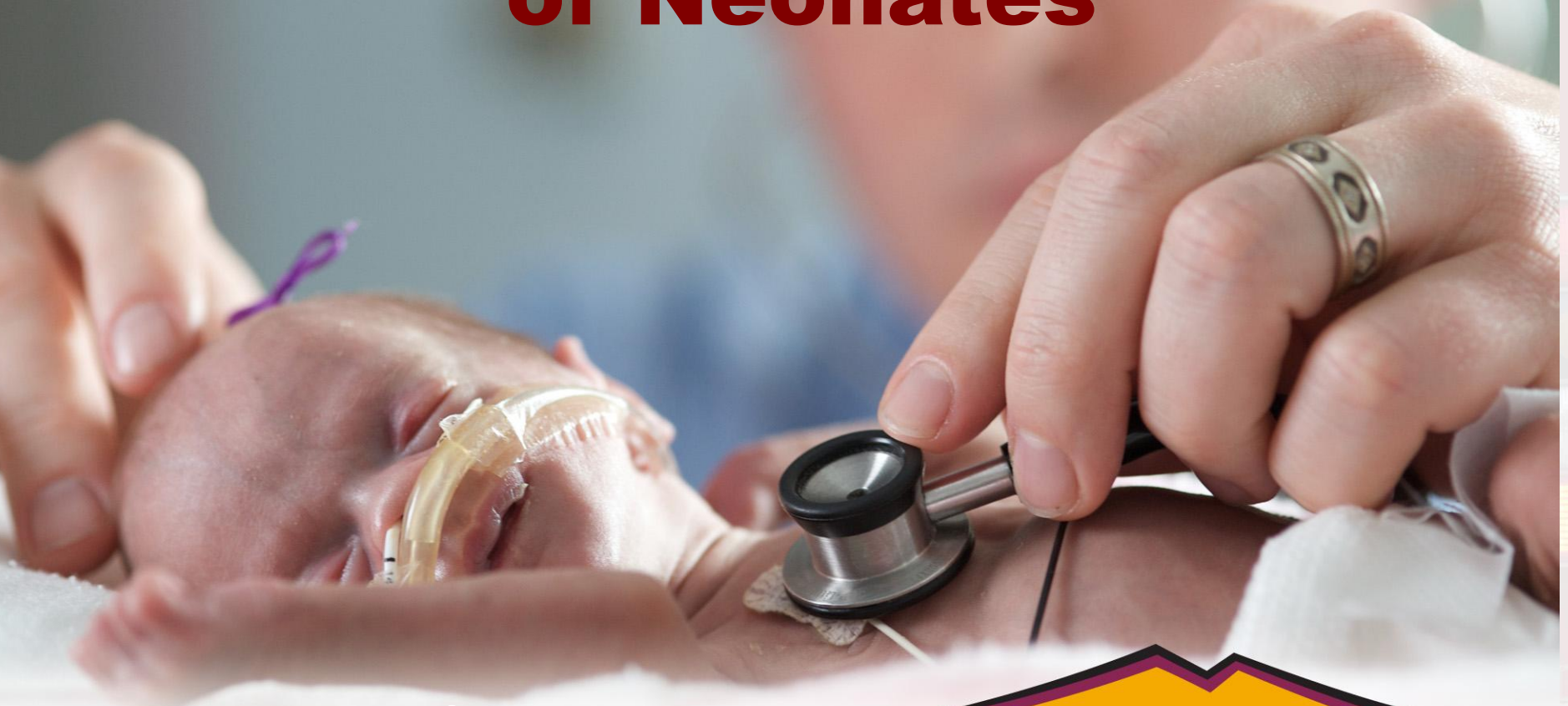


# Pre-Hospital Stabilization of Neonates



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**REGIONAL**  
MEDICAL CENTER

# Objectives

Compare and contrast precipitous, planned and unplanned home births.

Demonstrate required steps for immediate neonatal resuscitation.

Discuss physiological steps of fetal to neonatal transition.

# "Congratulations! It's a...squid."

- ~ Tommy Lee Jones line in "Men In Black" after Will Smith helps to deliver a space alien baby.



