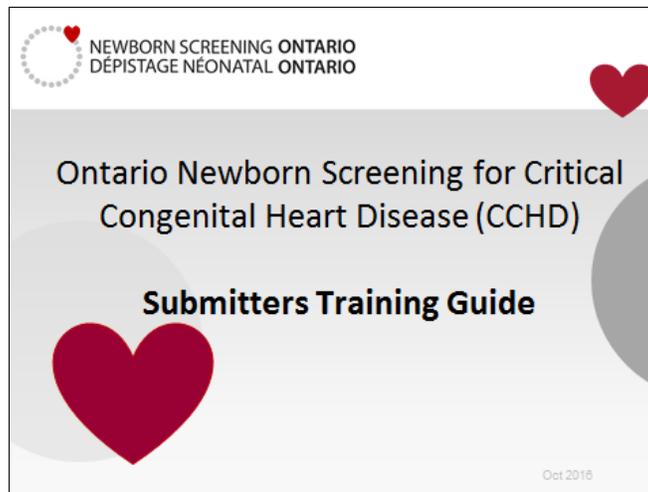


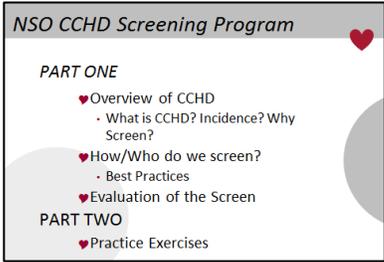
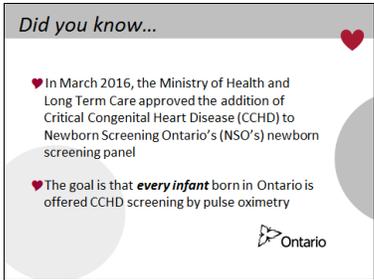
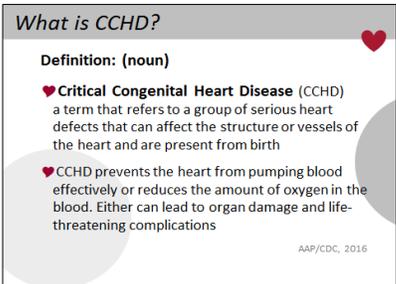


***Suggested Script for
Submitters Training Module
CCHD Power Point Presentation***





Suggested commentary for Power Point presentation:

<p><i>Slide 1:</i></p> 	<ul style="list-style-type: none"> ♥ Thank you for taking the time to learn about Critical Congenital Heart Disease pulse oximetry screening. ♥ We are very proud to be able to soon offer this valuable screening to all Ontario's well babies.
<p><i>Slide 2</i></p> 	<ul style="list-style-type: none"> ♥ This is the outline for this presentation. ♥ Please see the additional presentation that describes the Documentation process on the NSO blood spot cards.
<p><i>Slide 3</i></p> 	<ul style="list-style-type: none"> ♥ It is important that the screening program is based on best practice guidelines, is standardized across the province and is accessible for all newborns.
<p><i>Slide 4</i></p> 	<ul style="list-style-type: none"> ♥ Definitions for CCHD as described.



