Question Report – Professor Schmolzer May 24th

1 Would electronic Stethoscope help?

Response: Thank you, this might be an option, there have been several studies assessing a digital stethoscope (DS). A DS provides an amplified sound output, attenuates ambient noise and filters frequencies outside the range for heartbeats, providing greater accuracy and precision than conventional stethoscopes. Kevat et al. compared DS with auscultation or palpation in 50 infants admitted to the NICU to assess the accuracy, latency, and efficacy of HR assessments. The mean difference (SD) in DS Heart rate (HR) compared to ECG HR was 7.4(24) bpm, which was lower than previously reported differences between ECG and standard auscultation or palpation, suggesting a higher accuracy with a DS. However, Gaertner et al. compared DS utility in 37 infants and reported DS technology detected HR in only 23/37 infants within 30 s. The mean difference (95% CI) was of 0.2–1(-17.6 to 18) bpm with a higher correlation with the ECG HR. In the remaining 14 infants HR could not be assessed due to crying. Similarly, Treston et al. compared HR assessment using DS versus handheld ultrasound versus ECG and reported successful HR assessment in 13/20, 20/20, and 20/20, respectively. In addition, DS overestimated HR by a mean difference of17 bpm compared to ECG and took the longest time from birth to obtain HR (120 s). All study infants were vigorous and crying, which could have affected the accuracy and time needed for assessments using the DS. While crying during assessment appears to be a limitation of this technology, it is reasonable to assume most crying babies have a HR > 120 bpm.

In my opinion, a larger RCT comparing a DS to conventional stethoscope would provide some answers.

2 Every newborn should have ECG recording or those who need PPV support at 30 seconds / apnoeic / not crying

Response: Thank you, I agree, they should have ECG if available within the system (limited-resource settings might not be able to have ECG available. There have been several animal studies, case reports and case series of ECG displaying pulse less electrical activity (PEA), which was not recognized by the clinical staff at the time and resulted in delay of resuscitation or even death of the infant. While I would add an ECG, healthcare staff needs to be trained to recognize PEA to avoid delay.

3 Could you comment cord clamping and cord milking in preterm and ELBW infants

Response: Thank you, There has been a recent study by Katheria *et al* comparing delayed cord clamping and cord milking in infants <32 weeks' gestation (JAMA . 2019 Nov 19;322(19):1877-1886. doi: 10.1001/jama.2019.16004).

The trial aimed to randomize 540 infants but was stopped by the Data Safety Monitoring Committee after 474 (88%) were enrolled with a mean gestational age of 28 weeks; 46% female. Twelve percent (29/236) of the umbilical cord milking group died or developed severe intraventricular hemorrhage compared with 8% (20/238) of the delayed umbilical cord clamping group (risk difference, 4% [95% CI, -2% to 9%]; P = .16). Although there was no statistically significant difference in death, severe intraventricular hemorrhage was statistically significantly higher in the umbilical cord milking group than in the delayed umbilical cord clamping group (8% [20/236] vs 3% [8/238], respectively; risk difference, 5% [95% CI, 1% to 9%]; P = .02). The test for interaction between gestational age strata and treatment group was significant for severe intraventricular hemorrhage only (P = .003); among infants born at 23 to 27 weeks' gestation, severe intraventricular hemorrhage was statistically significantly higher with umbilical cord milking

than with delayed umbilical cord clamping (22% [20/93] vs 6% [5/89], respectively; risk difference, 16% [95% CI, 6% to 26%]; P = .002).

4 How does one achieve resuscitation when cord clamping is delayed?

Response: Thank you, the current guidelines recommend to do delayed cord clamping only in infants not needing resuscitation. If there is a need of resuscitation, the cord should be clamped immediately and resuscitation should be started. There are several trials ongoing examining this approach, until these have been published, delayed cord clamping should only be used for infants not needing resusication.

5 Could you present in Near future about management of asphyxiated term babies?

Response: Thank you, I am happy to present management of asphyxiated term babies.

6 Concerning PEA. Should we go back to more trust the sat-monitor if we have a good ”curve” or other equipment as the sure pulse cap or Laerdals Neo Beat?

Response: Thank you, I think the most important aspect is to confirm if there is a heart rate or not if either the ECG or pulse oximetry displays a heart rate. As the Laerdals Neo Beat uses the same approach as an ECG, I believe it would also displays a heart rate during PEA.