# Fundamental Differences in Planned Home Births and Unexpected Precipitous Deliveries

- Unplanned births are emergencies involving precipitous labor (fast labor) and/or unplanned home births result in poorer-than-average outcomes when the birth comes in a setting unprepared for a delivery.
- Like all things in medicine, "In an emergency, the only thing you control is how prepared you and your equipment are."

# OB Birth Pack

- Contains all essential items for a vaginal delivery and initial care for the newborn and mother.
- Precipitous Birth Pack Contents  
(Nurse Educator/Robinson May 2009)
  - bulb syringe
  - two blankets
  - towel
  - cord clamp x2
  - Infant hat
  - Ambu bag with size 1 mask
  - Laryngoscope and 0 blade
  - ETT size 2.5,3.0,3.5 (most common used sizes)
  - 8 and 10 Fr suction catheter
  - Sterile gloves
  - Sterile scissors
  - Gallon size zip lock bag- cut corner and place baby's head through it covering the baby with the bag to decrease insensible heat loss.
  - Consider a Braslow kit



APPENDIX B  
Labor and delivery summary record

Patient \_\_\_\_\_  
Date \_\_\_\_\_  
Time \_\_\_\_\_

LABOR AND DELIVERY SUMMARY RECORD

LABOR BP \_\_\_\_\_ P \_\_\_\_\_ RR \_\_\_\_\_ TEMP \_\_\_\_\_ G \_\_\_\_\_ P \_\_\_\_\_  
ABS \_\_\_\_\_ AB \_\_\_\_\_ EDC \_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_ FHT'S \_\_\_\_\_  
PMH \_\_\_\_\_ ALLERGIES \_\_\_\_\_

DELIVERY PRESENTATION: Cephalic \_\_\_\_\_  
Breech \_\_\_\_\_  
METHOD OF DELIVERY: Vaginal with Forceps \_\_\_\_\_  
Vaginal without Forceps \_\_\_\_\_  
PLACENTA: Contained and sent with Mother \_\_\_\_\_

LABOR SUMMARY

	DATE	TIME
MEMBRANES RUPTURED	____/____/____	____:____
ONSET OF LABOR	____/____/____	____:____
COMPLETION OF DILATATION	____/____/____	____:____
DELIVERY OF INFANT	____/____/____	____:____
DELIVERY OF PLACENTA	____/____/____	____:____

DELIVERED BY \_\_\_\_\_ RN \_\_\_\_\_

INFANT

APGAR	0	1	2	1 min	5 min	10 min
COLOR	Blue / pale	Body pink ext. blue	All pink			
RESP EFFORT	Absent	Slow weak gasping	Good strong cry			
MUSCLE TONE	Limp	Flexion	Active motion			
HEART RATE	Absent	<100	> 100			
REFLEX IRRITABILITY	none	Grimace	cry			
			TOTALS:			

ASSIGNED BY: \_\_\_\_\_

WEIGHT \_\_\_\_\_

RX: EYE OINTMENT \_\_\_\_\_ VITAMIN K \_\_\_\_\_  
MOTHER DISPOSITION TO: \_\_\_\_\_ MOTHER TRANSFER TIME: \_\_\_\_\_  
BABY DISPOSITION TO: \_\_\_\_\_ BABY TRANSFER TIME: \_\_\_\_\_  
INFANT ID BRACELET # \_\_\_\_\_  
MOTHER ID BRACELET # \_\_\_\_\_  
R.N. \_\_\_\_\_

Copies 1- mother chart                      1 - baby chart                      1- ED chart

Form modified from SEMC inpatient Labor and Delivery Record

AB, abortion; ABS, abortion spontaneous; BP, blood pressure; EDC, estimated date of conception; FHT'S, fetal heart tones; G, gravida; P, para; P, pulse; PMH, previous medical history; RR, respiratory rate; SEMC, St. Elizabeth Medical Center; TEMP, temperature.

# Sample Documentation

(Nurse Educator/Robinson May 2009)



# Pictures of Home Birth



# Uh Oh.....", Famous Last Words of an EMS Provider When Birth is Eminent

- "Who feels: inadequately prepared, tremendously anxious, disorganized, and uncomfortable with the equipment, uncomfortable at the thought delivering a baby, and worried your documentation won't be adequate?"

