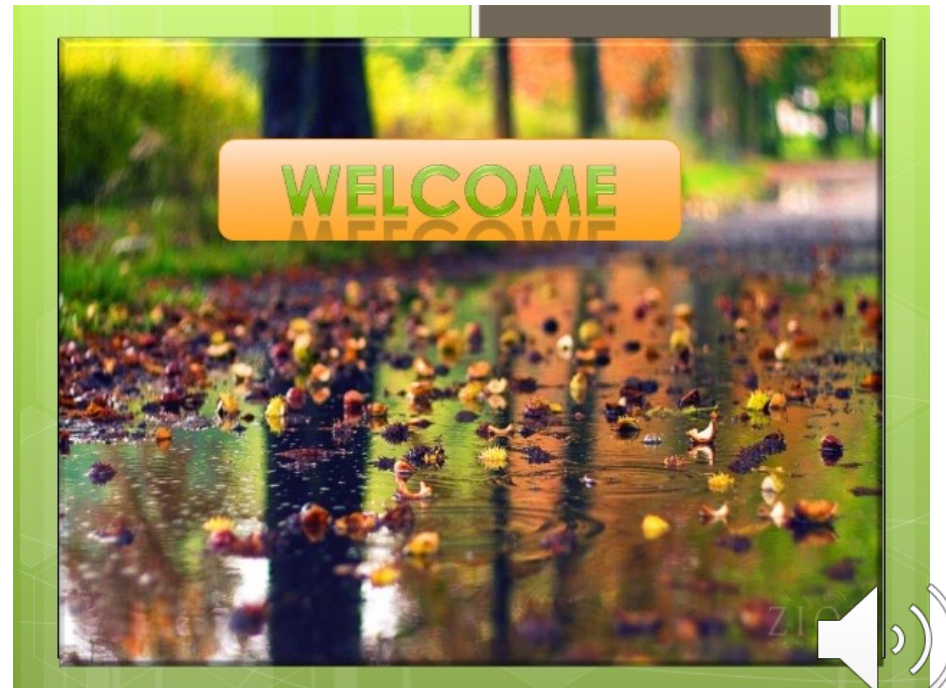


Preterm Baby Part 1



Eman Badran
Professor of Pediatrics
Fifth year medical
students
2022-2023





- **November 17th is World Prematurity Day**
- November 17th has been established as [World Prematurity Day](#). On this day, efforts are made to increase awareness of the health risks associated with preterm birth and how to reduce them.

Objectives

- Definition to Understand What is preterm baby?
- UNDERSTAND THE Definitions (LBW. SGA, LAG. AGA)
- Understand the Disease Burden
- Understand the characteristics of preterm baby
- Identify the Causes of preterm baby
- UNDERSTAND Prevention OF PRETEM
COMPLICATIONS
- UNDERSTAND THE ACUTE AND LONG TERM
Complications

What is preterm baby?

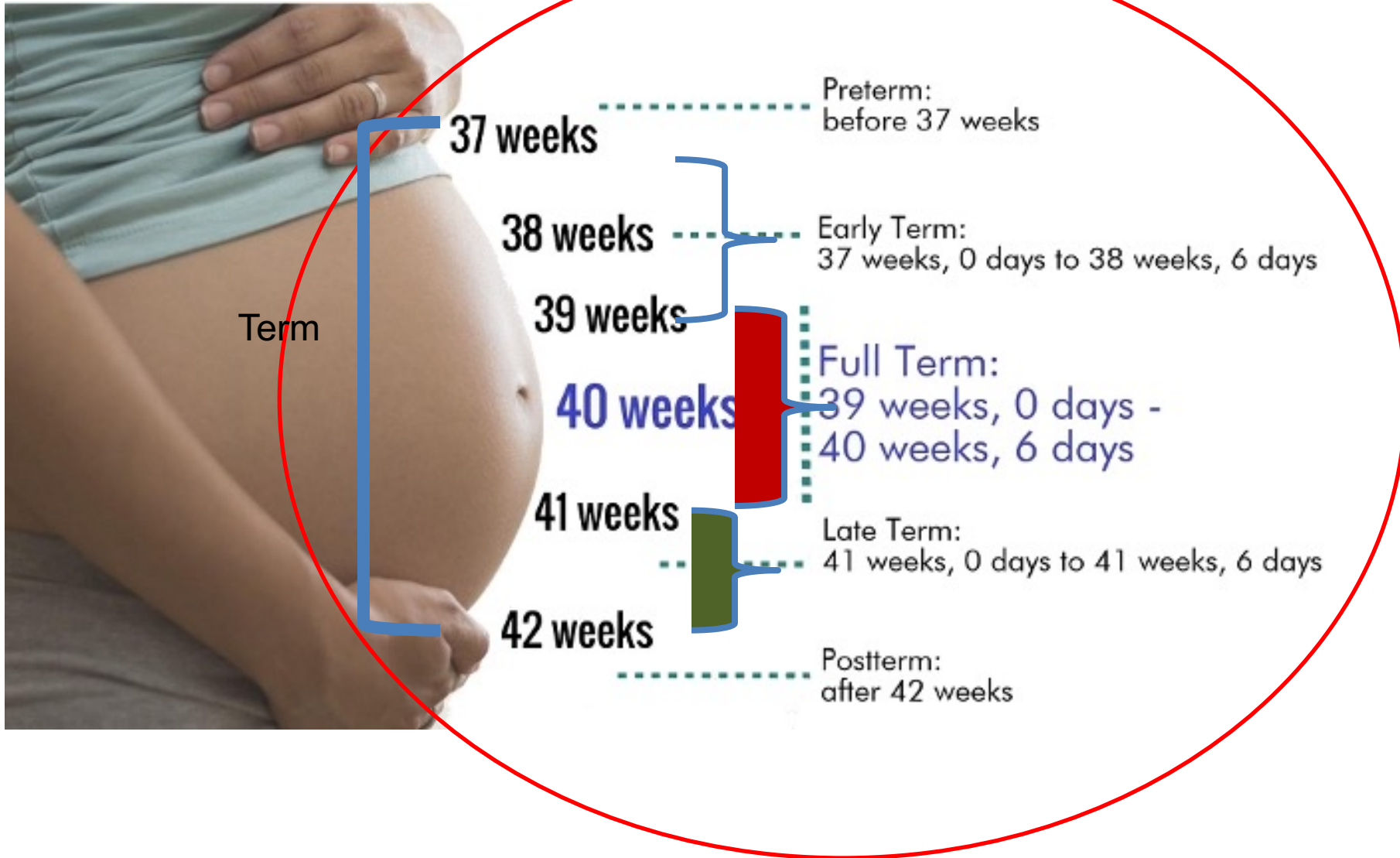
Preterm birth:



WHO definition

- A baby born before 37 weeks of pregnancy
 - Baby before 259 From first day of LMP
- **Preterm labor** : Uterine contraction < 37 weeks

