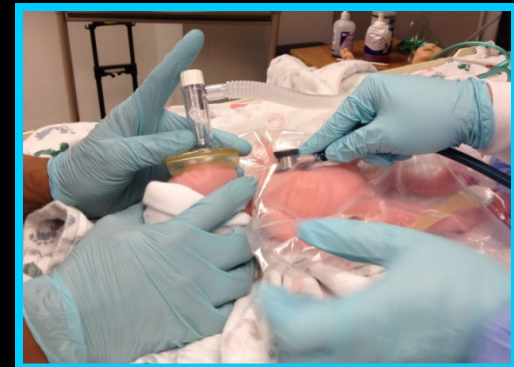


2015 International Liaison Committee on Resuscitation (ILCOR): Highlights of the New Recommendations for Neonatal Resuscitation

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Achieving Consensus on Resuscitation Science

- Since 2000, a Neonatal Task Force has participated with the International Liaison Committee on Resuscitation (ILCOR) for complete review of newborn resuscitation science every 5 years.
- 23 questions reviewed for the 2015 Neonatal Resuscitation Guidelines





ILCOR Evaluation Process Brings New Resuscitation Science Forward for Review

- Identify and prioritize the questions that need scientific review and assign reviewers (2-3 per question)
- Minimum requirements for every search strategy are specified and done by professional librarians
 - Medline, Embase, and Cochrane Systematic Reviews
 - Hand searches
- Every reviewer rates the level and quality of evidence using a standardized evidence evaluation (GRADE system)
- Consensus for each question reached by entire Neonatal Task Force in Feb 2015

Understanding GRADE

- GRADE: Most widely used method for appraising studies to be included in systematic reviews and guidelines
 - Recommended by Institute of Medicine-to give a common process and language for published guidelines
- GRADE is a method used by systematic reviewers and guideline developers to assess
 - the quality of evidence
 - Decide whether to recommend an intervention
- Grade is different from other appraisal tools because it
 - Separates quality of evidence and strength of recommendation
 - The quality of evidence is assessed for each outcome of interest
 - Observational studies can be “up-graded” if they meet certain criteria

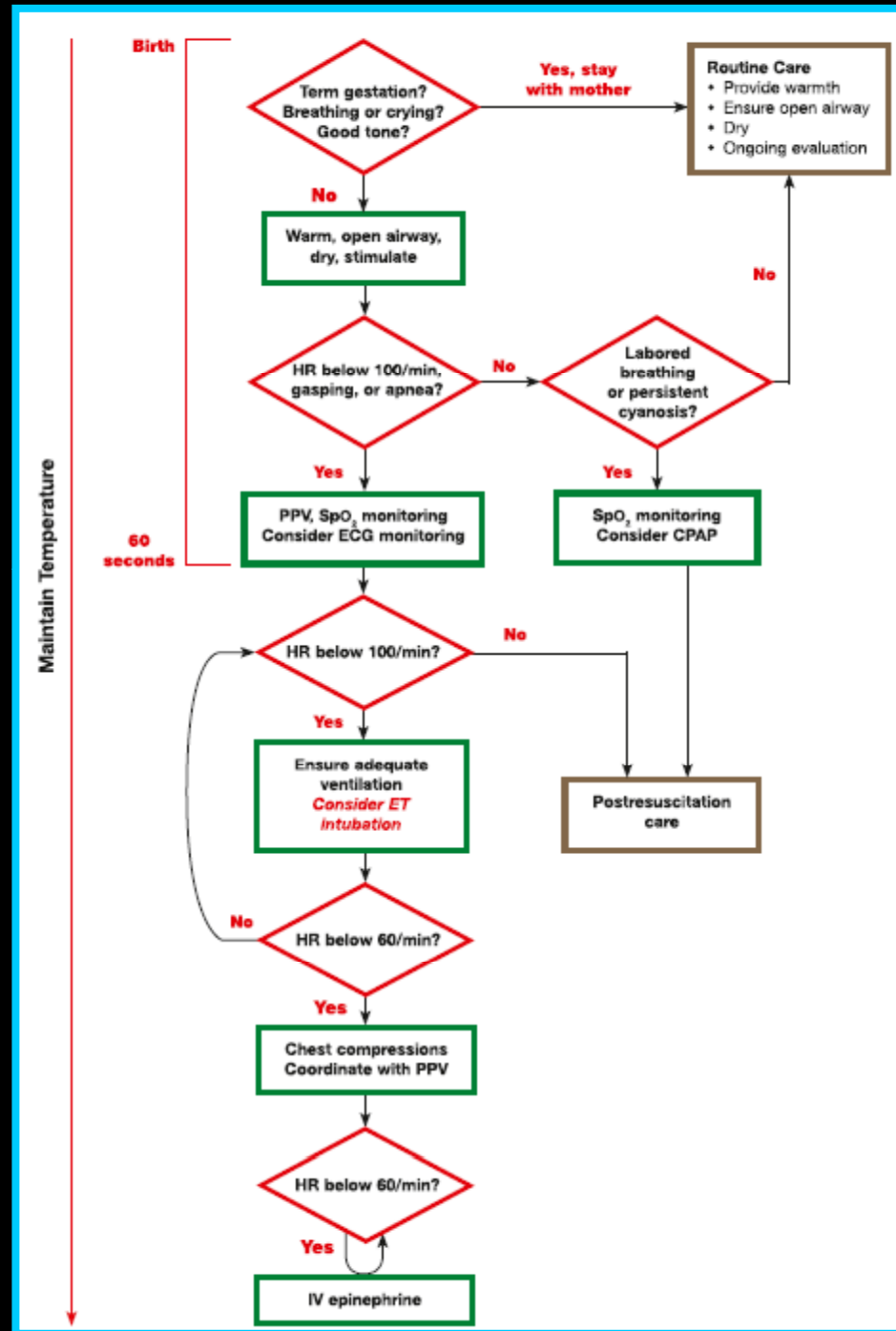
ILCOR Guidelines for Neonatal Resuscitation