<p><i>Slide 5</i></p> <p>Incidence?</p> <p><i>It is not uncommon...</i></p> <ul style="list-style-type: none"> ♥ Congenital Heart Disease (CHD) occurs in 12 per 1000 live births, 25% of CHD cases are <i>critical</i> or CCHD – require surgery or catheter intervention in the 1st year of life - CHD remains a leading cause of infant death ♥ ~1-2 infant deaths per year in Ontario due to undiagnosed CCHD (Ontario Coroner's office) <p><small>CCS/CPCA Position Statement, 2016</small></p>	<ul style="list-style-type: none"> ♥ <i>These statistics and practice guidelines are based on the Canadian Cardiovascular Society's position statement on CCHD screening best practice recommendations. The Canadian Paediatric Society is also aligned with these practice points.</i> ♥ <i>The Newborn Screening Ontario CCHD protocols are based on this...the standard for Canadian practice.</i>
<p><i>Slide 6</i></p> <p>Pulse Oximetry Primary Targets</p> <ul style="list-style-type: none"> ♥ Hypoplastic left heart syndrome ♥ Pulmonary atresia with intact septum ♥ Total anomalous pulmonary venous return ♥ Transposition of the great arteries ♥ Truncus arteriosus ♥ Tetralogy of Fallot ♥ Tricuspid atresia <p>The Cyanotic Seven</p>	<ul style="list-style-type: none"> ♥ <i>The pulse oximetry screen done during the recommended time frame of 24-48hrs of age (24-36hrs, optimally) is very effective at identifying cyanotic heart disease.</i> ♥ <i>These primary targets are sometimes called the 'cyanotic 7'</i>
<p><i>Slide 7</i></p> <p>Detected by Pulse Oximetry</p> <p>Secondary Targets: CCHDs detected by Pulse Oximetry (sometimes cyanotic):</p> <ul style="list-style-type: none"> ♥ Coarctation of the aorta ♥ Double outlet right ventricle ♥ Ebstein's anomaly ♥ Interrupted aortic arch ♥ Single ventricles <p>Also</p> <ul style="list-style-type: none"> ♥ Sepsis ♥ Respiratory Issues ♥ Persistent Pulmonary Hypertension of the Newborn (PPHN) 	<ul style="list-style-type: none"> ♥ <i>These are other conditions that can be 'caught in the CCHD screening net'.</i> ♥ <i>This is why it is important to tell parents that the screen is not a diagnostic tool for critical heart disease, but an alert to investigate further. Other conditions can cause cyanosis and it is important to determine the cause.</i>
<p><i>Slide 8</i></p> <p>Why screen for CCHD?</p> <p><i>Missed or late diagnosis can be devastating...</i></p> <ul style="list-style-type: none"> ♥ Prenatal ultrasound detects only about half of CCHD ♥ Unfortunately, changes in the structure and function of the newborn heart can lead to CCHD going unrecognized during the newborn hospital stay <p>Pulse Oximetry Newborn Screening can identify some infants with CCHD before they show signs of the condition, resulting in better outcomes for the baby</p>	<ul style="list-style-type: none"> ♥ <i>Consider the point of the screen...early detection prior to overt symptoms.</i> ♥ <i>Often these babies can appear quite normal. They can also have a normal physical exam with no murmur, no clinical cyanosis but most will have hypoxemia.</i> ♥ <i>Consider the Cyanotic Blind Spot...This occurs when you have an abnormal saturation with no visible cyanosis (usual range is around 83-95)...other factors can impede an accurate visual assessment of a baby's colour (lighting, ethnicity of the baby, hemoglobin, etc.) This is why the pulse oximeter is very useful... it can provide a numeric value rather than a judgement. (Incidentally, this is also why it was introduced into the NRP guidelines in 2012...visual assessment can be quite</i>



<p><i>Slide 9</i></p> <div data-bbox="277 235 651 516"> <p>Diagnosis of CCHD</p> <p>PO Screening used IN COMBINATION with prenatal ultrasound & postnatal physical exam, is the best approach to identify newborns with CCHD that would otherwise be missed prior to discharge.</p> <p>Estimated ~300 positive screens per year in Ontario with CCHD pulse oximetry screening implementation</p> </div>	<p>unreliable)</p> <ul style="list-style-type: none"> ♥ <i>The pulse ox screening is not intended to replace the current forms of screening (ultrasound or physical examination) but rather to add another layer to assist in early identification.</i>
<p><i>Slide 10</i></p> <div data-bbox="272 575 657 863"> <p>Responsibilities</p> <ul style="list-style-type: none"> ♥ Education to parents/guardians should include <ul style="list-style-type: none"> ♥ CCHD screening is not mandatory ♥ CCHD screening is a recommended standard of care ♥ Parents/guardians have the right to decline <ul style="list-style-type: none"> ♥ If they choose to do so, please document this on the CCHD portion of the blood spot card </div>	<ul style="list-style-type: none"> ♥ <i>Parents should be made aware that the screen is a safe, quick and painless test that measures oxygen levels. The probe for measuring is like a Band-Aid that wraps around the hand or foot. The screening is important because it can help to identify CCHD babies before they have symptoms. The results will be available immediately.</i> ♥ <i>Parents have the right to refuse the screen</i>
<p><i>Slide 11</i></p> <div data-bbox="264 940 664 1312"> <p>Best Practices</p> <ul style="list-style-type: none"> ♥ Optimal timing 24-48 hours of age; the earlier during that time frame, the better <ul style="list-style-type: none"> ♥ If discharge occurs before 24 hours, arrangements to be made for CCHD screening during the recommended time frame ♥ Screen well babies, in a quiet, non-fussing state, prior to any disruptive care activities (e.g. bloodwork) ♥ NICU/SCN/PICU babies may be screened if <ul style="list-style-type: none"> ♥ Cardio-respiratory status is stable and expected length of stay is less than 7 days OR at time of discharge if baby is less than 7 days of age </div>	<ul style="list-style-type: none"> ♥ <i>Pulse Ox screening before 24 hours of age increases the risk of false positive because transitional cardiovascular changes that occur during the initial 24 hours of life may be incomplete (closure of the ductus arteriosus)</i> ♥ <i>It is ok for babies to be held during the screen or to be breastfed during the screen.</i> ♥ <i>While the pulse ox screen is intended for 'well babies', NICU/SCN babies can benefit as well, provided their cardio-respiratory status is stable and their length of stay is expected to be less than 7 days of age. There is no value in performing the screen after 7 days of age as most CCHD cases would be evident by that time.</i>
<p><i>Slide 12</i></p> <div data-bbox="253 1514 677 1829"> <p>Special Considerations</p> <p><i>Do not screen:</i></p> <ul style="list-style-type: none"> ♥ Infants in NICU/SCN/PICU with an expected length of stay of longer than 7 days ♥ Infants diagnosed with CCHD/CHD prenatally or symptomatically after birth ♥ When parents/guardians decline </div>	<ul style="list-style-type: none"> ♥ Screening Exclusions <ul style="list-style-type: none"> ○ <i>NICU babies with an expected greater than 7 day hospitalization</i> ○ <i>Babies already diagnosed prenatally with CHD/CCHD or babies who are identified during their first 24 hours</i> ○ <i>When parents/guardians decline. (Ensure they are informed that this is a recommended standard of care for newborns)</i>