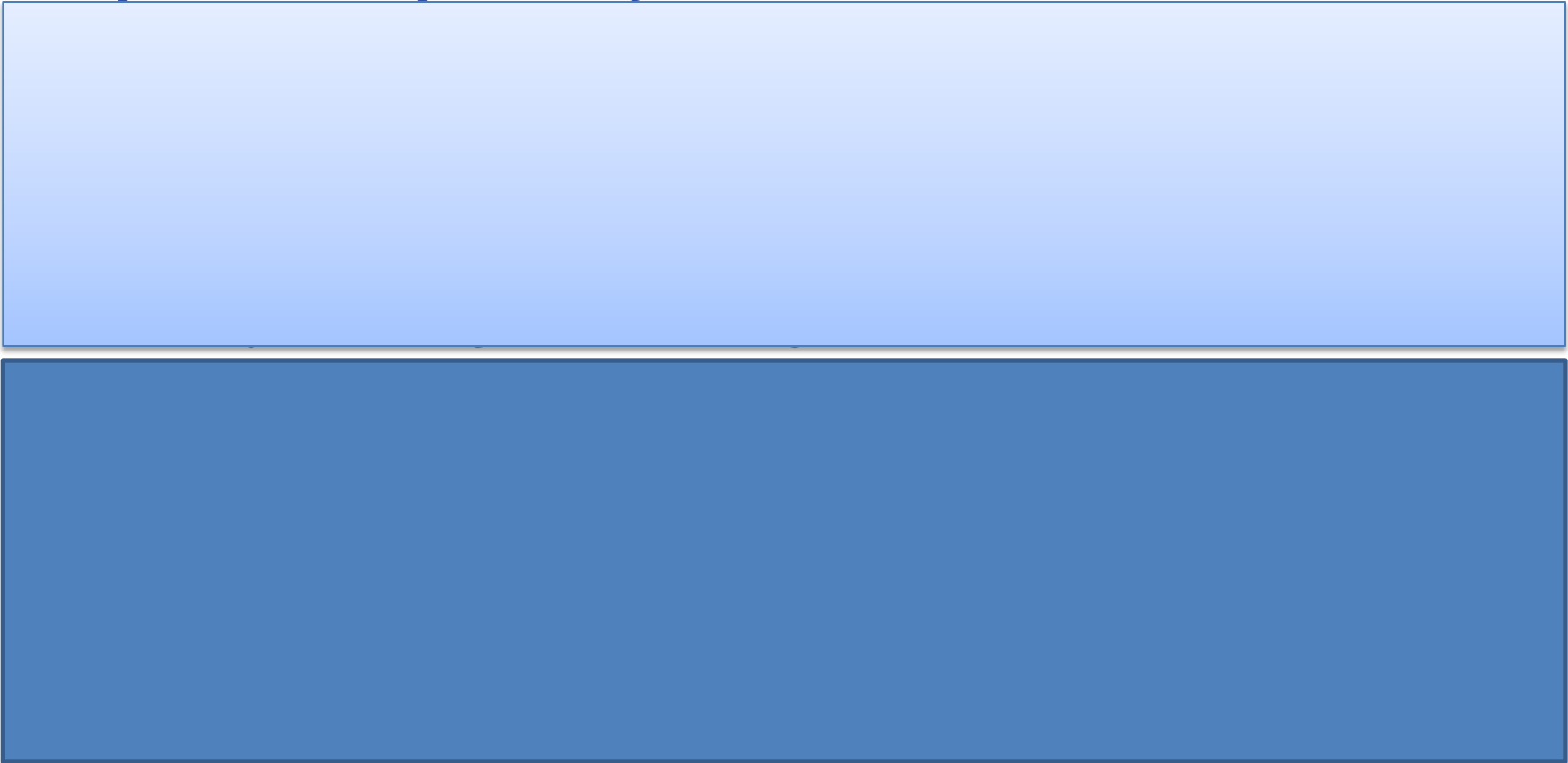
Defenitions



Birth weight

Summaury of **Definition**

- Gestation

- term: ≥ 37 completed weeks' gestation
 - preterm: < 37 completed weeks' gestation
 - post-term: > 42 completed weeks' gestation
- 

Summaury of Definition

- Gestation
 - term: ≥ 37 completed weeks' gestation
 - preterm: < 37 completed weeks' gestation
 - post-term: > 42 completed weeks' gestation
- Birth weight
 - low birth weight (LBW): < 2500 g
 - very low birth weight (VLBW): < 1500 g
 - extremely low birth weight (ELBW): < 1000 g

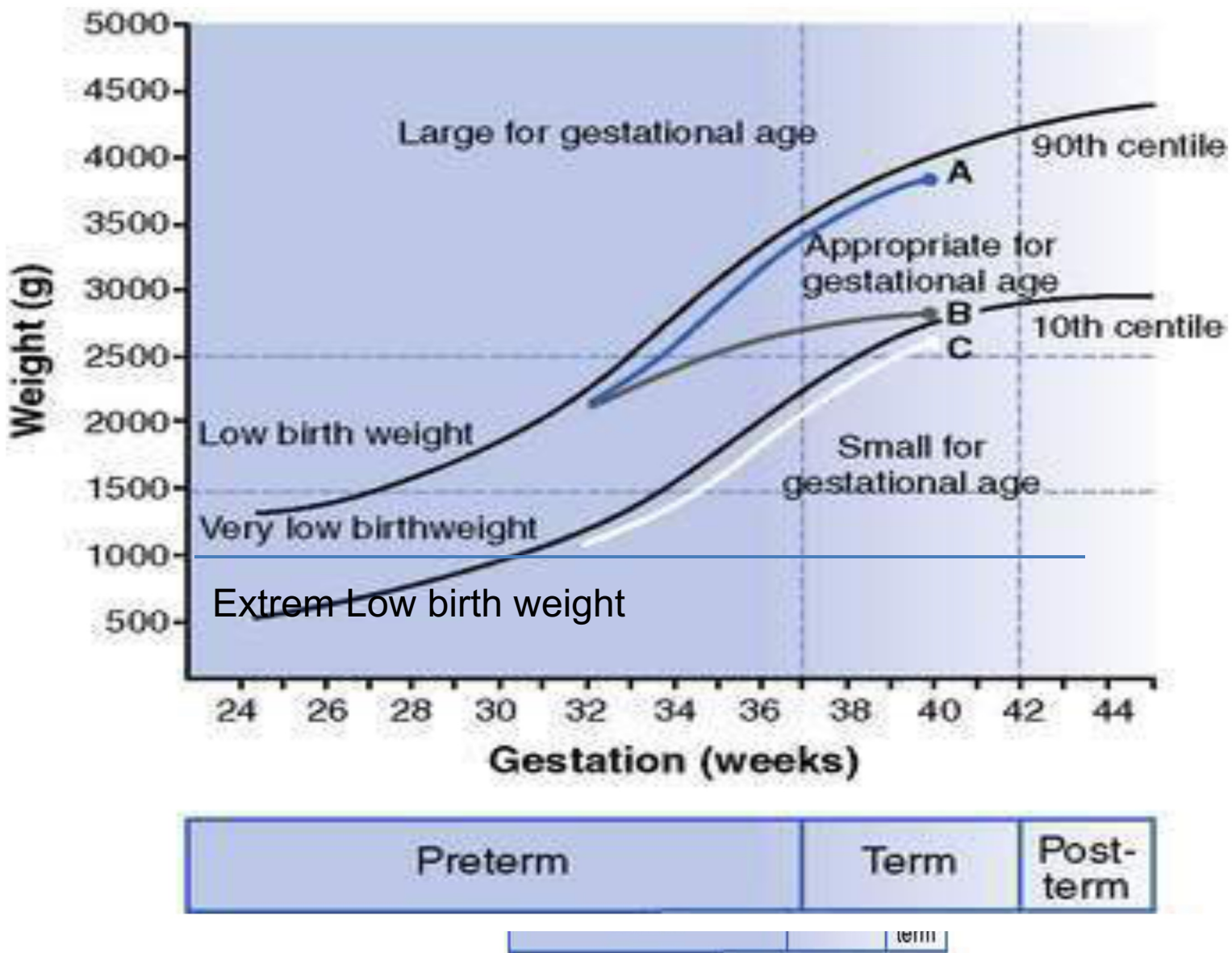


Fig. 11.2.1 Common definitions of size at birth, illustrating the difference between intrauterine growth restriction (IUGR) and small for gestational age (SGA). Baby A is an appropriately grown term baby. Baby B is also born with an appropriate size for gestational age (AGA), but has suffered reduced intrauterine growth compared with baby A and thus has IUGR. Baby C has had normal intrauterine growth, but is born SGA.

Summaury of **Definition**

- Gestation

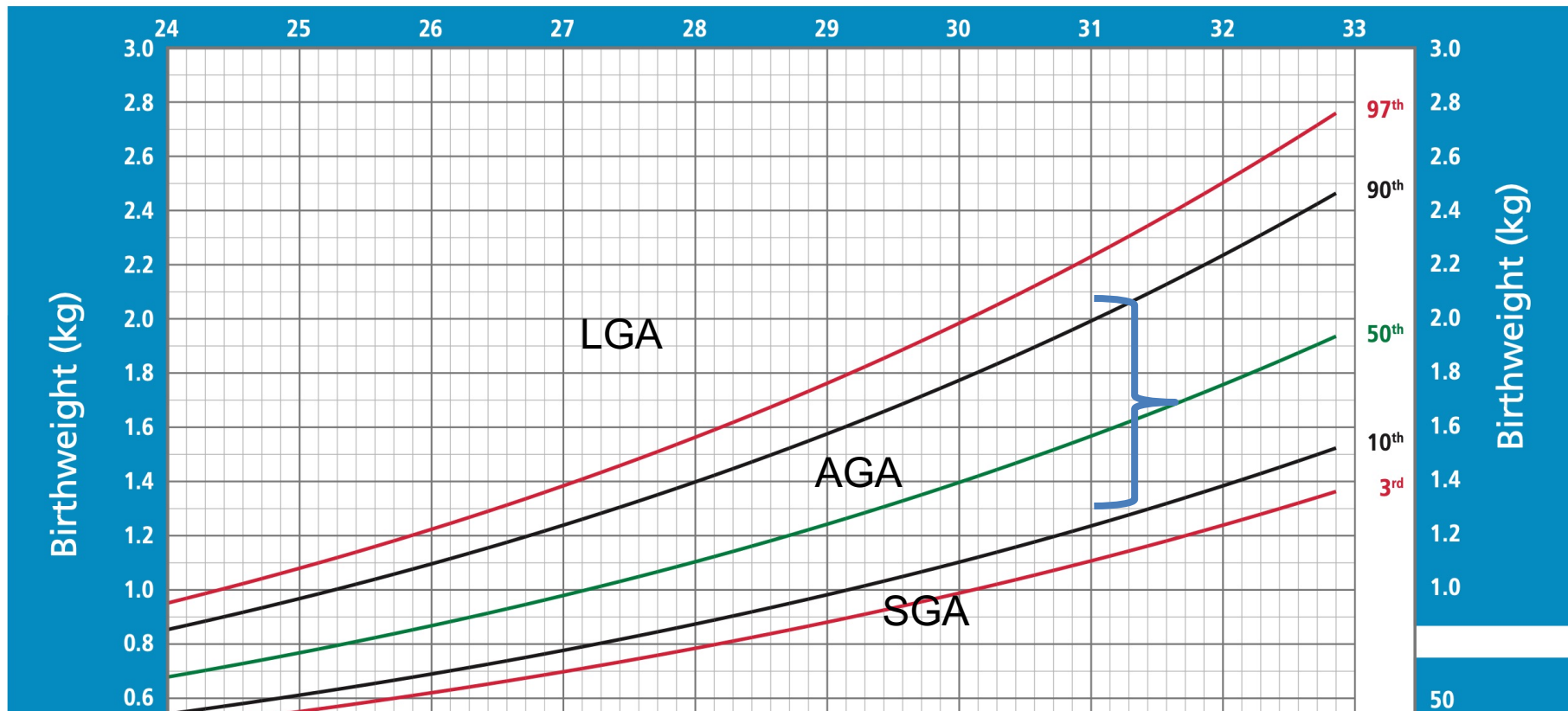
- term: ≥ 37 completed weeks' gestation
- preterm: < 37 completed weeks' gestation
- post-term: > 42 completed weeks' gestation