7 What about suctioning of the oral cavity?

Response: Thank you, I think suctioning of the oral cavity should be only done, if there is a blockage, but not routinely

8 what do you think of the use of endotracheal adrenaline?

Response: Thank you, while there has been no human trials, but animal studies have reported that IV adrenaline had superior efficacy compared with nasal or ET administration (Songstad et al, Front Pediatr . 2020 Jun 2;8:262). Human observational data suggest that both repeated dosing of intravenous and endotracheal epinephrine is needed frequently for successful resuscitation (Halling et al, J Pediatr . 2017 Jun;185:232-236).

9 what do you think about the use of endotracheal adrenaline?

Response: Thank you, while there has been no human trials, but animal studies have reported that IV adrenaline had superior efficacy compared with nasal or ET administration (Songstad et al, Front Pediatr . 2020 Jun 2;8:262). Human observational data suggest that both repeated dosing of intravenous and endotracheal epinephrine is needed frequently for successful resuscitation (Halling et al, J Pediatr . 2017 Jun;185:232-236).

10 Thank You very much... For how long you perform resuscitation?

Response: Thank you, there are no guidelines on how long to resuscitate. This should be decided on an individual basis. I believe after 20min of resuscitation including CPR, the next steps should be di used with the family to make a decision.

11 what about need of special modality of resuscitation in shoulder dystocia?

Response: Thank you, I think there needs to be a special algorithm for the obstetric team on how to deliver a baby with shoulder dystocia, but resuscitation should be the same as for other infants.

12 resource poor country 21% oxygen is it ok in CPR based on the studies in term babies.

Response: Thank you, for respiratory support yes, during CPR, there is no evidence to support this. Several animal studies support this approach, but no clinical data is available so far. Please contact me, as I am aiming to start a study comparing 21% with 100% during CPR.

13 Why do you not think it might be actually beneficial to continue resuscitation with intact cord unless CPR is required

Response: Thank you, I think there is currently no evidence to support this, and until the evidence is available, the cord should be clamped prior resuscitation.

14 What is your advice for resuscitation rythm on the neonatology ward, when the baby is for example 2 wks old? 3:1 or 15:2?

Response: Thank you, I think this could be done either way using the neonatal guidelines or the pediatric guidelines.

15 how can we access previous webinars recordings

Response: Thank you, I am not sure how this might be achieved

16 Would Sustained Inflation during Chest compression not increase the risk of pneumothorax and subsequent brain injury?

Response: Thank you, the animal and human studies so far have not reported an increase in either pneumothorax and subsequent brain injury

17 What should be the duration for SI during ventilation ?

Response: Thank you, the studies using sustained inflation for respiratory support at birth used times of 10-20 sec. However, given the recent SAIL trial reported - Among extremely preterm infants requiring resuscitation at birth, a ventilation strategy involving 2 sustained inflations, compared with standard intermittent positive pressure ventilation, did not reduce the risk of BPD or death at 36 weeks' postmenstrual age (Kirpalani et al, JAMA 2019).

18 for how long we can continue resuscitation of ashyxiated baby

Response: Thank you, there are no guidelines on how long to resuscitate. This should be decided on an individual basis. I believe after 20min of resuscitation including CPR, the next steps should be di used with the family to make a decision.

19 Should a respiratory function monitor be part of resuscitation? Would it help guide us in terms of mask leak, VT, etc in clinical settings or serve too much as a distraction?

Response: Thank you, a respiratory function monitor would help to identify mask leak or tidal volume delivery. Several trials have examined this and reported a reduction in mask leak and more targeted tidal volume delivery.

20 Do you have any experience in using NICOM for resus in delivery room?

Response: Thank you, No, I have never used NICOM in the delivery room.

21 thx excellent presentation. What about drying when to do ?

Response: Thank you, drying should be done immediately after birth to prevent heat loss. If an infant is <30 weeks gestation or <1500 gram the infant should be placed in a plastic bag immediately after birth for heath loss prevention.

22 The baby is born, asphyxiated. we clamp the cord and start resuscitation. Are there any animal study that show how much blood flow is going through placenta prior to clamp and whether starting resuscitation at this point would be a better option ?