- New ILCOR Consensus on Science with Treatment Recommendations (CoSTR) document available online since October 15, 2015
- USA guidelines supplement based on CoSTR co-published in *Circulation*, *Resuscitation* and *Pediatrics*
- Download at: www.heart.org/cpr



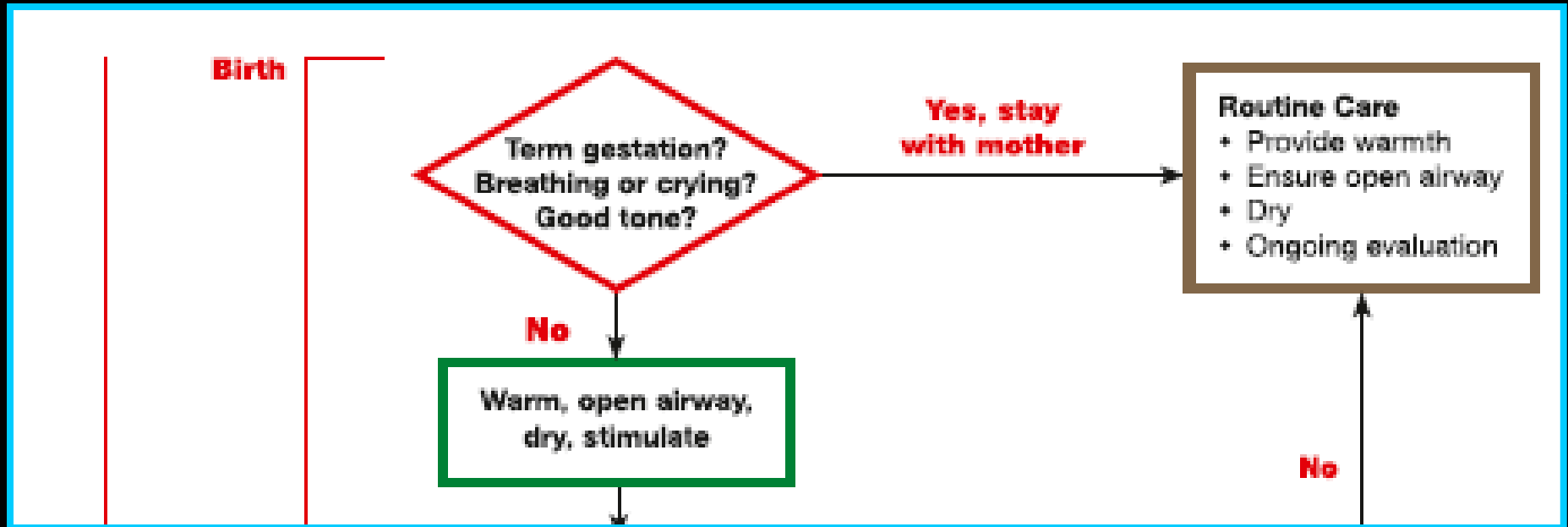


2015 New Algorithm





Initial questions to ask following birth have not changed



Delayed Cord Clamping: 2010 ILCOR Review

- OK for Term Infants who were not in need of resuscitation
- Not enough data to make recommendation for preterm infants



2015: Delayed Cord Clamping (DCC) for Preterm Infants?

- Outcomes examined: mortality, severe IVH, any IVH, hemodynamic stability, hyperbilirubinemia, neurodevelopment
- Sixteen articles included
 - RCTs 12 articles (691 cases)
 - Non-RCTs 4 articles (811 cases)
 - Excluded 230 articles
- No difference in mortality or severe IVH
- No data for neurodevelopment
- DCC improved any IVH, hemodynamic stability
- We suggest DCC for preterm infants not requiring immediate resuscitation after birth



Outcome: PVH/IVH (gr I-IV)

<RCT>

Study or Subgroup	DCC		ICC		Weight	Odds Ratio M-H, Fixed, 95% CI
	Events	Total	Events	Total		
Hofmeyr 1988	8	23	10	13	19.6%	0.16 [0.03, 0.75]
Hofmeyr 1993	8	40	11	46	19.3%	0.80 [0.28, 2.23]
Kugelman 2007	2	30	4	35	8.1%	0.55 [0.09, 3.26]
McDonnell 1997	0	15	1	16	3.3%	0.33 [0.01, 8.83]
Mercer 2003	3	16	5	16	9.6%	0.51 [0.10, 2.62]
Mercer 2006	5	36	13	36	26.4%	0.29 [0.09, 0.91]
Oh 2011	4	16	3	17	5.1%	1.56 [0.29, 8.38]
Rabe 2000	1	19	3	20	6.5%	0.31 [0.03, 3.33]
Strauss 2008	1	45	1	60	2.0%	1.34 [0.08, 22.03]
Total (95% CI)		240		259	100.0%	0.49 [0.29, 0.82]