Definitions (LBW. SGA, LAG. AGA)



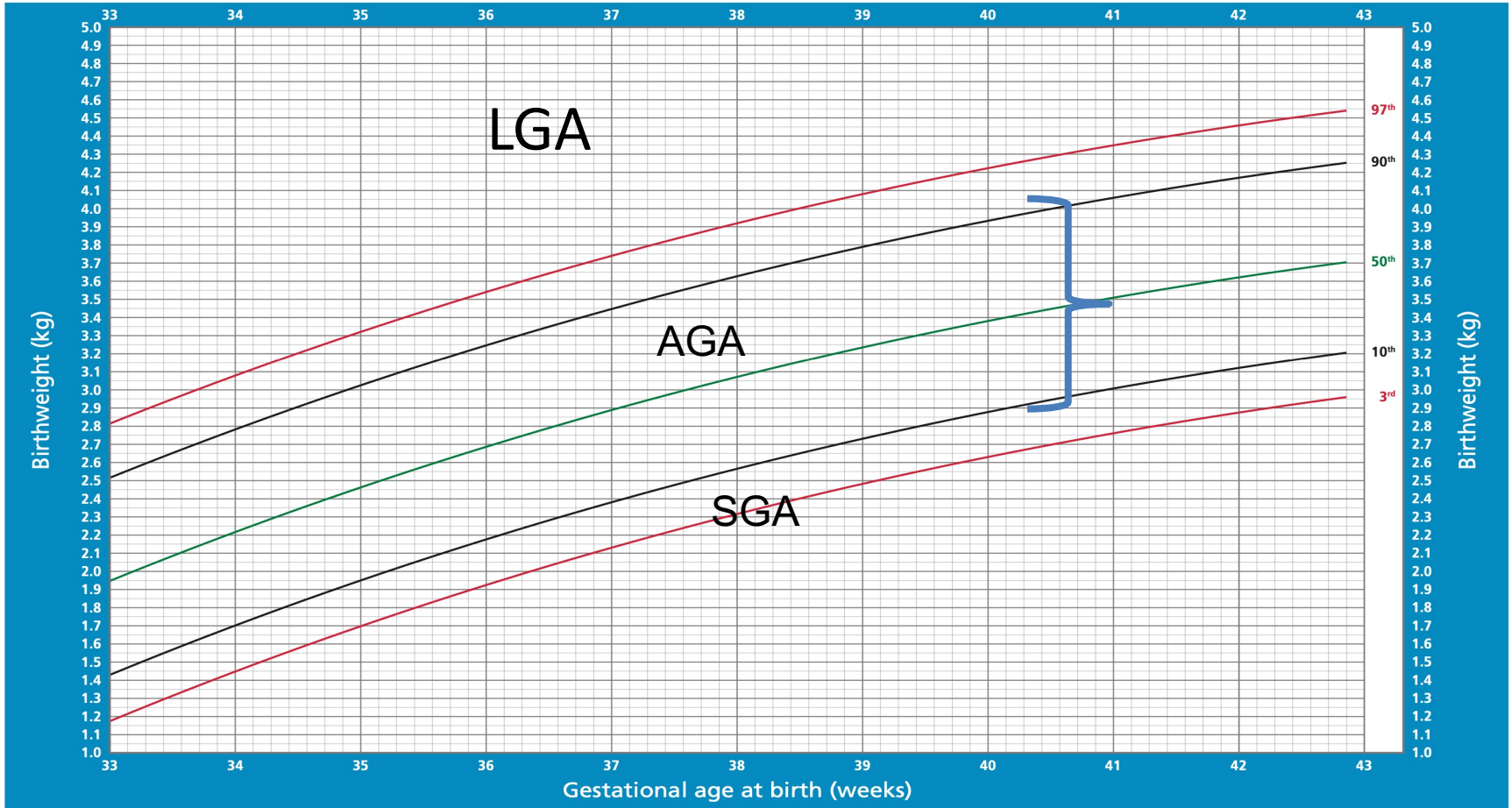
International Newborn Size Reference Charts for Very Preterm Infants (Boys)

INTERGROWTH-21⁵¹

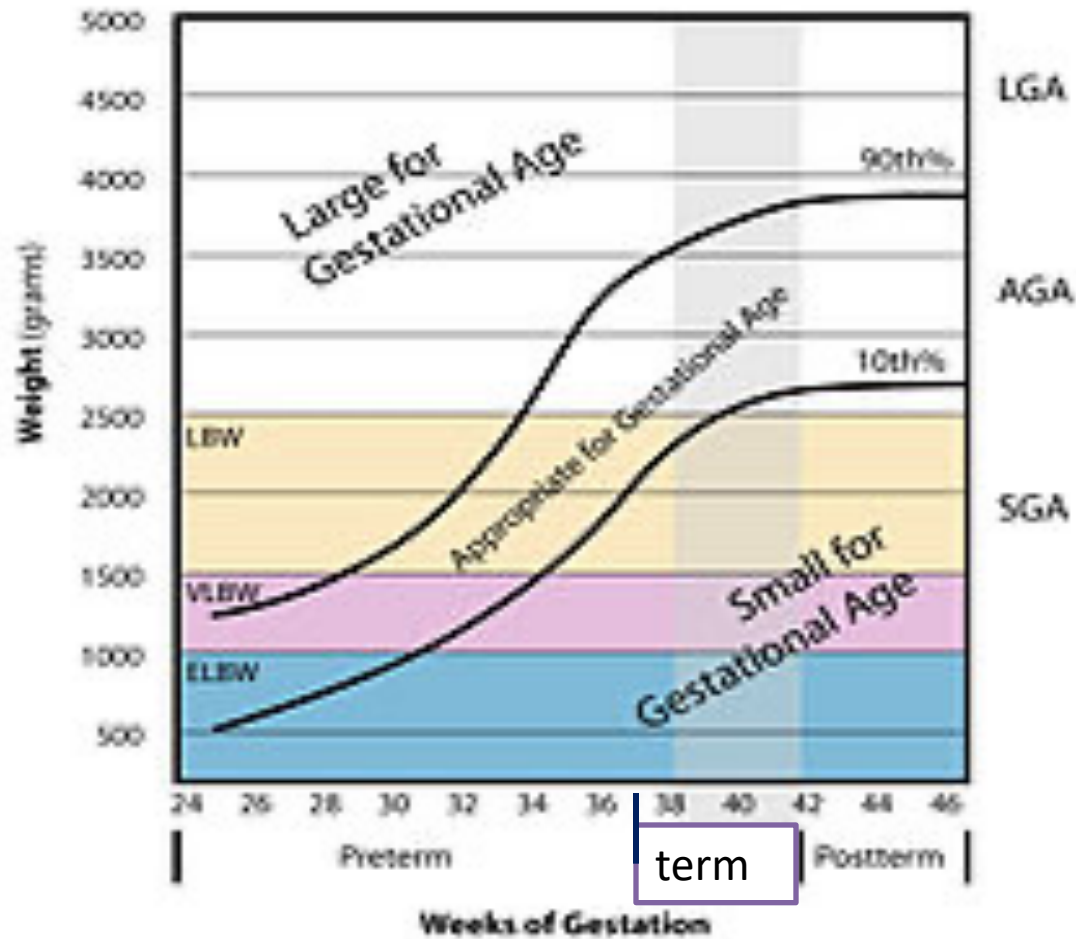


Definitions (LBW. SGA, LAG. AGA)