You are not alone....

## 3 keys to relieving the stress related to imminent delivery:

- 1) Accessible equipment
- 2) Training in emergency delivery
- 3) Specialized documentation



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# Before Delivery: 2 Key Periods

- **First Period - prior to the call.**
  - **Do you know what's in your OB kit for delivery and resuscitation?**
    - If delivery is imminent consider calling for 2nd team- soon you will have 2 patients to stabilize.
- **Second Period- minutes prior to delivery.**
  - **When you should ask the mother key questions and prepare your equipment.**
    - The stretcher can provide an initial area for assessment and resuscitation. Move the infant to the bench seat for further management.



# Key Questions Before Delivery

- 1. Does the patient feel the need to push or have a bowel movement, or pressure in the vagina?
- 2. Has the patient had any vaginal bleeding or discharge?  
*This is often an indication that labor has started.*
- 3. Has the patient's water broken?  
*What was the color of the fluid? green/brown = meconium*
- 4. When is your baby due? Term is 40 weeks  
*Three weeks before the due date is considered preterm and you should anticipate resuscitation.*
- 5. How many babies are you expecting?  
*Anticipate that each baby following the first will need more resuscitation.*
- 6. Is this your first pregnancy?  
*Successive pregnancies, labor and delivery often are more rapid.*
- 7. Are you having contractions?  
*As delivery gets closer the contractions will be closer and stronger.*

(EMSWorld: Newborn Resuscitation June 2011)



# Newborn Resuscitation: The Golden Minute

- Rapid Assessment: T.A.R.T

**T=Term A=Amniotic Fluid R=Respiratory Effort T=Tone**

- \*Vast majority of deliveries do not require resuscitation, routine care is usually all that is required.
  - **Less than 10% require any intervention**
  - **Less than 1% require extensive resuscitation including chest compressions.**
- "Is the baby full term, crying and has good muscle tone?"
  - **"Yes" = focus on drying the baby and keeping it warm (best is skin to skin with mom)**
  - **"No" to any of the questions = resuscitation is needed.**

Neonatal Care--*Initial 30 seconds*

### 3 Questions You Should Ask...

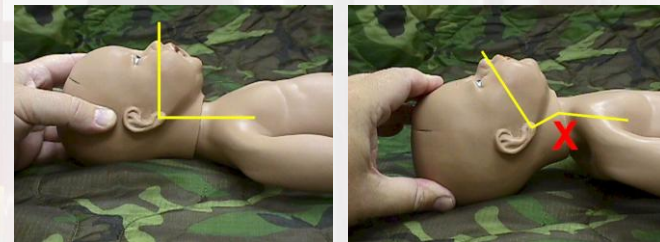
1. Is the infant **TERM**?
2. Is the infant breathing or crying?
3. Does the infant have muscle tone?

NO, to the above then.....

-Warmth (KEY!!)

-Position the airway and clear if necessary

-Dry, stimulate, and reposition the infant into "sniff position"