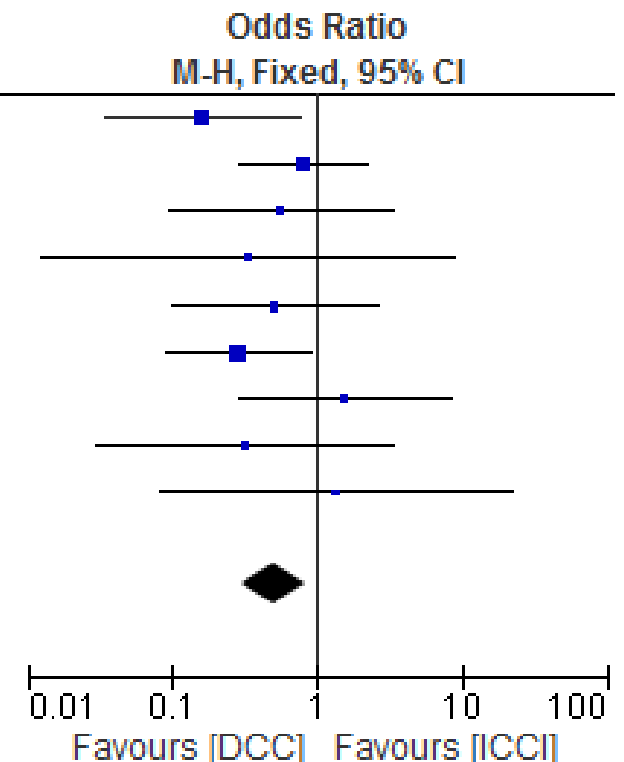
Total events

32

51

Heterogeneity: $\text{Chi}^2 = 6.20$, $\text{df} = 8$ ($P = 0.63$); $I^2 = 0\%$

Test for overall effect: $Z = 2.70$ ($P = 0.007$)





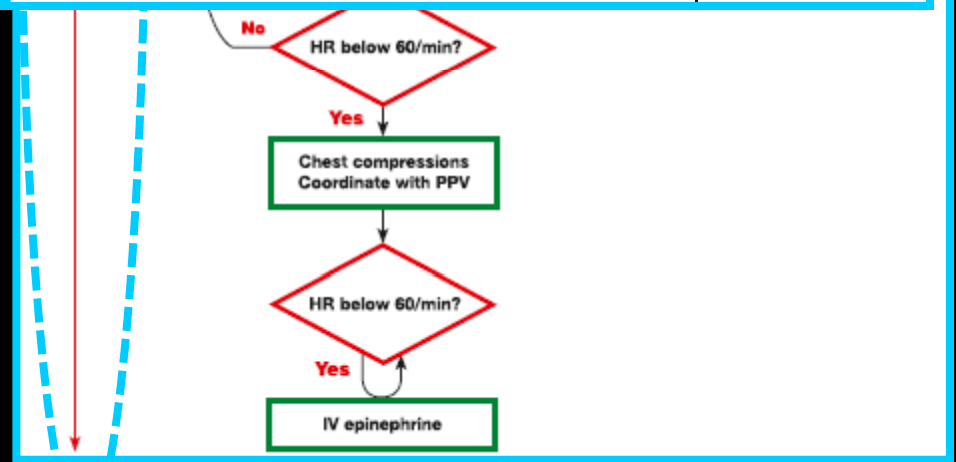
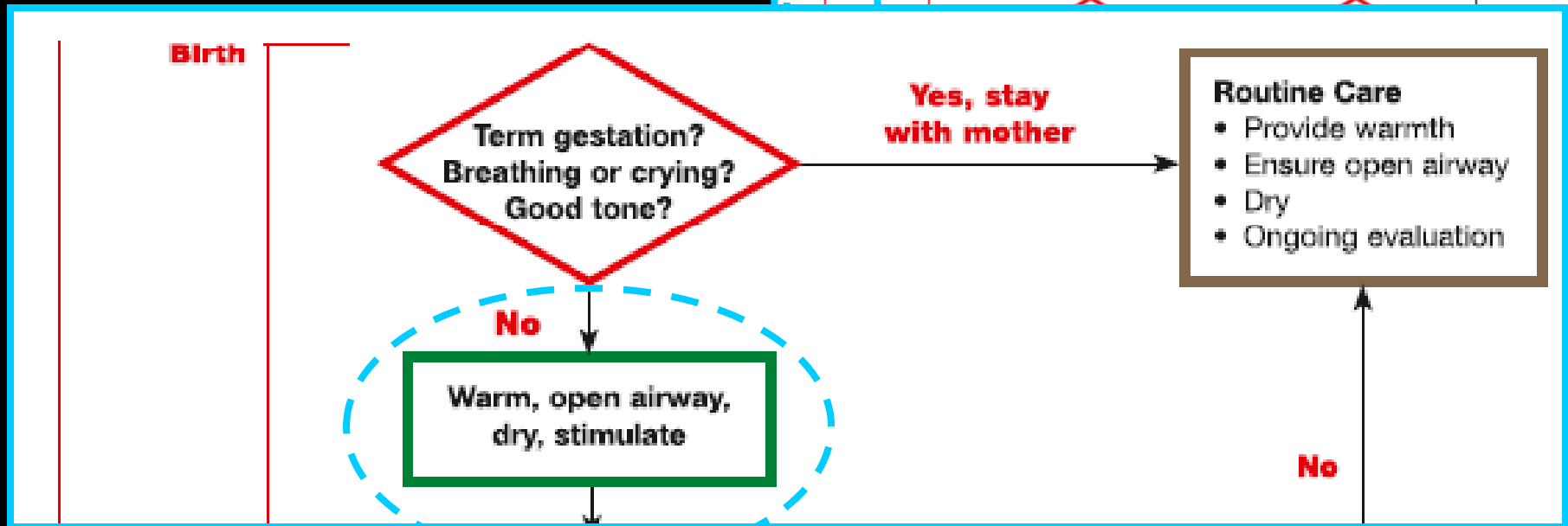
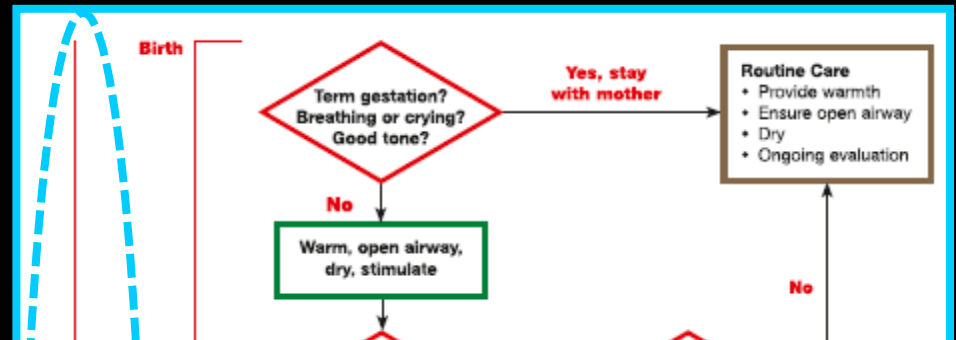
What about Cord Milking?