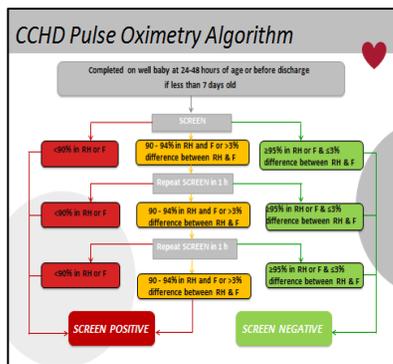
Slide 13

PO Screening: Best Practices

- ♥ Pre-ductal (RIGHT hand) and post-ductal (EITHER foot) saturations are measured in direct sequence, noting the highest value achieved during a 30 second evaluation **once a reliable signal is obtained**
- ♥ The two values are then compared using the algorithm or evaluation chart

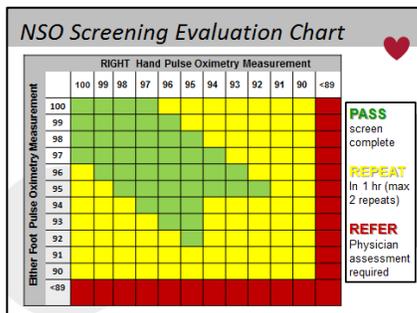
- ♥ It does not matter which site is performed first (try the least disruptive to the baby)
- ♥ Turn off any bili treatment lights as they can interfere with the receptor side of the oximeter probe
- ♥ Ensure a reliable signal is established (using confidence indicators e.g. even pleth line, regular HR audible, etc) prior to gathering a reading
- ♥ Once you have a reliable signal, watch the saturation value for 30 seconds, noting the highest saturation value during that time. That is your value for that particular site.

Slide 14



- ♥ This is the algorithm that is suggested for use for Ontario babies
- ♥ It is a revised version of the American Academy of Pediatrics (AAP) algorithm for CCHD.
- ♥ Note it outlines the recommended window for screening as 24-48 hours.
- ♥ It offers 3 result options for each screen with a possible 2 repeat screens (3 total)
- ♥ Remember...24-2-3 (after 24 hours of age, 2 steps or sites, and 3 chances)

Slide 15



- ♥ The chart compliments the algorithm
- ♥ Follow the pre-ductal or Right hand value across the top and the post-ductal or either foot value along the left side. Find the intersecting point and note the colour of the box for the result of the screen.
- ♥ Red is immediate REFER... yellow means a repeat in one hour (unless this is the third screen, then refer) and green is a pass and no further testing is needed.
- ♥ You should have this chart (or the algorithm) handy at the time of screening for evaluation purposes

Slide 16

- ♥ A screen negative or **PASS** result means the baby has at least one measurement over 95% and the difference between the two measurements is 3% or less.
- ♥ If a pass result is obtained, the blood spot card is completed, and forwarded to Newborn Screening Ontario.