Response: Thank you, Please see Delaying cord clamping until ventilation onset improves cardiovascular function at birth in preterm lambs. Bhatt S, Alison BJ, Wallace EM, Crossley KJ, Gill AW, Kluckow M, te Pas AB, Morley CJ, Polglase GR, Hooper SB. J Physiol. 2013 Apr 15;591(8):2113-26.

23 How long do you suggest we should continue resuscitation if we have no response at all?

Response: Thank you, there are no guidelines on how long to resuscitate. This should be decided on an individual basis. I believe after 20min of resuscitation including CPR, the next steps should be di used with the family to make a decision.

24 D9 u recommend sustained inflation when giving mask ventilation during chest compression, "

Response: Thank you, no, I do not recommend sustained inflation when giving mask ventilation during chest compression. There is an ongoing trial called SURV1VE, which is examining this.

25 Thank you very much. What do you think about a minimal time for primary resuscitation? May be we can use more long time than 10 min.

Response: Thank you, there are no guidelines on how long to resuscitate. This should be decided on an individual basis. I believe after 20min of resuscitation including CPR, the next steps should be di used with the family to make a decision.

26 continuous inflation is achieved with PEEP? 25?

Response: Thank you, yes, a PEEP of 25 cm H2O is needed to achieve continuous inflation (Shim GH PLoS One. 2020)

27 What would be maximum recommended inspiratory pressure for term and preterm neonates during resuscitation in delivery room? Thank you .

Response: Thank you, The current resuscitation guidelines recommend a pressure of 20-25 cm H_2O for preterm infants and a up to 30cm H_2O for term infants,

28 good afternoon Do you use i.o. tools like EZ io ?

Response: Thank you, no, I do not, but everyone should use the device they are most comfortable and have the needed training.

29 what about using nasal probs for PPV?

Response: Thank you, this is a great idea, there has been some studies suggesting that placing a face mask could result in apnea. (Kuypers et al Arch Dis Child Fetal Neonatal Ed. 2020)

30 when is optimum decision for shut off radiant warmer in delivery room for initiation therapeutic hypotermia?

Response: Thank you, there is no evidence, therapeutic hypothermia must be initiated within the first 6 hours after birth.

31 when orofaringeal tube should be put?

Response: Thank you, I think this is a valid alternative to face mask in the delivery room

32 What do you think about umbilical cord expressing?

Response: Thank you, I assume this is cord milking, in preterm infants a recent RCT (Katheria et al JAMA 2019) reported “In this post hoc analysis of a prematurely terminated randomized clinical trial of umbilical cord milking vs delayed umbilical cord clamping among preterm infants born at less than 32 weeks' gestation, there was no statistically significant difference in the rate of a composite outcome of death or severe intraventricular hemorrhage, but there was a statistically significantly higher rate of severe intraventricular hemorrhage in the umbilical cord milking group”.

33 Suction or PPV at first in case of MAC

Response: Thank you, The current resuscitation guidelines recommend to start PPV before suction of MAC.

34 Is there any evidence for better outcome if we immediately turned off the warmer during resuscitation(i.e starting passive hypothermia) for HIE patients who needs chest compression?

Response: Thank you, there is no evidence, therapeutic hypothermia must be initiated within the first 6 hours after birth.

35 What's your opinion about cord milking and increased risk oF IVH?

Response: Thank you, a recent RCT (Katheria et al JAMA 2019) reported “In this post hoc analysis of a prematurely terminated randomized clinical trial of umbilical cord milking vs delayed umbilical cord clamping among preterm infants born at less than 32 weeks' gestation, there was no statistically significant difference in the rate of a composite outcome of death or severe intraventricular hemorrhage, but there was a statistically significantly higher rate of severe intraventricular hemorrhage in the umbilical cord milking group”.

36 When myconium aspiration and hypotonia do we sunction first or give positive pressure immediately?

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37 what do you think about cord miliking?

Response: Thank you, a recent RCT (Katheria et al JAMA 2019) reported “In this post hoc analysis of a prematurely terminated randomized clinical trial of umbilical cord milking vs delayed umbilical cord clamping among preterm infants born at less than 32 weeks' gestation, there was no statistically significant difference in the rate of a composite outcome of death or severe intraventricular hemorrhage, but there was a statistically significantly higher rate of severe intraventricular hemorrhage in the umbilical cord milking group”.

For term infants, a currently ongoing RCT called MINVI is ongoing and hopefully will report outcomes in a 1-2 years.