- Appealing as can be done quickly so that resuscitation could commence quickly for babies who are not breathing
- ~200 babies randomized to either cord milking or immediate cord clamping in 4 small RTCs, 1 cohort study
- At the time of review no studies comparing cord milking to delayed cord clamping



Cord Milking Treatment Recommendations

- We **suggest against the routine use** of cord milking for infants born at less than 29 weeks of gestation but cord milking may be considered a reasonable alternative to immediate cord clamping to improve initial mean blood pressure, hematological indices and ICH. However, there is no evidence for improvement or safety in long term outcomes.
- All studies included in this evidence review milked 20 cm of umbilical cord toward the umbilicus 3 times while the infant was held at the level of the introitus or below the level of the placenta prior to cord clamping.



5 different systematic reviews regarding importance and methods of temperature stabilization in the DR



ILCOR Systematic Reviews

Regarding Temperature Stabilization

- There is evidence from 36 observational studies of increased risk of mortality associated with hypothermia at admission (low-quality evidence but upgraded to moderate-quality evidence due to effect size, dose-effect relationship, and single direction of evidence).
- Hypothermic infants have increased morbidity
 - Hypoglycemia, Respiratory Distress, IVH, Late onset sepsis
- Temperature should be monitored and maintained between 36.5-37.5°C after delivery

Will Likely Need Combination of Strategies to Provide Warmth

- For all newborns

- Environmental Temperature at least 25°C (77°F)
- Warm Blankets for Drying
- Hats (wool or plastic)