Weight (Boys)



definitions



Objectives

- What is preterm baby?
- Definitions (SGA, LAG. AGA, LBW)
- **Disease Burden**
- characteristics of preterm baby
- Causes of preterm baby
- Prevention
- Complications
- prognosis

Incidence

Jordan Data

source : J-SANDS 2019-2020

**JORDAN STILLBIRTHS AND NEONATAL DEATHS SURVEILLANCE AND
AUDITING SYSTEM**

Jordan 2020-2021 JSANDS data	Period						Total N = 31106
	Complete lockdown Mid March-April/2020 n = 2181		Partial lockdown May2020-April2021 n = 13614		Before COVID-19 April2019-mid-march2020 n = 15311		
	n	%	n	%	n	%	N
Gestational age							
Extremely preterm (less than 28 weeks)	20	0.9%	69	0.5%	100	0.7%	189
Very preterm (28 to 32 weeks)	21	1.0%	174	1.3%	202	1.3%	397
Moderate to late preterm (32 to 37 weeks)	174	8.0%	1149	8.4%	1380	9.0%	2703
Full term	1966	90.1%	12222	89.8%	13629	89.0%	27817

JORDAN	Period						Total N = 31106
	Complete lockdown n = 2181		Partial lockdown n = 13614		Before COVID-19 n = 15311		
	n	%	n	%	n	%	N
Birth weight							
Normal birth weight	1941	89.0%	12017	88.3%	13400	87.5%	27358
Low birth weight	192	8.8%	1388	10.2%	1478	9.7%	3058
Very low birth weight	30	1.4%	138	1.0%	200	1.3%	368
Extremely low birth weight	18	0.8%	71	0.5%	233	1.5%	322
SGA							
No	1956	89.7%	12153	89.3%	13818	90.2%	27927
Yes	225	10.3%	1461	10.7%	1493	9.8%	3179

USA

IN 2014, **1** OF EVERY **10** BABIES
WAS BORN **PREMATURE**
IN THE UNITED STATES



Disease burden

Lead to neonatal Death

Neonatal Mortality rate

- Definition
 - Neonatal death /1000Live newborn (first 28 days of life)

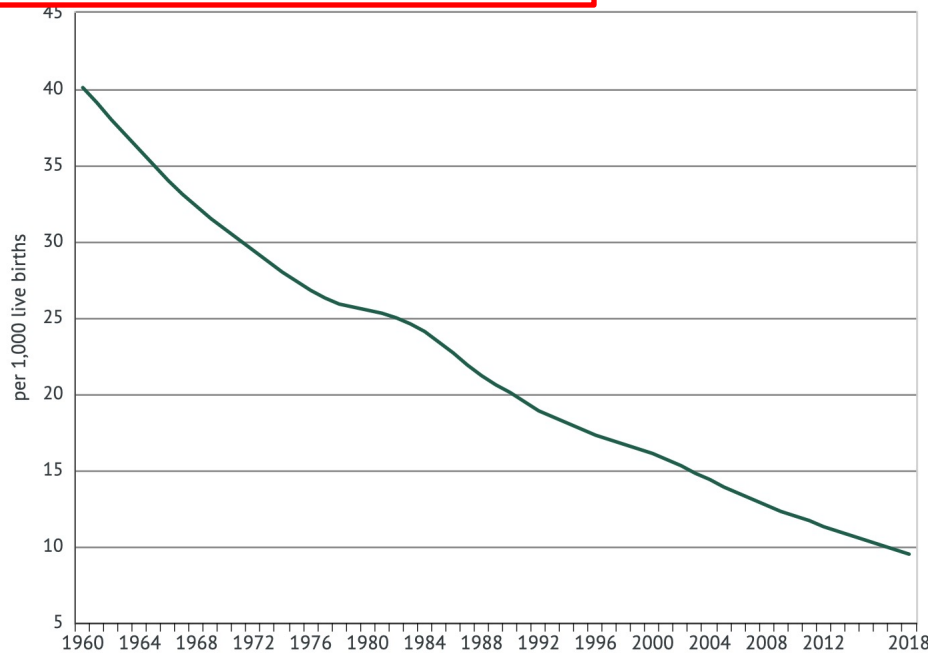
Under five year mortality Rate



Source of data



What is Jordan neonatal mortality rate?



[Sign up free to view source](#)

https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&df=GLOBAL_DATAFLOW&ver=1.0&dq=JOR.CME_MRM0.&startPeriod=1970&endPeriod=2020

DATE	VALUE	CHANGE, %
2018	9.5	-3.06 %
2017	9.8	-2.97 %
2016	10.1	-2.88 %
2015	10.4	-2.80 %
2014	10.7	-2.73 %
2013	11.0	-2.65 %
2012	11.3	-3.42 %
2011	11.7	-2.50 %
2010	12.0	-2.44 %
2009	12.3	-3.15 %
2008	12.7	-3.05 %
2007	13.1	



Neonatal Mortality In Jordan

(according to Gestation age and birth weight)

Sources: J-SANDS: Jordan Stillbirths and Neonatal Deaths Surveillance and Auditing System

study
2019

Inclusion criteria	NMR
If > 24 weeks GA	14.7/1000 live birth
> 28 week and > 1 kg	10.5 /1000 live birth*

Perinatal and Neonatal Mortality in Jordan

May 2019

DOI:

[10.1007/978-3-319-74365-3_161-1](https://doi.org/10.1007/978-3-319-74365-3_161-1)

In book: Handbook of Healthcare in the Arab World

Publisher: Springer

https://www.researchgate.net/publication/333295581_Perinatal_and_Neonatal_Mortality_in_Jordan

Project:

[J-SANDS: Jordan Stillbirths and Neonatal Deaths Surveillance and Auditing System](#)

Neonatal Mortality In Jordan

(according to Gestation age)

- | GA | NMR |
|---------------------|-----------------|
| > 37 week | 4/1000 |
| < 37 week | 123/1000 |

[Turk J Obstet Gynecol.](#) 2017 Mar;14(1):28-36. doi: 10.4274/tjod.62582. Epub 2017 Mar 15.

The incidence, risk factors, and mortality of preterm neonates: A prospective study from Jordan (2012-2013).

[Abdel Razeq NM](#)¹, [Khader YS](#)², [Batieha AM](#)

Neonatal Mortality In Arab Countries

(

Country	NMR	Year	Source
Australia	2.2/1000 live birth	2020	Unicef
Jordan	14.7/1000 live birth		JSANDS
Syria	10.5 /1000 live birth	2019	World bank
Libya	6 /1000 live birth	2019	UNICEF
Saudi Arabia	3.6 /1000 live birth	2019	
Lebanon	4.2/1000 live birth	2019	UNICEF

https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&df=GLOBAL_DATAFLOW&ver=1.0&dq=.CME_TMM0+CME_PND+CME_MRM0..&startPeriod=2016&endPeriod=2021

Significance of preterm In Jordan

Causes of Neonatal mortality In Jordan

1- Congenital malformation

2- **prematurity (ie second leading cause)**

Cost: first 4-5days around 700-1200 JOD/day Then 150-250JOD/day

Disability

< 26 weeks – 60% have disability

ies

Level, Causes and Risk Factors of Neonatal Mortality, in Jordan: Results of a National Prospective Study.

Batieha AM¹, Khader YS², Berdzuli N³, Chua-Oon C³, Badran EF⁴, Al-Sheyab NA⁵, Basha AS⁶, Obaidat A⁷, Al-Qutob Rj⁸

[Author information](#) ▶

Maternal and Child Health Journal, 01 May 2016, 20(5):1061-1071

<https://europepmc.org/article/med/26645614>

Classification of
preterm based on

Based on:
gestational age

Classification of preterm based on **Based on gestational age**

Pictures

- **Extreme prematurity:**
 - less than 28 weeks' gestation
- **Late-preterm infants :**
 - 34⁺⁰ to 36⁺⁶ weeks' gestation





Late preterm

Late preterm
Gestation age between
34⁺⁰ - complete 36⁺⁰⁶ weeks

Don't deliver late-preterm infants unless medically indicated

LATE-PRETERM INFANTS should not be delivered unless there is an accepted maternal or fetal indication for delivery, according to a new ACOG Committee Opinion.

Late-preterm infants—those born between 34 weeks and zero days and 36 weeks and six days of gestation—are often mistakenly believed to be as physiologically and metabolically mature as term infants. However, late-preterm infants are at higher risk than term infants are of developing numerous substantial medical complications, resulting in higher rates of infant mortality, morbidity before initial hospital discharge, and hospital readmission in the first months of life.