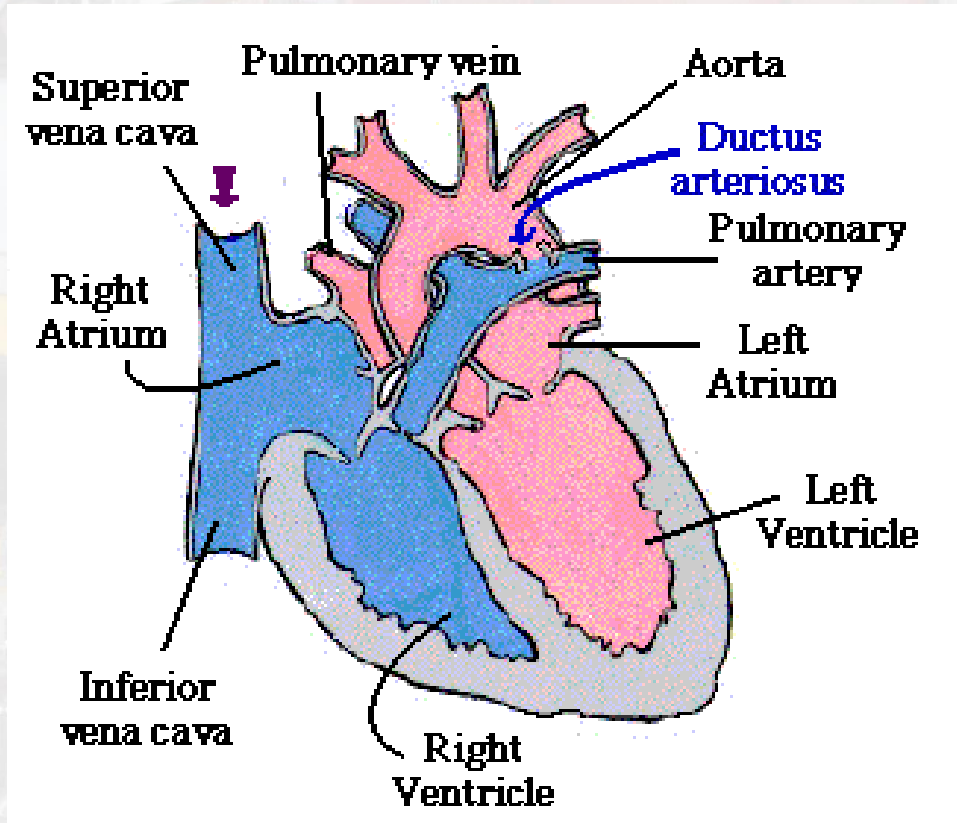
# Newborn Resuscitation: The Golden Minute

- Babies die from respiratory distress not cardiac failure.
- Cyanosis is common for the first 10 minutes of life. (central cyanosis (bad) vs. peripheral (ok)-Best place to look is the gums and inside lip.
- Apnea or less than 20 breaths per minute is not normal.
- Bag mask ventilation should be started within 30 seconds, after stimulation if respiratory effort is not effective.
- **KEY FACT: COLD BABIES DON'T BREATHE. WARMTH IS JUST AS IMPORTANT AS OXYGEN IN NEWBORN RESUSCITATION.**



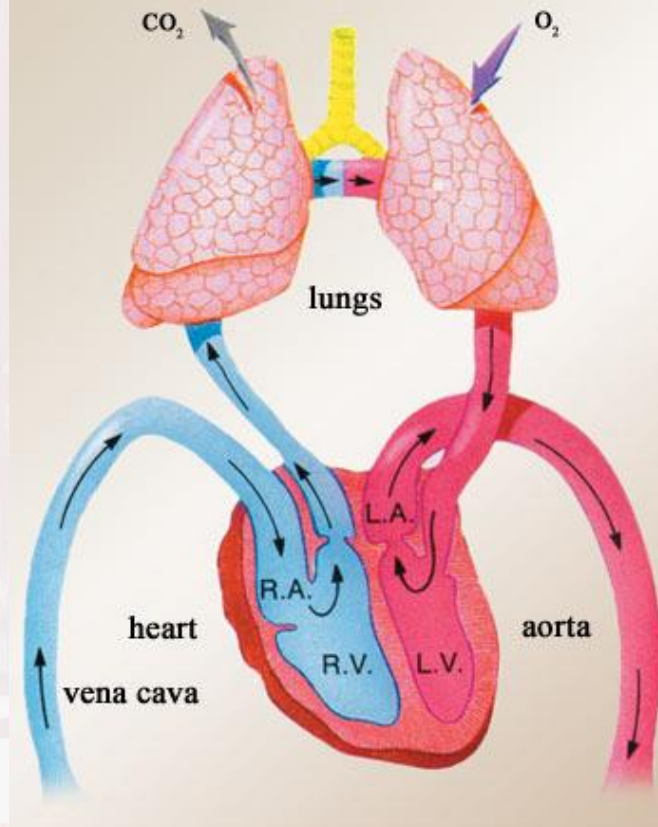
# Background: Review of Fetal Circulation

The ductus arteriosus is a normal fetal structure, allowing blood to bypass circulation to the lungs. Since the fetus does not use lungs (oxygen is provided through the mother's placenta), flow from the right ventricle needs an outlet. The ductus provides this, shunting flow from the left pulmonary artery to the aorta distal to the subclavian artery.