38 what is the role of videolaryngoscopy in babies with difficult airway ?

Response: Thank you, I think video laryngoscope is a great alternative, not only for difficult airway but also for learning and routine use during intubation.

39 What about resuscitation of baby with CDH

Response: Thank you, most hospital created their own specific algorithms, using what each sites identified as best practise.

40 The target SpO2 levels we already use are actually valid for term infants. Should we go on to use them for premies? especially the very immature ones?

Response: Thank you, yes, this is the best data we current have available, therefore we should use them until data for very immature infants become available.

41 how to determine that the depth of chest compressions is appropriate and not too less?

Response: Thank you, this is difficult, and might not be possible, there are some feedback devices for infants available, but none has been tested in newborn infants.

42 If you have not respiratory mouvement for mor then 10 minutes, but you have heart activity. do you stop resuscitation?

Response: Thank you, there are no guidelines on how long to resuscitate. This should be decided on an individual basis. I believe after 20min of resuscitation including CPR, the next steps should be di used with the family to make a decision.

43 What about pharyngeal tube ventilation instead of mask ventilation to avoid leakage during ventilation?

Response: Thank you, I think this a great alternative and a recent cochrane review comparing laryngeal mask airway with mask ventilation reported improved outcomes with laryngeal mask airway.

44 Is there a role for NIRS in resus?

Response: Thank you, yes, there is a role for NIRS, there is a trial currently ongoing called COSGOD which examined the use of NIRS in the delivery room. This trial should have results in 1-2 years.

45 Tell me, how much infusion do you give during therapeutic hypothermia?

Response: Thank you, we start at an infusion rate of 40mL/kg/day for the first day.

46 please management of seizures in first 24h of life with asphyxia?

Response: Thank you, we use 20mg/kg phenobarbital as initial treatment, which can be repeated once, the next step in our hospital is phenytoin followed by benzodiazepine infusion.

47 Should we have particular care in resuscitation IUGR newborn?

Response: Thank you, I think prevention of hypothermia might be an area to be more aware of, but otherwise, I would not change the approach of the neonatal resuscitation algorithm and the approach to resuscitate an IUGR infant.

48 What is the best and reliable method to evaluate carotid flow in newborn in DR? Thanks

Response: Thank you, you might be able to use Doppler Ultrasound, however, I am not aware of any study reporting carotid blood flow.

49 what do you think of giving epinephrine through peripheral vein catheter ? (if i don't have enough staff for placing UVC)

Response: Thank you, I think is a valid alternative, the most important aspect would be to get this as close to the heart as possible.

50 What do you think about umbilical cord expressing?

Response: Thank you, there is a current trial ongoing - Umbilical Cord Milking in Non-Vigorous Infants (MINVI) (https://clinicaltrials.gov/ct2/show/NCT03631940), which compares immediate cord clamping with cord milking in non-vigorous infants at term. I believe, there will be results in 2021.

51 we don't have ECG what do you recommend ?

Response: Thank you, I would use auscultation for the initial assessment and if available pulse oximetry. We have described this approach in D Luong et al. Arch Dis Child Fetal Neonatal Ed . 2019 Nov;104(6):F572-F574. doi: 10.1136/archdischild-2018-316087. Cardiac Arrest With Pulseless Electrical Activity Rhythm in Newborn Infants: A Case Series

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53 If the baby has respiratory distress and breathing Is not effective but heart is > 100 beats per minute will you start ventilation with only PEEP?

Response: Thank you, yes I would provide CPAP and if breathing is insufficient then I would also do PPV despite a heart rate of >100/min.

54 In asphyxiated term and preterm infants how much do we delay cord clamping?

Response: Thank you, if they are floppy and apnoeic I would do immediate cord clamping and not delay resuscitation.

55 place of hypothermia in first 06hours of life and mortalité ?

Response: Thank you, therapeutic hypothermia must be initiated within the first 6 hours after birth. I am not aware of any study comparing to start therapeutic hypothermia earlier (1 hour after birth) or later (e.g., 3 hours after birth) and reported differences in mortality.

56 Have you looked at a study outcome when you used a targeted volume instead of sustained pressure

Response: Thank you, no we have not sued a targeted volume instead of a sustained pressure during chest compression. However this is a great idea and we will investigate this in the future.