“In the last decade, the proportion of births that were late-preterm births increased by 16%,” said Ann R. Stark, MD, the American Academy of Pediatrics liaison to the ACOG Committee on Obstetric Practice. “Women and physicians need to be careful that when scheduling cesarean deliveries or inductions,

they do so only when maternal or fetal indications exist, such as preeclampsia or a nonreassuring fetal status.”

Collaborative counseling by both obstetric and neonatal clinicians about the outcomes of late-preterm births is warranted unless precluded by emergent conditions, according to the Committee Opinion *Late-Preterm Infants*, which was published in the April issue of *Obstetrics & Gynecology*. Much of the Committee Opinion contains information on the health risks these infants face, as outlined in guidelines by the American Academy of Pediatrics.

Late-preterm infants are four times more likely than term infants are to have at least one medical condition diagnosed and three and a half times more likely to have two or more conditions diagnosed, according to the Committee Opinion. Late-preterm infants are more likely to be diagnosed with temperature instability, hypoglycemia, respiratory distress, apnea, jaundice, and feeding difficulties. ♀

Late preterm babies usually **appear healthy at birth** but may have:

- more difficulties adapting than full-term babies.
- They may have trouble maintaining **their body temperature**.
- They often have **difficulty with breastfeeding** and **bottle feeding**.
- May have **breathing difficulties**
- These infants are also at higher **risk for infections and jaundice**, and should be watched for signs of these conditions.

Studies show that Infants Born Late Preterm are Less Healthy than Full-Term Infants and are More Likely

Re-Hospitalization

to experience



(Josephine, Aug 18, 2015)

to suffer from

**Hypoglycemia
or**

Hyperbilirubinemia

**Respiratory
Distress**

**Increased Temperature
Instability or
Hypothermia**

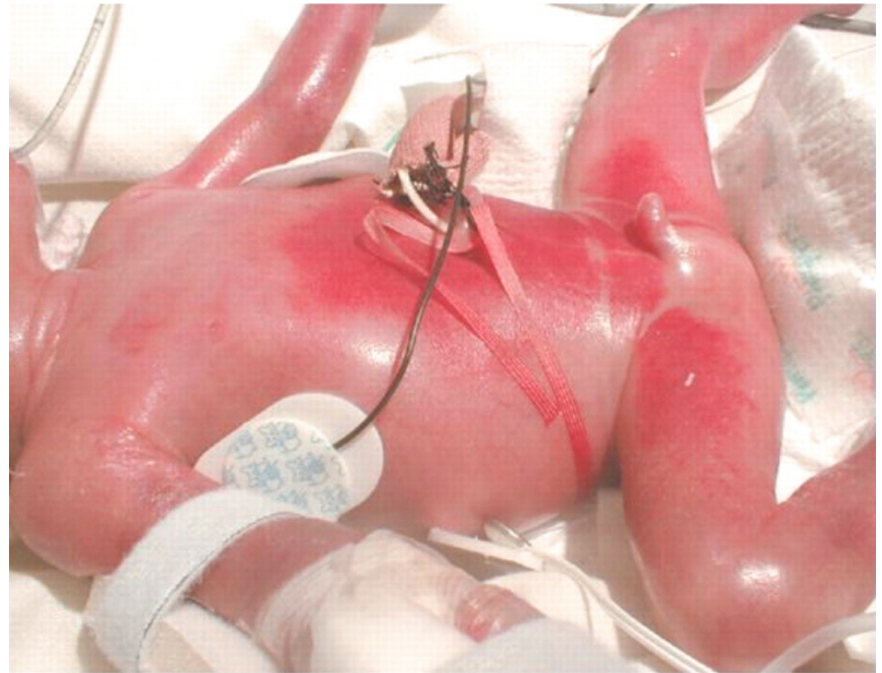
(Wang, Dorer, Fleming, Catlin, 2004 in 2012; Engle, Tomashek, & Wallman, 2007 in 2012 in Lipkind, Slopen, Pfeiffer, & McVeigh, 2012)

Objectives

- **What is preterm baby?**
- **Definitions (LBW. SGA, LAG. AGA)**
- **Disease Burden**
- **characteristics of preterm baby**
- **Causes of preterm baby**
- **Prevention**
- **Complications**
- **prognosis**

low birth weight (LBW).

- Birth weight less than 2,500 grams
 - May preterm, SGA or both



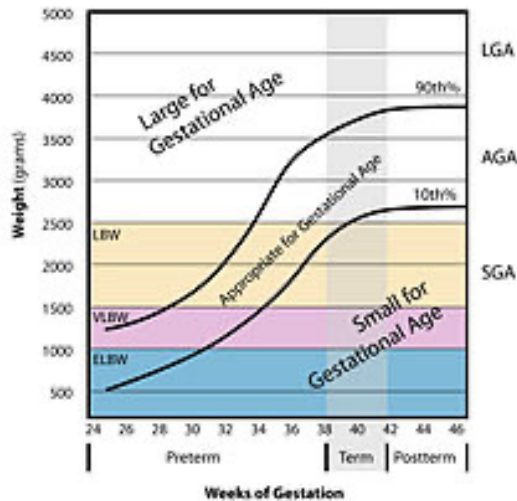
How to know

Birth weight

LBW

Preterm

Not accurate
May be helpfull



- Ballard Score

The New Ballard Score is a set of procedures developed by Dr. Jeanne L Ballard

-To determine Gestational Age through:

-Physical assessment of a newborn infant.

-Neuromuscular

<https://www.signnow.com/jsfiller-desk15/?projectId=422299065#1bf7300df0c48e529bc58c2860f8e375>

MATURATIONAL ASSESSMENT OF GESTATIONAL AGE (New Ballard Score)

NAME _____ SEX _____
 HOSPITAL NO. _____ BIRTH WEIGHT _____
 RACE _____ LENGTH _____
 DATE/TIME OF BIRTH _____ HEAD CIRC. _____
 DATE/TIME OF EXAM _____ EXAMINER _____
 AGE WHEN EXAMINED _____
 APGAR SCORE: 1 MINUTE _____ 5 MINUTES _____ 10 MINUTES _____

NEUROMUSCULAR MATURITY

NEUROMUSCULAR MATURITY SIGN	SCORE						RECORD SCORE HERE
	-1	0	1	2	3	4	
POSTURE							
SQUARE WINDOW (Wrist)							
ARM RECOIL							
POPLITEAL ANGLE							
SCARF SIGN							
HEEL TO EAR							
TOTAL NEUROMUSCULAR MATURITY SCORE							

SCORE

Neuromuscular _____
 Physical _____
 Total _____

MATURITY RATING

SCORE	WEEKS
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

PHYSICAL MATURITY

PHYSICAL MATURITY SIGN	SCORE						RECORD SCORE HERE
	-1	0	1	2	3	4	
SKIN	sticky friable transparent	gelatinous red translucent	smooth pink visible veins	superficial peeling & / or rash, few veins	cracking pale areas rare veins	parchment deep cracking no vessels	leathery cracked wrinkled
LANUGO	none	sparse	abundant	thinning	bald areas	mostly bald	
PLANTAR SURFACE	heel-toe 40-50 mm: -1 < 40 mm: -2	>50 mm no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole	
BREAST	imperceptible	barely perceptible	flat areola no bud	stippled areola 1-2 mm bud	raised areola 3-4 mm bud	full areola 5-10 mm bud	
EYE / EAR	lids fused loosely: -1 tightly: -2	lids open pinna flat stays folded	sl. curved pinna; soft; slow recoil	well-curved pinna; soft but ready recoil	formed & firm instant recoil	thick cartilage ear stiff	
GENITALS (Male)	scrotum flat, smooth	scrotum empty faint rugae	testes in upper canal rare rugae	testes descending few rugae	testes down good rugae	testes pendulous deep rugae	
GENITALS (Female)	clitoris prominent & labia flat	prominent clitoris & small labia minora	prominent clitoris & enlarging minora	majora & minora equally prominent	majora large minora small	majora cover clitoris & minora	
TOTAL PHYSICAL MATURITY SCORE							

GESTATIONAL AGE (weeks)

By dates _____
 By ultrasound _____
 By exam _____

Reference
 Ballard JL, Khoury JC, Wedig K, et al: New Ballard Score, expanded to include extremely premature infants. J Pediatr 1991; 119:417-423. Reprinted by permission of Dr Ballard and Mosby—Year Book, Inc.

What are the characteristics of prematurity?