- For newborns requiring resuscitation

- Radiant Warmer
- Warm, humidified gases



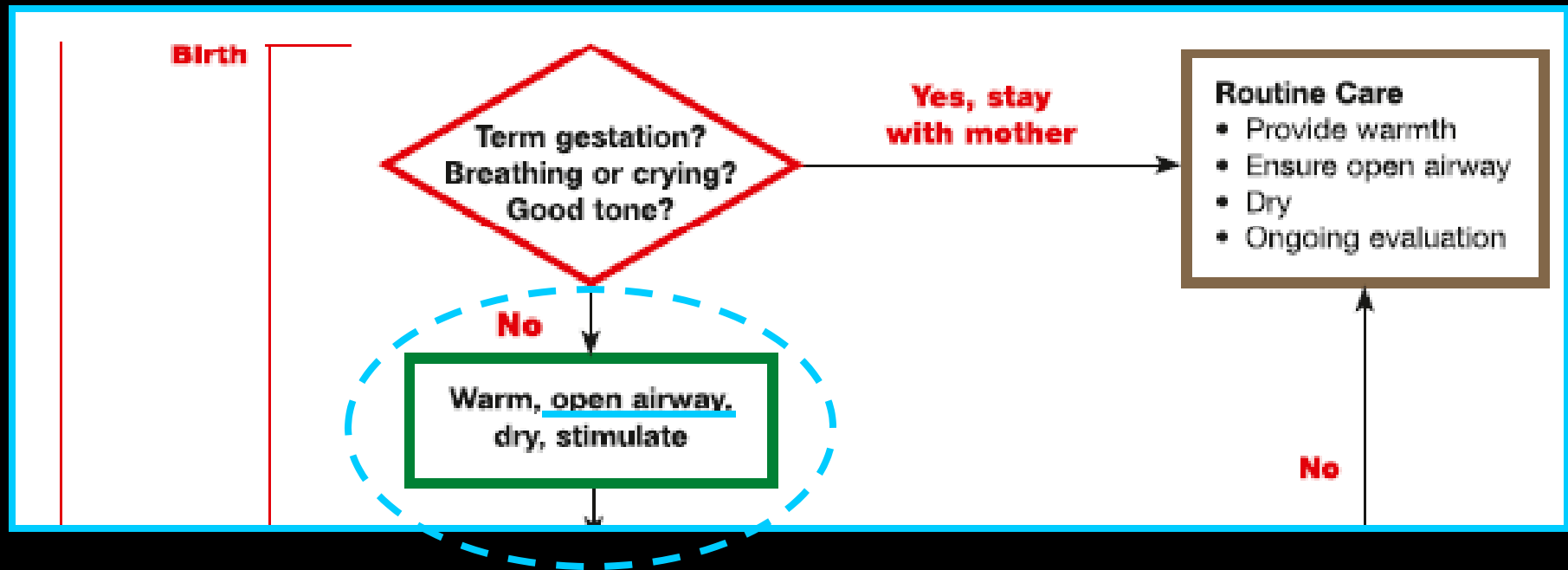
- For Preemies

- Polyethylene Occlusive wrapping
- Heated (NaAcetate) Mattresses



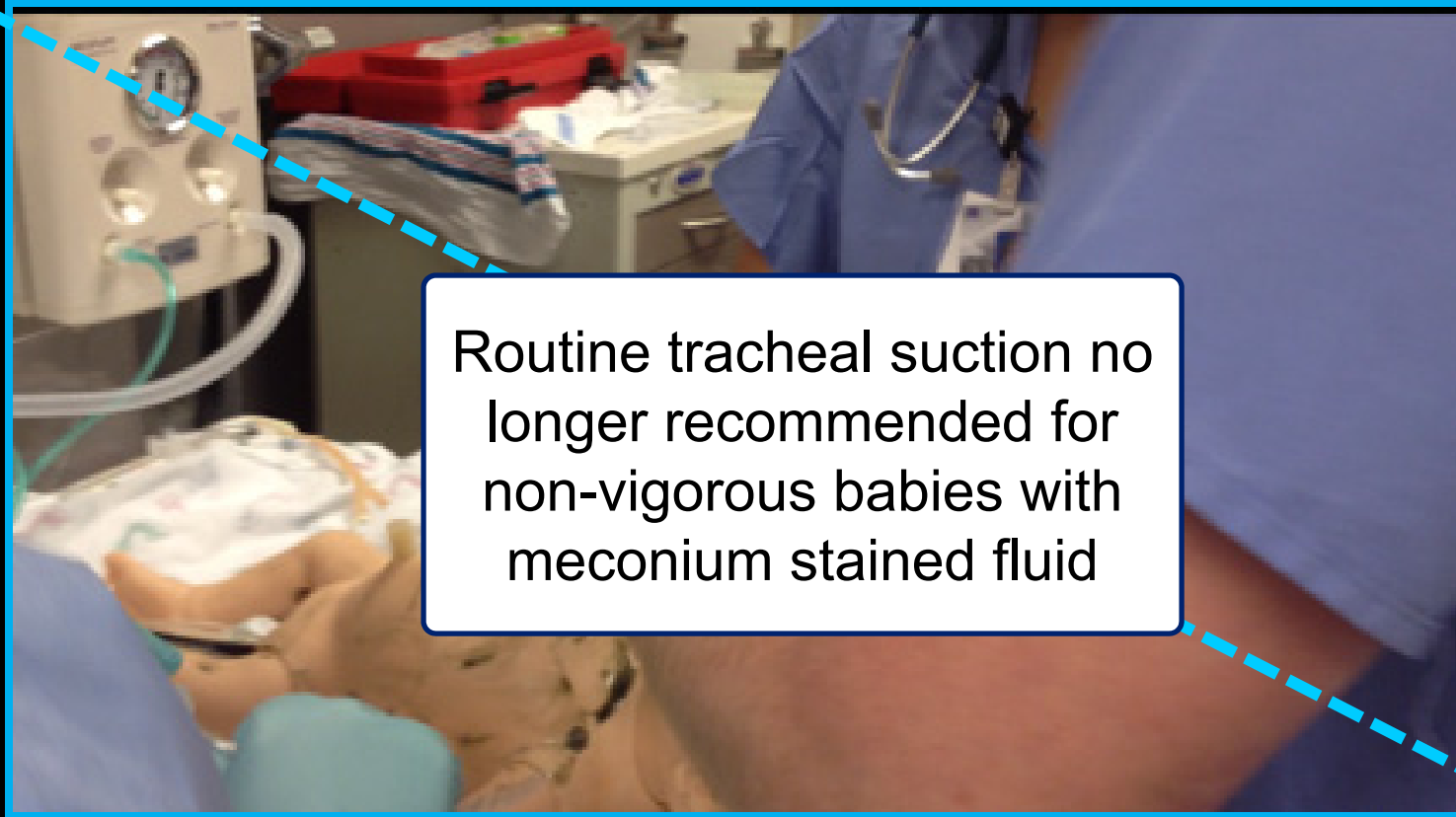


Initial Steps now the Same Regardless of Amniotic Fluid Status



- Open airway by positioning
- Clearing airway if needed
 - Apneic
 - Drowning in secretions
 - Airway obstructed despite ventilation corrective steps (MRSOPA)

2015: Do We Still Intubate and Suction Every Non-vigorous Meconium Exposed Infant?



Routine tracheal suction no longer recommended for non-vigorous babies with meconium stained fluid