# It's All About Plumbing: Pressure and Flow

- ◎ **The Heart and Lungs** are intrinsically connected due to their “plumbing” of blood flow.
- ◎ **Key point:** Fluid flows to the path of less resistance.
  - Trigger for change in pressure is the clamping of the umbilical cord and the infant's first breath.
- ◎ **Fetal:** Lungs are a high pressure system and the heart is a low pressure system. *DA shunts blood past the lungs and back into systemic circulation.*
- ◎ **Newborn:** Lungs become a low pressure system. *The pressure in the RV increases to pump blood to the lungs.*



# Physiological Changes Occurring in the First Hour of Life

- **Clamping of umbilical cord and first breath**

**Clamp cord** → leads to increase systemic vascular resistance (increase pressure in the RV) and the FO closes due to pressure change.

**First breath** → leads to decrease pulmonary vascular resistance (lung pressure drops)

**Heart** → blood flow is direct to the lungs and the DA begins to close (takes up to 24 hours to fully close)



# What Causes Disruption in the Fetal to Neonatal Transition?

## ◎Fetal Causes

- Hypoxic event during labor (known by the presence of meconium)
- Contraction pattern that minimizes “rest time” for fetus during labor
- Maternal fever or illness (environment causes fetus to use more oxygen)
- Antidepressants use during pregnancy

(increase risk for persistent pulmonary hypertension)

## ◎Newborn Causes

- Hypoglycemia
- Hypothermia
- Sepsis
- Meconium aspiration
- Stress (environmental)
  - Cold stress from wet skin- frequently remove wet blankets/towels
  - Over stimulation immediately after delivery

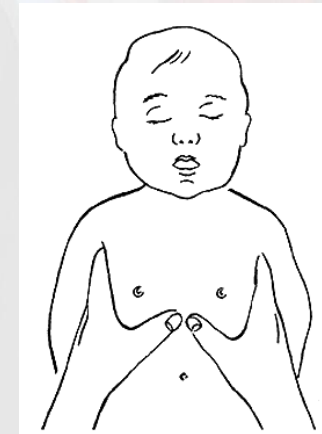


# Golden Minute Step By Step

- T.A.R.T (term, amniotic fluid, respiratory effort, tone)
- 00:30-Dry and stimulate
  - Rub head-to-toe and flick bottom of foot, remove wet blankets.
  - Rapidly assess respirations, heart rate and color
- 00:30-01:00 start bag-mask ventilation
  - Ambu bag set at 7cc/kg of Tital Volume      Fio2 21-40%
  - Bag for chest rise
  - Breathe-two-three, Breathe-two-three, Breathe-two-three
  - Put a pulse ox on right hand (pre-ductal = highest oxygen levels)
- 1:00 If heart rate less than 60 bpm start chest compressions.

# Golden Minute Step By Step

- Heart rate less than 60 start chest compressions.
- Encircle hands around chest- technique produces higher coronary perfusion.
- One-and-two-and-three-and-breathe
- One-and-two-and-three-and-breathe
- One-and-two-and-three-and-breathe
- Following 30 seconds of BMV and chest compressions reassess the heart rate.
- Greater than 60 bpm stop compressions
- Less than 60 bpm, set up for intubation



# Golden Minute Step By Step

- Intubation 3 indications include:
  - Meconium stained newborn is non-vigorous
  - Bag-mask-ventilation is ineffective or prolonged
  - Chest compressions are started
- Vascular Access
  - Medication is rarely needed in resuscitations outside of the delivery room.
  - Umbilical Venous Catheters (UVC) are rarely used in the field but, commonly seen in the hospital.
  - Intraosseous (IO) are more commonly used and are able to be achieved more rapidly than a UVC

# Golden Minute Step By Step

- Most bradycardia cardiac arrest are due to hypoxia.
- Epinephrine
  - ETT dosing (less efficacy but buys you time) dosing 0.05-0.1mg/kg (1:10,000)- put down ETT with 0.5cc NS flush. Bagging continued after administration to force into capillary beds for absorption.
  - IV or IO dosing 0.01-0.03mg/kg (1:10,000) followed by a 1-2cc NS flush.
- Volume Replacement
  - Should be considered with known blood loss or signs & symptoms of hypovolemia.
  - Noted: weak pulse greater than 100bpm, paleness, all other efforts not working
  - IV or IO NS bolus 10ml/kg over 5-10 minutes