Physical assessment of a newborn infant

Differentiating features

Sole- have fine wrinkles,
creases are not well formed

- Breast nodule- small or absent

Identification: Preterm LBW

Sole creases



Identification: Preterm LBW

Breast nodule



- EAR- preterm ear cartilages are poorly developed, soft and poor recoil
- Hair- wooly and fuzzy



- Skin- skin is thin, gelatinous, shiny and excessively pink, abundant lanugo



- testes undescended and scrotum poorly developed



- Labia majora widely separated in females

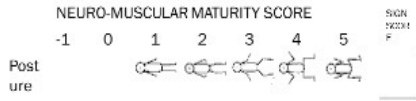
Identification: Preterm LBW

Female genitalia

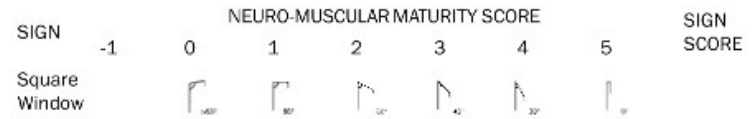


Neurologic Assessment

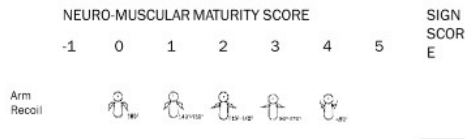
posture



re window



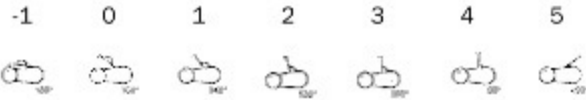
Arm recoil



Neurologic Assessment

Popliteal angle

NEURO-MUSCULAR MATURITY SCORE

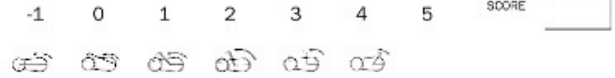


SIGN SCORE



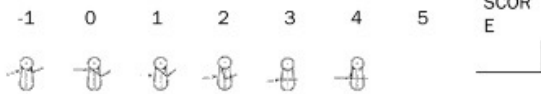
Heel to ear

-MUSCULAR MATURITY SCORE



Scarf sign




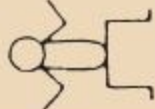

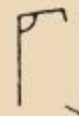



















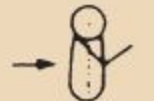









NEURO-MUSCULAR MATURITY SCORE



Physical Maturity

	-1	0	1	2	3	4	5																														
Skin	sticky friable transparent	gelatinous red, translucent	smooth pink, visible veins	superficial peeling &/or rash. few veins	cracking pale areas rare veins	parchment deep cracking no vessels	leathery cracked wrinkled																														
Lanugo	none	sparse	abundant	thinning	bald areas	mostly bald	<table border="1"> <thead> <tr> <th colspan="2">Maturity Rating</th> </tr> <tr> <th>Score</th> <th>weeks</th> </tr> </thead> <tbody> <tr><td>-10</td><td>20</td></tr> <tr><td>-5</td><td>22</td></tr> <tr><td>0</td><td>24</td></tr> <tr><td>5</td><td>26</td></tr> <tr><td>10</td><td>28</td></tr> <tr><td>15</td><td>30</td></tr> <tr><td>20</td><td>32</td></tr> <tr><td>25</td><td>34</td></tr> <tr><td>30</td><td>36</td></tr> <tr><td>35</td><td>38</td></tr> <tr><td>40</td><td>40</td></tr> <tr><td>45</td><td>42</td></tr> <tr><td>50</td><td>44</td></tr> </tbody> </table>	Maturity Rating		Score	weeks	-10	20	-5	22	0	24	5	26	10	28	15	30	20	32	25	34	30	36	35	38	40	40	45	42	50	44
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Neuromuscular Maturity

	-1	0	1	2	3	4	5
Posture							
Square Window (wrist)	 $>90^\circ$	 90°	 60°	 45°	 30°	 0°	
Arm Recoil		 180°	 $140^\circ - 180^\circ$	 $110^\circ - 140^\circ$	 $90^\circ - 110^\circ$	 $<90^\circ$	
Popliteal Angle	 180°	 160°	 140°	 120°	 100°	 90°	 $<90^\circ$
Scarf Sign							
Heel to Ear							

MATURATIONAL ASSESSMENT OF GESTATIONAL AGE (New Ballard Score)

NAME _____ SEX _____
 HOSPITAL NO. _____ BIRTH WEIGHT _____
 RACE _____ LENGTH _____
 DATE/TIME OF BIRTH _____ HEAD CIRC. _____
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 AGE WHEN EXAMINED _____
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SQUARE WINDOW (Wrist)							
ARM RECOIL							
POPLITEAL ANGLE							
SCARF SIGN							
HEEL TO EAR							
TOTAL NEUROMUSCULAR MATURITY SCORE							

SCORE

Neuromuscular _____
 Physical _____
 Total _____

MATURITY RATING

SCORE	WEEKS
-10	20
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0	24
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50	44

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GESTATIONAL AGE (weeks)

By dates _____
 By ultrasound _____
 By exam _____

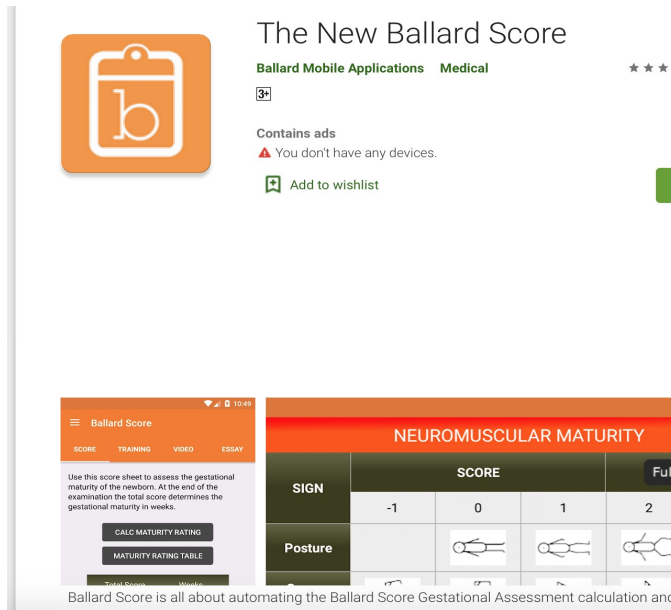
Reference
 Ballard JL, Khoury JC, Wedig K, et al: New Ballard Score, expanded to include extremely premature infants. J Pediatr 1991; 119:417-423. Reprinted by permission of Dr Ballard and Mosby—Year Book, Inc.

Example: What are the characteristics of prematurity?

- The following are the most common characteristics of a premature baby. Characteristics may include:
 - - small baby, often weighing less than 2,500 grams
 - - pink or red skin, able to see veins
 - - little body fat
 - - little scalp hair, but may have lots of lanugo
 - - weak cry and body tone
 - - genitals may be small and underdeveloped



How to do Ballard Score



The New Ballard Score

Ballard Mobile Applications Medical ★★★

Contains ads
⚠ You don't have any devices.

🔖 Add to wishlist

Ballard Score is all about automating the Ballard Score Gestational Assessment calculation and providing the information and training needed for the most accurate assessment. The program comes with a FREE version with training, monograph, frequently asked questions and a static score sheet for reference. The in app purchase for just \$0.99 enables the interactive score sheet, downloadable videos and high quality pictures.

NEUROMUSCULAR MATURITY				
SIGN	SCORE			
	-1	0	1	2
Posture				

HOME › IOS › EDUCATIONAL SOFTWARE › HEALTH & FITNESS SOFTWARE › BALLARD SCORE



Ballard Score for iPhone

FREE / Brian Ballard / iOS / Version 1.0 / FULL SPECS ▾



PUBLISHER'S DESCRIPTION

From [Brian Ballard](#):

Ballard Score is all about automating the Ballard Score Gestational Assessment calculation and providing the information and training needed for the most accurate assessment. The program comes with a FREE version with training, monograph, frequently asked questions and a static score sheet for reference. The in app purchase for just \$0.99 enables the interactive score sheet, downloadable videos and high quality pictures. Ballard Score Highlights: Interactive Score Sheet that automatically calculates the weeks gestation based on the cells selected on the touch screen. Detailed Monograph about the Ballard Score Training on each assessment criteria. Frequently Asked Questions with responses from Dr. Ballard

When To Do Ballard. Score


new ballard sore

Best- <12hrs(<26 wks)

upto 96 hrs(>26 wks)

Accurate within 2 wks of GA

Overestimates by 2-4 days in 32-37 wks babies



When To
Do Ballard

Objectives

- **What is preterm baby?**
- **Definitions (LBW. SGA, LAG. AGA)**
- **Disease Burden**
- **characteristics of preterm baby**
- **Causes of preterm baby**
- **Prevention**
- **Complications**
- **prognosis**

What causes prematurity?

1- Maternal factors:

- Previous preterm delivery
- Infection (such as group B streptococcus, urinary tract infections, vaginal infections, infections of the fetal or placental tissues).
- Abnormal structure of the uterus.
- Cervical incompetence (inability of the cervix to stay closed during pregnancy).
- Maternal illness
- Previous preterm birth ?? genetic.
- Drug abuse (such as cocaine).