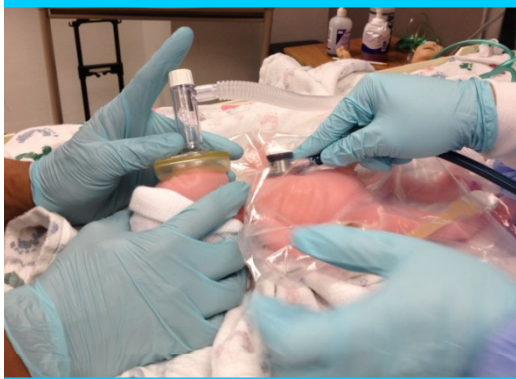
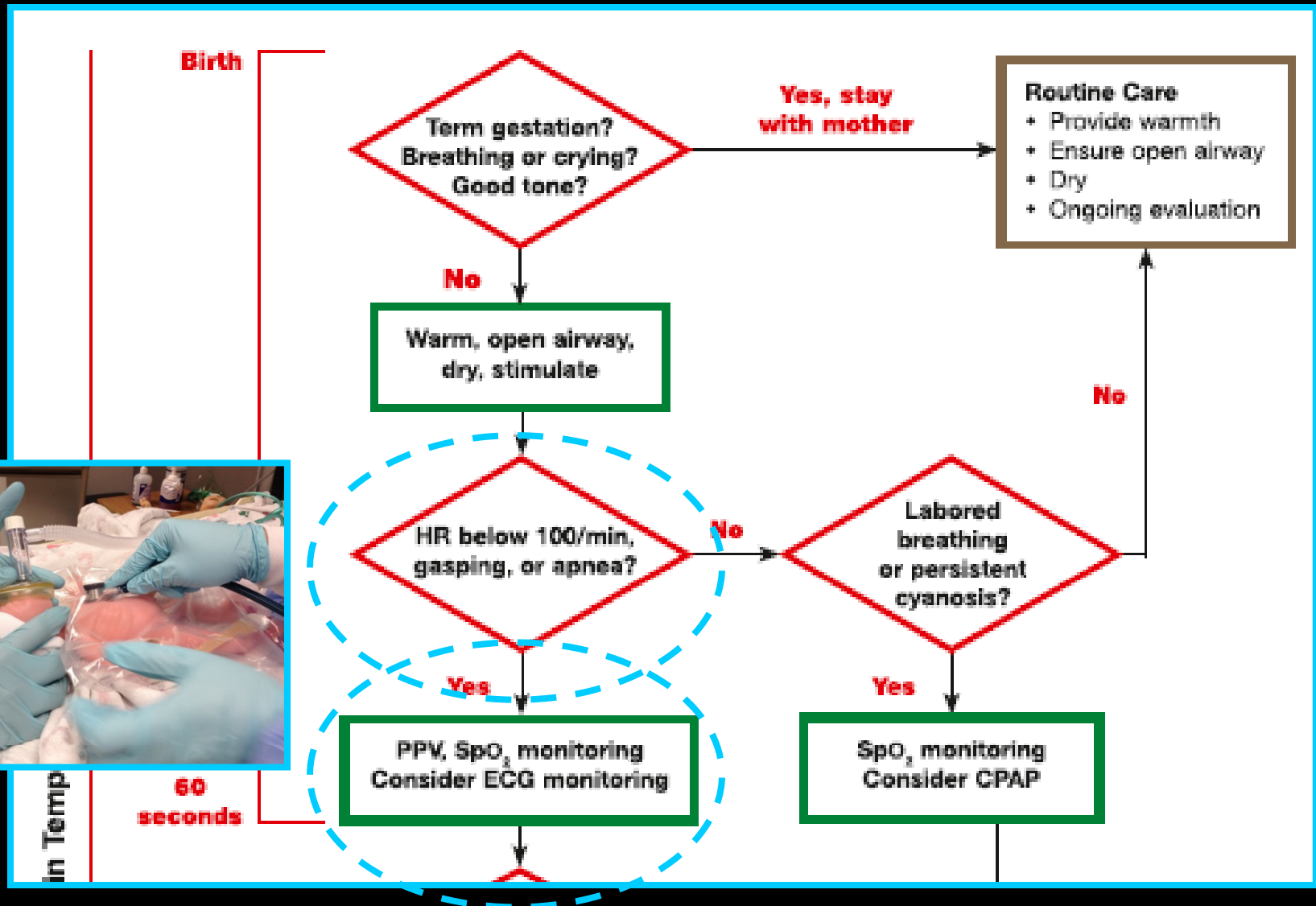


2015: Meconium Management

- Still need a provider with PPV and intubation skills present at birth of infants born through meconium stained fluid
- Much higher need for effective PPV
- Will still need to practice the skill of intubation and suction for the rare case of airway obstruction



Respiratory Effort and Heart Rate?



