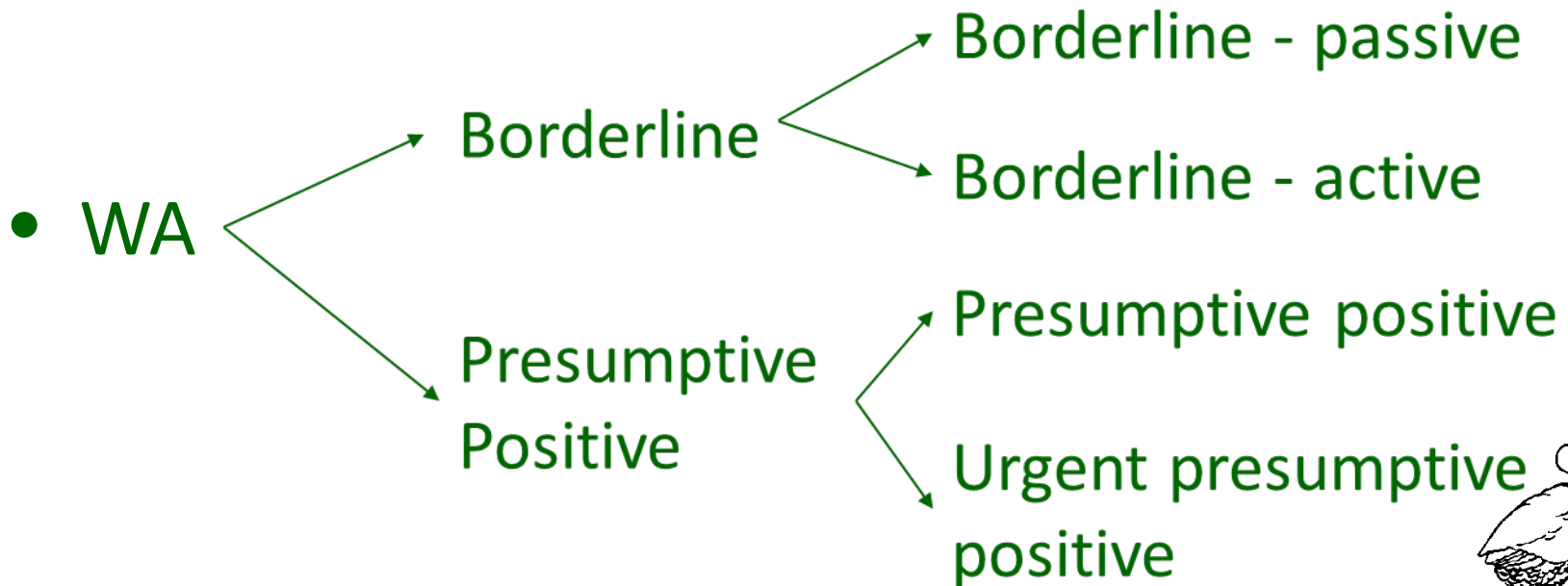
- Stratified by predictive value of results
- Urgency of follow-up dictated by likelihood of immediate clinical consequences (e.g. death)

Note: urgent result reporting is not delayed by other pending NBS tests



Terminology

- Normal (in-range; within normal limits; negative; passing)
- Abnormal (out-of-range; equivocal; positive)



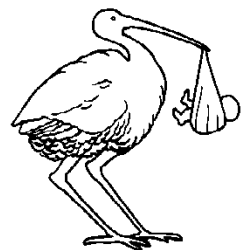
Biotinidase deficiency algorithm

Initial

Biotinidase (% activity)	Classification
> 30%	Normal
10% – 30%	Partial deficiency
< 10%	Profound deficiency

Revised

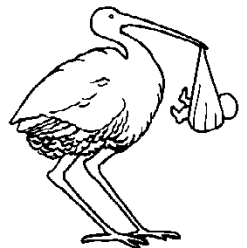
Biotinidase (% activity)	Classification
> 20%	Normal
10% – 20%	Partial deficiency
< 10%	Profound deficiency



MSUD algorithm

LEU μmol/L blood	Age at collection less or equal to 6 days		Age at collection greater than 6 days	
	not all secondary markers* elevated	all secondary markers* elevated	not all secondary markers* elevated	all secondary markers* elevated
< 236	normal	normal	normal	normal
236 - 321	borderline	borderline	normal	normal
322 - 465	borderline	presumptive positive	borderline	presumptive positive
≥ 466	presumptive positive	presumptive positive	borderline	presumptive positive

* Normal ranges for secondary markers: val < 220, leu/ala < 1.5, leu/phe < 3.65, val/phe < 3.0



Congenital hypothyroidism algorithm

TSH μIU/mL serum	1 to 12 hours	13 to 24 hours	25 to 36 hours	37 to 48 hours	49 to 504 hours	> 504 hours
0 — 14.99	Normal	Normal	Normal	Normal	Normal	Normal
15.00 — 19.99	Normal	Normal	Normal	Normal	Normal	Borderline
20.00 — 24.99	Normal	Normal	Normal	Normal	Borderline	Borderline
25.00 — 29.99	Normal	Normal	Normal	Borderline	Borderline	Borderline
30.00 — 44.99	Normal	Normal	Borderline	Borderline	Borderline	Borderline
45.00 — 54.99	Normal	Borderline	Borderline	Borderline	Borderline	Borderline
55.00 — 59.99	Borderline	Borderline	Borderline	Borderline	Borderline	Borderline
60.00 — 99.99	Borderline	Borderline	Presumptive	Presumptive	Presumptive	Presumptive
greater than or equal to 100.00	Presumptive	Presumptive	Presumptive	Presumptive	Presumptive	Presumptive

6 age categories





Congenital hypothyroidism algorithm

Categorization of Thyroid Screening Results Using Primary TSH

AAC	<i>TSHBD Borderline Passive TSH ≥</i>	<i>TSHBDA Borderline Active TSH ≥</i>	<i>TSHPP Presumptive Referral TSH ≥</i>	<i>TSHPPU Urgent Presumptive TSH ≥</i>
1 hours	115	175	190	300
2-7 hours	100	150	180	300
8-17 hours	60	100	125	300
18-22 hours	40	75	80	300
23-25 hours	35	75	80	300
26-35 hours	30	50	80	300
36-47 hours	26	50	60	100
48-72 hours	20	50	60	100
73-144 hours	18	40	50	100
145-504 hours	n/a	16	35	100
505 hours - 6 months	n/a	13	30	100

11 age categories = fewer false(+) results



Factors for NBS Interpretation

- Age of baby at collection
- Birth weight/gestational age
- Clinical status of the baby at time of collection
- Race/ethnicity
- Specimen handling procedures

Resources for NBS Interpretation

- Other NBS programs
 - Funding: HRSA, CDC
 - Technical assistance: APHL, NNSGRC, ACMG
- Data repositories
 - R4S
 - NewSTEPs
- State specific databases/repositories
- Clinical specialists

Program Challenges

A chain of metal links is shown against a solid blue background. The chain is composed of several interlocking links, with some links appearing more prominent than others. On the left side of the image, there are four white rectangular text boxes, each containing a different challenge. The text is in a clean, black, sans-serif font.

Lack of technical expertise

Insufficient staff time

Information technology

Disagreement among specialists