2- Factors involving the pregnancy

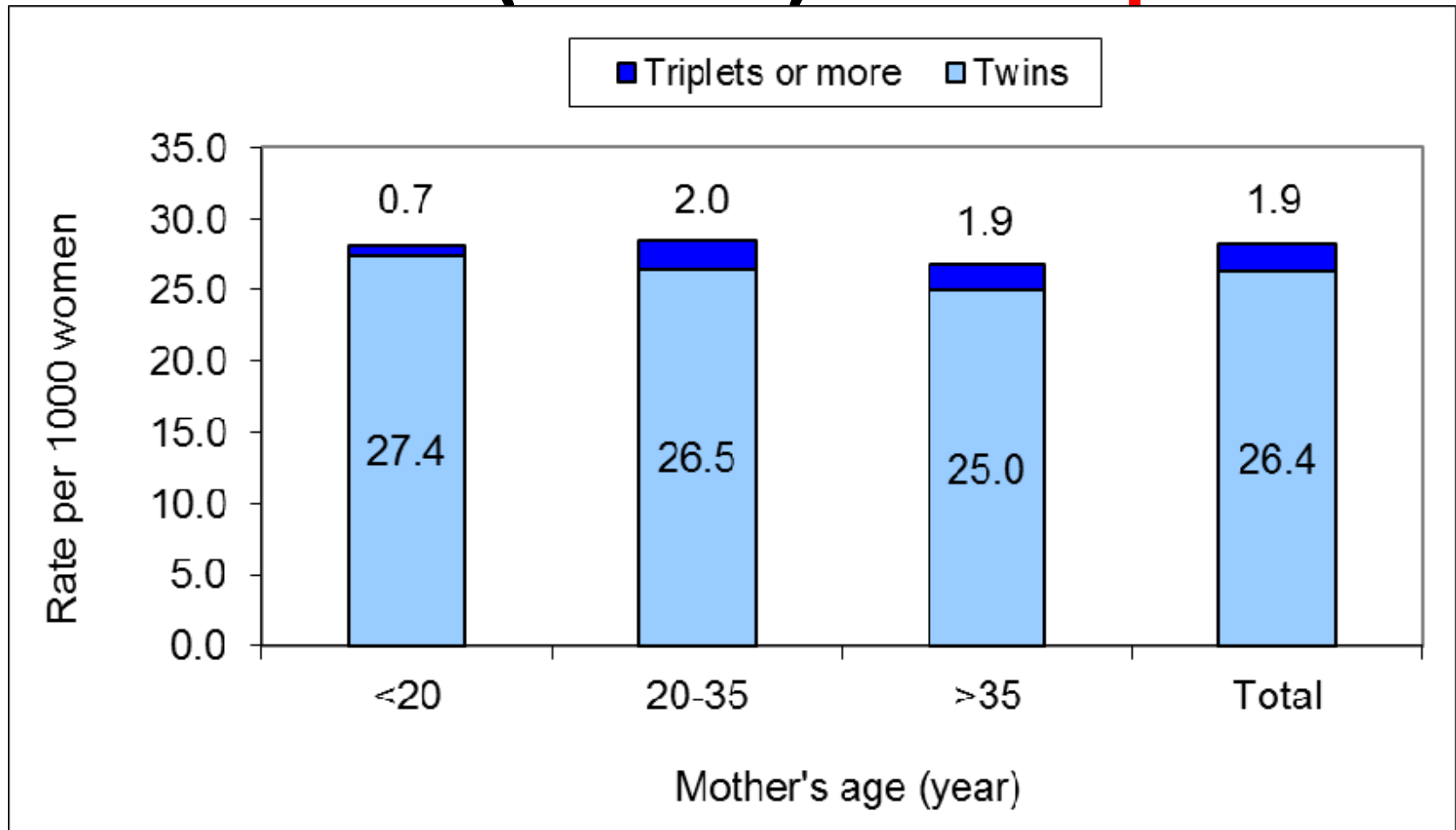
- Abnormal or decreased function of the **placenta**.
- Placenta previa (low lying position of the placenta).
- Placental abruption (early detachment from the uterus).
- Premature rupture of membranes (amniotic sac).
- Polyhydramnios (too much amniotic fluid).

3- Factors involving the fetus

- When fetal behavior indicates the intrauterine environment is not healthy.
- Multiple gestation (twins, triplets or more).

Multiple Birth Ratios

Jordan Data: **(JPNMS) 2013 report**



Jordan case

Risk factors Associated significantly with preterm delivery

- Primigravida
- Illness: preeclampsia, and diabetes
- Mother's weight <50 kg
- lack of antenatal care visits or <8 visits during pregnancy
- Previous history of preterm delivery,
- Previous history of stillbirth/neonatal death
- Male sex

The incidence, risk factors, and mortality of preterm neonates: A prospective study from Jordan (2012-2013)

Preterm yenidoğan insidansı, risk faktörleri ve mortalitesi: Ürdün'den prospektif bir çalışma (2012-2013)

Nadin M. Abdel Razeq¹, Yousef S. Khader², Anwar M. Batieha²

¹The University of Jordan Faculty of Nursing, Department of Maternal and Child Health Nursing, Amman, Jordan
²Jordan University of Science and Technology, Faculty of Applied Medical Sciences, Department of Community Medicine and Public Health, Irbid, Jordan

Abstract

Objective: To explore the incidence of preterm delivery, maternal risk factors for having a preterm neonate, and preterm neonates' mortality in Jordan.
Materials and Methods: A cross-sectional population-based design was applied. Socio-demographic, perinatal, delivery risk factors, and survival information were gathered in pre- and post-hospital discharge interviews with 21875 women who gave birth to live neonates <28 weeks of gestation in 18 hospitals in Jordan. Women were interviewed between 2012 and 2013. The sample was limited to singleton women who gave birth to live neonates. Women who gave birth to stillborn babies were excluded.
Results: Preterm delivery incidence was 5.8%, of which 83% were in 32-36 gestational weeks. Male sex, primigravidity, hypertension, preeclampsia, and diabetes were significantly associated with an increased risk of preterm delivery. Women aged 20-35 years had the lowest risk of preterm delivery. Mother's weight <50 kg, hospitalization at 24-28 gestational weeks, lack of antenatal care visits or <8 visits during pregnancy, a history of preterm delivery, and a history of stillbirth/neonatal death were associated with increased risks of preterm delivery. The neonatal mortality rate was 49/1000 live births among full-term and 1230/1000 live births among preterm babies. Prematurity, congenital anomalies, and maternal diseases were the causes of 44% of preterm neonatal deaths.
Conclusion: The mortality rate was considerably higher among preterm neonates than among term neonates; discrepancies between Jordan and other countries existed. Systematic prenatal risk assessment and quality postnatal health care improvements are required to improve the survival rates of preterm neonates.

Keywords: Preterm, infant, prematurity, obstetric, premature birth

Öz

Amaç: Ürdün'deki yenidoğan doğum insidansı, yenidoğanın anne doğum risk faktörleri ve yenidoğanın mortalite oranını incelemektir.

- [Turk J Obstet Gynecol.](#) 2017 Mar;14(1):28-36. doi: 10.4274/tjod.62582. Epub 2017 Mar 15.
- **The incidence, risk factors, and mortality of preterm neonates: A prospective study from Jordan (2012-2013).**
- [Abdel Razeq NM¹](#), [Khader YS²](#), [Batieha AM²](#)

Prevention Bundles

- 1- **Prevention of preterm Birth**
- 2- Management of preterm labor
- 3- Care of preterm baby

PREVENTION OF PRETERM BIRTH

- Preconception care package, including family planning (e.g., birth spacing and adolescent-friendly services), education and nutrition especially for girls, and STI prevention
- Antenatal care packages for all women, including screening for and management of STIs, high blood pressure and diabetes; behavior change for lifestyle risks; and targeted care of women at increased risk of preterm birth
- ~~Provider education~~ to promote appropriate induction and cesarean
- ~~Policy support~~ including smoking cessation and employment safeguards of pregnant women

CARE OF THE PREMATURE BABY

MANAGEMENT OF PRETERM LABOR

- Tocolytics to slow down labor
- Antenatal corticosteroids
- Antibiotics for pPROM

- Essential and extra newborn care, especially feeding support
- Neonatal resuscitation
- Kangaroo Mother Care
- Chlorhexidine cord care
- Management of premature babies with complications, especially respiratory distress syndrome and infection
- Comprehensive neonatal intensive care, where capacity allows

**REDUCTION OF
PRETERM BIRTH**

**MORTALITY
REDUCTION AMONG
BABIES BORN PRETERM**

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REDUCTION OF
PRETERM BIRTH

MANAGEMENT OF PRETERM LABOR

- Tocolytics to slow down labor
- Antenatal corticosteroids
- Antibiotics for pPROM

- Essential newborn special support

- Neonatal

- Kangaroo

- Chlorhexidine care

- Management

premature babies complications, especially respiratory distress

Prevention Bundles

- 1- Prevention of preterm Birth
- 2- Management of preterm labor
- 3- Care of preterm baby

Prenatal preventions

Management of preterm labor

1. Antenatal care.

Antenatal visits to detect mother **at risk** of preterm labor and manage **her disease** :

Reference:

Neonatal outcomes in extremely preterm newborns admitted to intensive care after no active antenatal management: a population-based cohort study. *J Pediatr.* 2018 Dec;203:150–5.