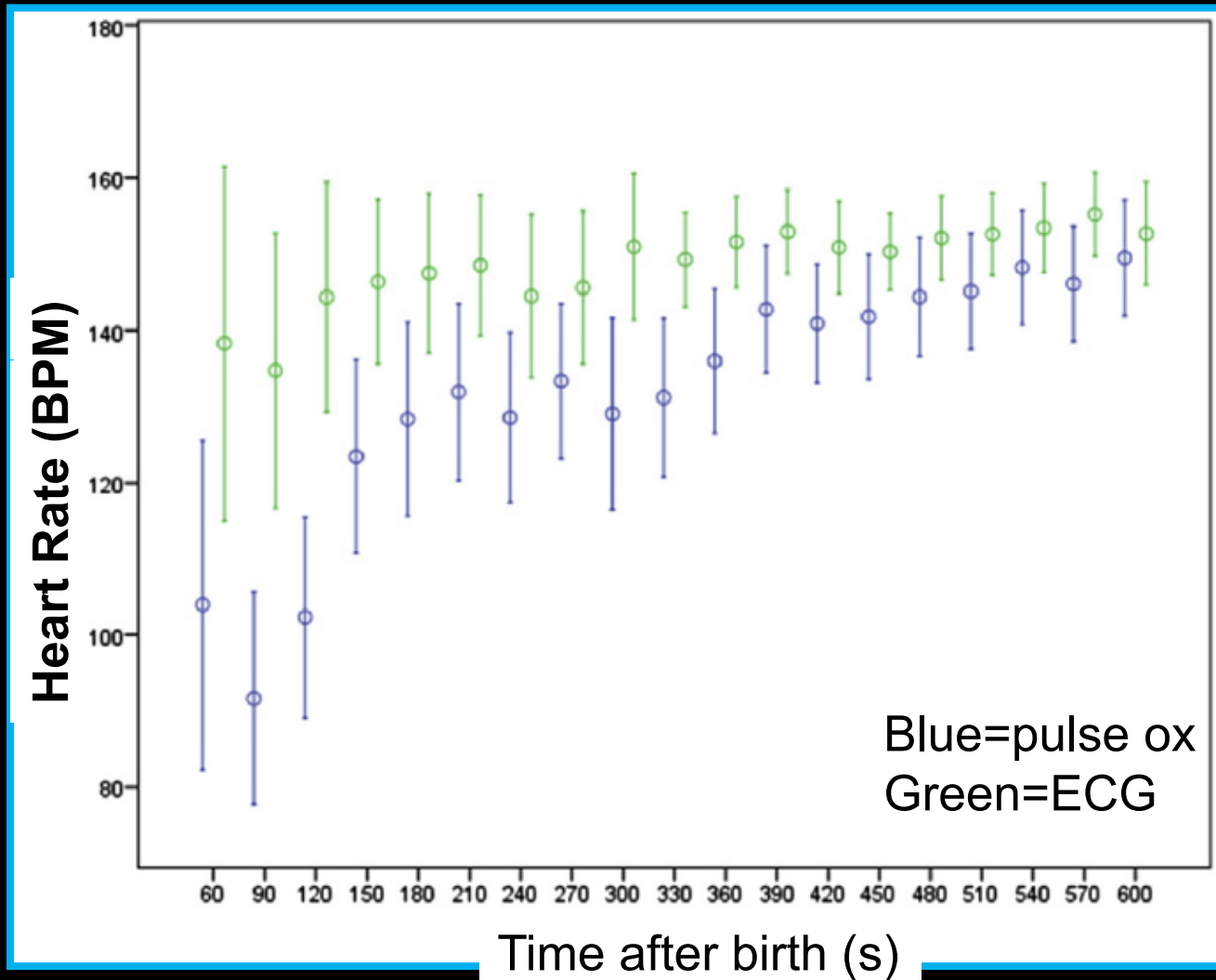


2015: Initial Heart Rate Determination

- Initial HR assessed by auscultation
 - PPV begins, consider **electronic cardiac monitor** for assessment of heart rate



Pulse Oximetry Measures a Lower Heart Rate at Birth Compared with Electrocardiography J Pediatr 166(1): 49-53.



- **Unnecessary** Interventions may be initiated if relying solely on Pulse Oximetry for Heart Rate in the delivery room

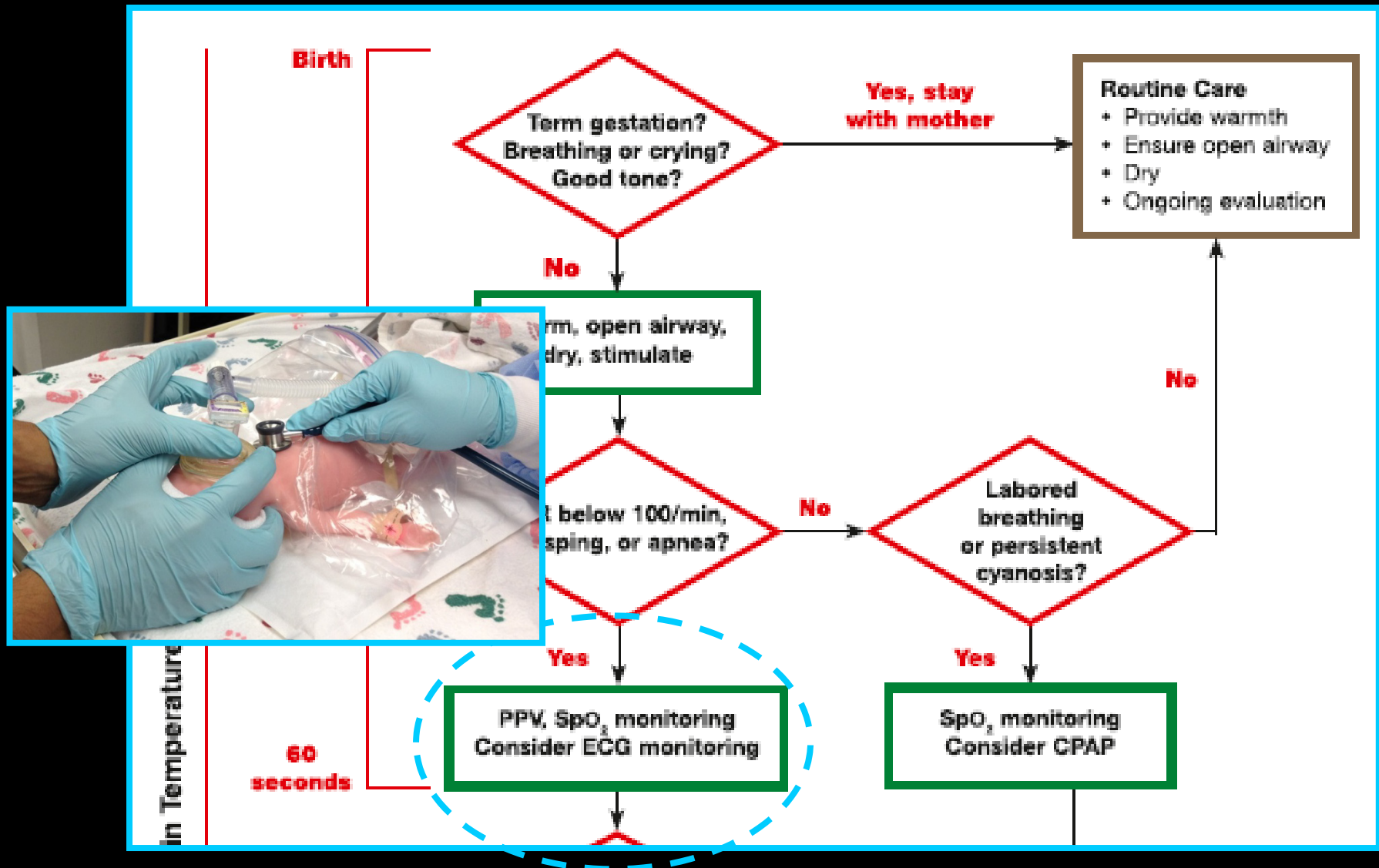


Strategies for Accessing ECG in the Delivery Room

- Have a portable ECG on a cart or pole that can be pulled into the room
- Utilize the ECG on the maternal crash cart that is already present on L&D
- Obtain/place monitor next to Radiant Warmer for each LDR and OR (\$\$) but can be done with new construction
- New technologies for rapid acquisition of ECG are under development



Pulse Oximetry to Guide Oxygen Use During Resuscitation





What Oxygen Concentration Should We Start PPV with for ELGAN Infant?