# What Causes Disruption in the Fetal to Neonatal Transition?

## ◎ Fetal Causes

- Hypoxic event during labor (known by the presence of meconium)
- Contraction pattern that minimizes “rest time” for fetus during labor
- Maternal fever or illness (environment causes fetus to use more oxygen)
- Antidepressants use during pregnancy (increase risk for PPHTN)

## ◎ Newborn Causes

- Hypoglycemia
- Hypothermia
- Sepsis
- Meconium aspiration
- Stress (environmental)
  - Bathing before infant is stable
  - Over stimulation immediately after delivery

\*\*\*The degree of neonatal pulmonary hypertension can often be mediated by the actions of the providers

# Cascade of Cell Death

- ⊙ **Oxygen + Glucose** = required for all fetal to neonatal transitions.
- ⊙ **Hypoxia** (decrease oxygen supply)
- ⊙ **Hypoglycemia** (less than 40 in term newborn, 50 in preterm/ill newborn)

**Hypoxia + Hypoglycemia** = anaerobic metabolism = increase lactic acid production = decrease pH. When a newborn's pH decreases their bodies ability to hold onto the oxygen in their system decreases leading to more tissue deprivation and eventually cell death. Cell death occurs and cytokines are released causing injury and death to surrounding cells.

## **Cascade:**

Hypoxia + Hypoglycemia = anaerobic metabolism =  $\uparrow$  lactic acid = pH = cell death = release of cytokines = inflammation = more cell death and more cytokine release.

# Case Study

- 2205, EMS called to private residence for a young girl complaining of abdominal pain. Upon arrival the EMS determines the patient is 24 weeks pregnant and is having contractions. Although a language barrier and dim lighting increases difficulty of the assessment the provider determine that this is her first pregnancy.
- Patient is in distress due to continuous contractions, but is unclear if her water has broken. No crowning noted, the lead paramedic decided to move the patient to the ambulance.
- Once inside the ambulance the patient begins having severe contractions and the EMS team prepares for possible delivery, another unit is requested to respond.
- A second check reveals breech presentation. Despite buttocks first presentation, the patient delivers rapidly after a brief period of pushing.

(JEMS: Jan 2012)

# Case Study

- One crew member attends to the mother while the other two care for the newborn, who has an initial Apgar of 2. Fortunately, 2 other units arrive on the scene soon after delivery. Oxygen and an IV have already been initiated for the mother.
- Second crew assist in care of the newborn, which includes warming, drying, and tactile stimulation. Cord is clamped and cut.
- Positive pressure ventilation via BMV was started, despite interventions the baby's cardiac and respiratory status remain depressed. Chest compressions are started and a size 3 ETT tube is placed on first attempt.
- Resuscitation efforts are continued en route to the hospital. Upon arrival to the hospital care was transferred to the ER team. The baby's heart rate had risen to 140bpm and the baby was having spontaneous respirations.
- Discussion



# Discussion

- Lessons Learned from this team-
- Expect the unexpected- a call for a female with abdominal pain can range from an upset stomach to domestic violence to an ectopic pregnancy.
- What clues were present at the scene? Are fluids on the ground? Is there an obvious level of urgency at the scene?
- Recognizing imminent birth should trigger a crew to prepare for delivery. Although they may wish to hurry up and get to the hospital, sometimes crews must accept that the birth process won't wait.
- The lead paramedic chose to move the patient into the ambulance instead of staying in the house. This was because the need for a clean environment with supplies ready would best prepare the crew for delivery.

# Discussion

- Recognizing the birth process immediately creates a scenario with two patients. If possible, calling additional help early with distribute the work.
- This case involved additional challenges of premature newborn in the breech position and a rapid delivery. Consider what this scene would look like if the mother experienced significant hemorrhage.
- Care of the infant with an APGAR of 2 requires focus on the basics of resuscitation. Positioning, warming, suctioning and tactile stimulation. All of this must be performed simultaneously with an assessment of respiratory effort, heart rate and tone.
- Other comments?

# Thank you!

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