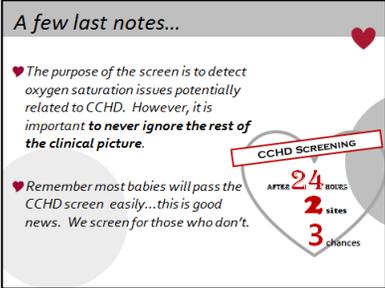
<p>Screen Negative</p> <p>Screen Negative ("Pass")</p> <ul style="list-style-type: none"> SpO2 is greater than or equal to 95% in either the hand or foot, with less than or equal to 3% difference between them. <p>What next?</p> <ul style="list-style-type: none"> No further measurements required Inform parents/guardians of the result Documentation on CCHD portion of the blood spot card and forward to Newborn Screening Ontario 	
<p>Slide 17</p> <p>Repeat Result...</p> <ul style="list-style-type: none"> SpO2 is less than 95% in hand <u>AND</u> foot (but not less than 90) or more than 3% difference between the hand and foot The screen can be repeated twice (for a total of three chances) After the third screen, you will have either a Pass or Refer result 	<ul style="list-style-type: none"> For an indeterminate or REPEAT result, both measurements are under 95% (but not less than 90%) or the difference is greater than 3%. The screen can be done up to 3 times, (an initial, plus 2 repeats...total is 3 attempts) The third attempt is the last chance and the result will either be a pass or refer result.
<p>Slide 18</p> <p>Screen Positive</p> <p>Screen Positive ("Refer")</p> <ul style="list-style-type: none"> SpO2 in hand OR foot less than 90% at any time <p>OR</p> <ul style="list-style-type: none"> SpO2 is less than 95% in hand AND foot or more than 3% difference on 3 separate measures, each separated by 1 hour <p><i>Remember: "Three strikes and you're out"</i></p> 	<ul style="list-style-type: none"> A screen positive or REFER result indicates that either <ul style="list-style-type: none"> both measurements are under 95% (but not less than 90%) or the difference is greater than 3% on three attempts each separated by an hour (3 unsuccessful repeats) OR the saturation in the hand or foot was less than 90% at some point in the screen
<p>Slide 19</p> <p>Screen Positive</p> <p>What next?</p> <ul style="list-style-type: none"> Urgent referral to a physician for further investigation For out of hospital environments, follow your usual referral protocol as appropriate per clinical picture 	<ul style="list-style-type: none"> Once a screen positive result is obtained, the cause for the difference in saturations or low saturation must be determined. A screen positive is an indication to alert a physician for further investigation Screen positives at home should follow the usual protocol for referral to physician as appropriate for the clinical picture of the baby.
<p>Slide 20</p>	<ul style="list-style-type: none"> Urgent referral to be made to physician Physical exam by physician should include a 4 limb BP, femoral pulses, full vital signs and pre and post ductal saturations. Also consider an ECG, chest X-Ray and rule out other non-cardiac causes. If cardiac diagnosis cannot be confidently ruled out, consultation with a paediatric cardiologist or



<p>Screen Positive Result?</p> <ul style="list-style-type: none"> ♥ Urgent physician referral <ul style="list-style-type: none"> • Consideration of non-cardiac pathology (e.g. infection, persistent pulmonary hypertension) • Referral to pediatric cardiology / echocardiography if cannot exclude CCHD ♥ Possible transfer to another unit or hospital ♥ Inform parents/guardians of the result ♥ Documentation on CCHD portion of the blood spot card and forward to Newborn Screening Ontario 	<p><i>paediatrician/neonatologist for further investigation would be advisable.</i></p> <ul style="list-style-type: none"> ♥ <i>The screener will complete the CCHD portion of the DBS card appropriately and forward to NSO.</i>
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<p>Slide 21</p> <p>Screen Positive Result?</p> <p>Remember...a screen positive does not necessarily mean CCHD...it indicates a need for further assessment</p> <ul style="list-style-type: none"> ♥ Newborn Screening Ontario will follow up on screen positives with a phone call to determine the outcome 	
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<p>Slide 22- 30</p> <p>Part Two</p> 	<ul style="list-style-type: none"> ♥ <i>This next section offers an opportunity to practice using the evaluation chart and algorithm. The answers are provided as the slides progress with discussion and rationale for the decisions made. (8 practice scenarios, with solutions)</i>
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<p>Slide 31</p> <p>A few last notes...</p> <ul style="list-style-type: none"> ♥ <i>The purpose of the screen is to detect oxygen saturation issues potentially related to CCHD. However, it is important to never ignore the rest of the clinical picture.</i> ♥ <i>Remember most babies will pass the CCHD screen easily...this is good news. We screen for those who don't.</i> 	<ul style="list-style-type: none"> ♥ <i>The screen is intended to identify CCHD through either difference in saturations between pre-ductal and post-ductal site measurements or by detecting cyanosis prior to clinical presentation. We must always evaluate the baby based on various factors and never ignore the complete clinical picture.</i>
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<p>Slide 33</p>	<ul style="list-style-type: none"> ♥ <i>Question period to address any issues or questions. Please feel free to direct any questions you are uncertain about to nsocch@cheo.on.ca or alternatively, visit the</i>
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<p>Questions?</p>  <p><i>Thank you for your front line commitment to promoting healthy starts for Ontario's babies!</i></p>	<p><i>Newborn Screening Ontario website, CCHD section.</i></p> <p><i>Thank you for your attention!</i></p>