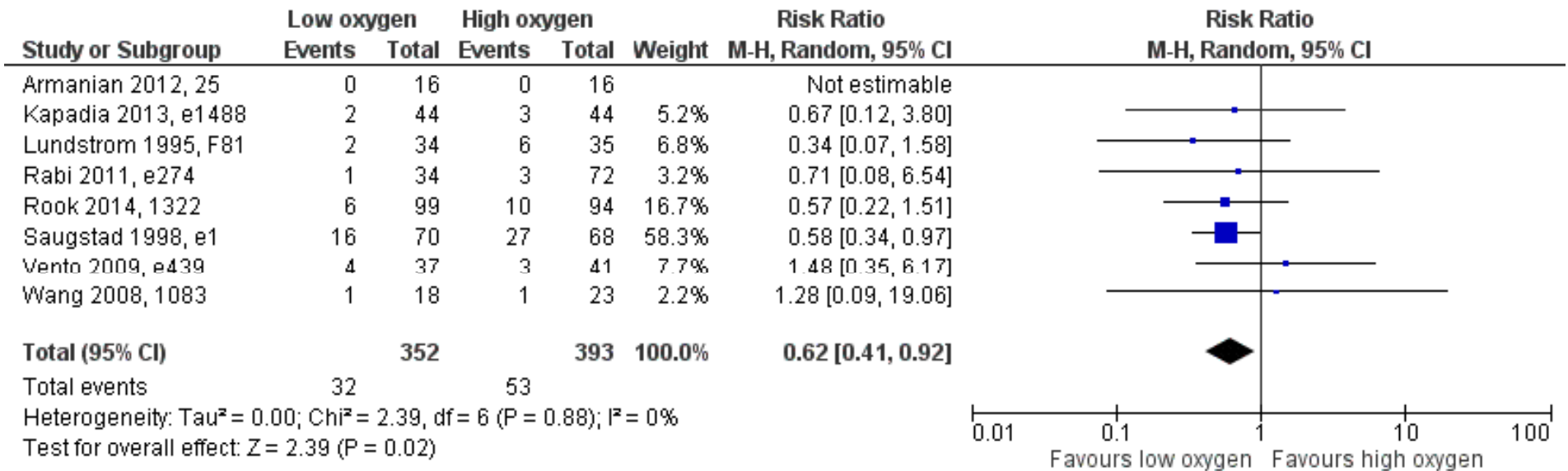
- **P**: Among preterm newborns (< 37 wk GA) who receive **PPV** in the delivery room, does
- **I**: low initial oxygen (21-30%)
- **C**: high initial high oxygen (50-100%)
- **O**: decrease mortality, BPD, ROP, intraventricular hemorrhage, neurologic deficit, time to HR > 100 bpm

- Final AHA search strategy → 1752 citations, 46 potentially relevant studies → **9 Studies included** → **8 RCTs, 1 Cohort**

	Design/n	GA (wk)	FiO2 % Low/Hi	Sat Targeting?	FiO2 masked?
Dawson '09	Cohort/125	<30	21 / 100	Y	N
Rook '14	RCT/123	<32	30 / 65	Y	Y
Kapadia '13	RCT/88	24 - 34	21 / 100	Y	N
Armanian '12	RCT/32	29 - 34	21 / 100	Y	N
Rabi '11	RCT/106	≤ 32	21 / 100	Y*	Y
Vento '09	RCT/78	24 - 28	30 / 90	Y	N
Wang '08	RCT/41	< 32	21 / 100	Y	N
Saugstad '98	RCT/138*	< 37	21 / 100	N	N
Lundstrom '95	RCT/69	< 33	21 / 100	N*	N



Mortality before discharge: *All RCT and quasi-RCT*



2015 Treatment Recommendation: Among preterm newborns, we recommend that resuscitation be initiated with low oxygen (21-30%) and titrated to reach the saturation target.



What About Initial Sustained Inflations (SI)?

- Lots of heterogeneity in definition of SI (5-20 seconds, PIP of 20-30 cm H₂O)
- 3 RCTs (n=404), 2 cohort studies (n=331)
- No advantage: mortality, BPD, air leak, Apgar scores
- Advantage: reduced need mechanical ventilation in first 72 hrs
- Tx Recommendation: We suggest against the routine use of initial SI (greater than 5 sec duration) for preterm infants without spontaneous respirations immediately after birth, but an SI may be considered in individual clinical circumstances or research settings

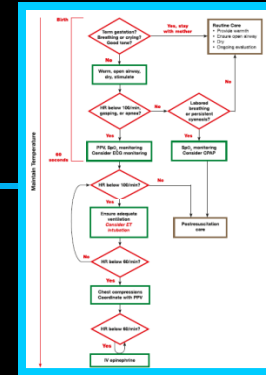


What stays the same?

- Corrective steps for achieving effective ventilation
 - Mask, Reposition, Suction, Open the Mouth, Increase Pressure, Intubate
- No change in cardiac compression recommendations
 - Two Thumb technique
- No change in drug (Epinephrine or Volume) recommendations
 - IV preferred route



Veni, Venti, Vici



- For 2015 Neonatal Resuscitation Guidelines, another thing that has **NOT** changed is...

- “Ventilation of the lungs is the single most important and most effective step in resuscitation of the compromised newborn.”



Acknowledgments

- Thanks to the AAP for several of the drawings and photos used for illustration

http://pediatrics.aappublications.org/content/136/Supplement_2/S196 (USA Guidelines)

http://circ.ahajournals.org/content/132/16_suppl_1/S204.full.pdf+html (ILCOR CoSTR)