Prenatal preventions

Management of preterm labor

2 :Cervical length measurements in populations **at risk of preterm birth** (example :previous preterm)

- Reference:

- Interventions for women with mid-trimester short cervix: which ones work? [editorial]. *Ultrasound Obstet Gynecol.* 2017 Mar;49(3):295–300.
- Vaginal progesterone, oral progesterone, 17-OHPC, cerclage, and pessary for preventing preterm birth in at-risk singleton pregnancies: an updated systematic review and network meta-analysis. *BJOG.* 2019 Apr;126(5): 556-567.

Prenatal preventions

Management of preterm labor

3. Progesterone (different types)

Use of progesterone is associated with:

- **May reduced** preterm delivery rates and reduced neonatal mortality

Indication

- **Give if**
 - **In singleton gestations**
 - **With previous preterm birth**

And

- shortened cervix has been identified

In these **women with prior PTB**, if the transvaginal ultrasound Cervical length (CL) shortens to <25 mm at <24 weeks, cervical cerclage may be offered.

References:

- Interventions for women with mid-trimester short cervix: which ones work? [editorial]. Ultrasound Obstet Gynecol. 2017.
- Vaginal progesterone, oral progesterone, 17-OHPC, cerclage, and pessary for preventing preterm birth in at-risk singleton pregnancies: an updated systematic review and network meta-analysis. BJOG. 2019 Apr;126(5): 556-567.

3. Use of progesterone

2016 Meta-Analysis including data from OPPTIMUM study

Ultrasound Obstet Gynecol 2016
Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.15953

Vaginal progesterone decreases preterm birth ≤ 34 weeks of gestation in women with a singleton pregnancy and a short cervix: an updated meta-analysis including data from the OPPTIMUM study

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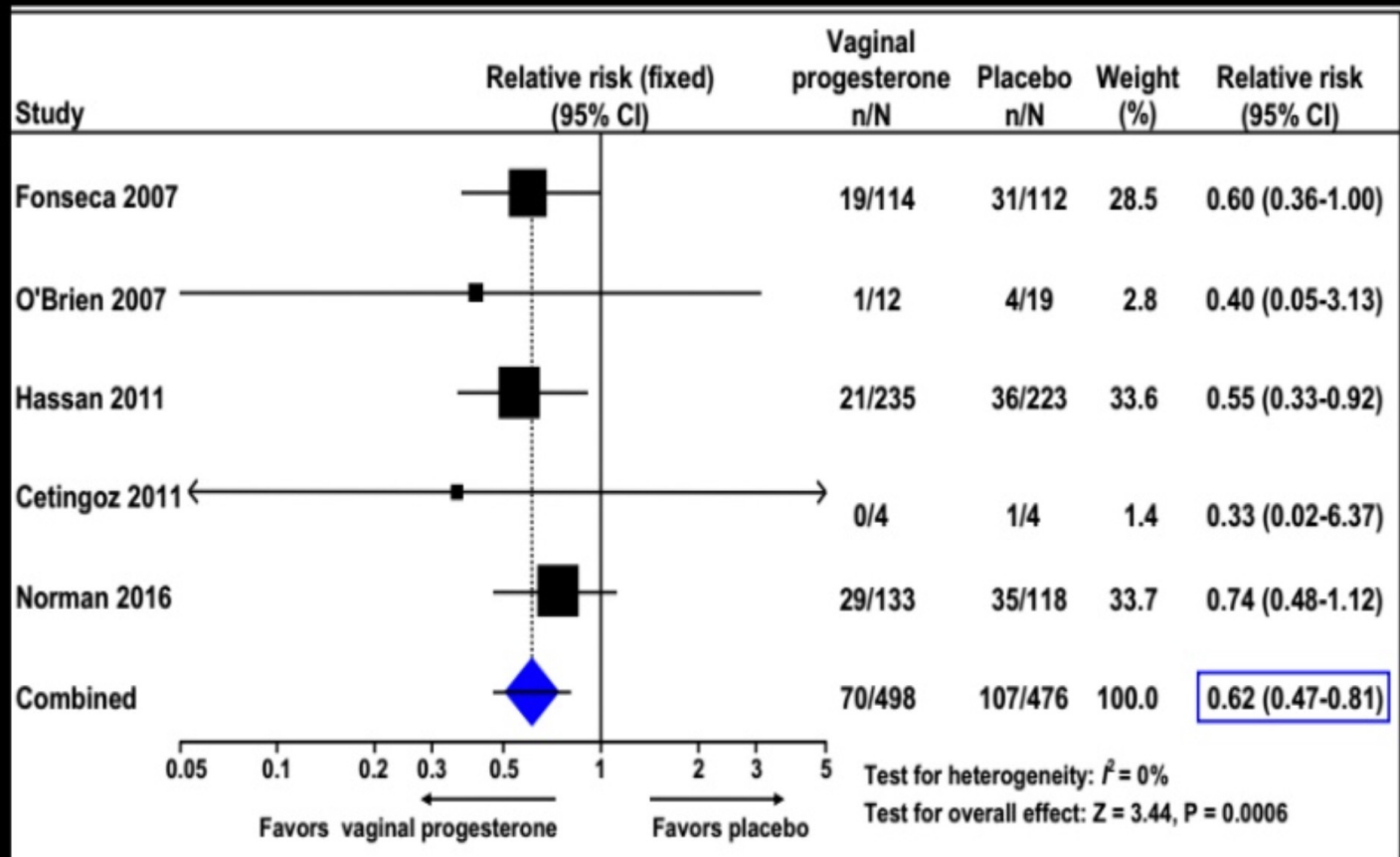
Meta-analysis

Conclusion This updated systematic review and meta-analysis reaffirms that vaginal progesterone reduces the risk of preterm birth and neonatal morbidity and mortality in women with a singleton gestation and a mid-trimester CL ≤ 25 mm, without any deleterious effects on neurodevelopmental outcome. Clinicians should continue to perform universal transvaginal CL screening at 18–24 weeks of gestation in women with a singleton gestation and to offer vaginal progesterone to those with a CL ≤ 25 mm. Published 2016. This article is a U.S. Government work and is in the public domain in the USA.

2018 Meta-analysis

Progesterone for prevention of PTL

- 5 studies combined – Favors progesterone



Prevention Bundles

- 1- Prevention of preterm Birth
- 2- Management of preterm labor
- 3- Care of preterm baby

Prenatal preventions

Management of preterm labor (PTL)

4. in utero Transfer of mother at risk of PTL

- The Extremely preterm baby (< 29-30 weeks) should, if possible, be transported in utero to tertiary NICU

5. Antibiotics for **Preterm prolonged rupture of membrane (pPROM)**

- antibiotics
 - can delay preterm delivery
 - reduce neonatal morbidity,
- Avoid co-amoxiclav because of its association with increased risk of NEC

Antibiotics in preterm rupture of membranes (pPROM)



Potential for lives saved through antibiotics for premature prelabor rupture of the membranes (pPROM)

In high-income countries, it is standard practice to give antibiotics to women with pre-term, pre-labour rupture of membranes (pPROM) to delay birth and reduce the risk of infection.

- In LMICs use of antibiotic therapy for pPROM is not common
- Reviewed 18 RCTs (most from HIC) that provide strong evidence that antibiotics for pPROM:
 - Reduced risk of RDS [risk ratio (RR) = 0.88; confidence interval (CI) 0.80, 0.97],
 - Reduced risk of early onset postnatal infection (RR = 0.61; CI 0.48, 0.77).
 - Reduction in neonatal mortality (RR = 0.90; CI 0.72, 1.12).
- In LMICs where access to other interventions (antenatal steroids, surfactant therapy, ventilation, antibiotic therapy) may be low, antibiotics for pPROM could prevent 4% of neonatal deaths due to complications of prematurity and 8% of those due to infection.

Could save about 12% of PT babies each year if reached 95% of women in preterm labor (LiST analysis)

Prenatal preventions

Management of preterm labor

5. Neuroprotection

Magnesium Sulphate (MgSO₄)

➤ Is given to women with imminent preterm delivery before 32 weeks

➤ It reduces **cerebral palsy at 2 years of age** by about 30%

Magnesium sulphate for women at risk of preterm birth for neuroprotection of the fetus. Cochrane Database Syst Rev. 2009 Jan;1(1):CD004661.

➤ The longer-term benefits are less clear.

➤ Australasian Collaborative Trial of Magnesium Sulphate (ACTOMgSO₄) Study Group. School-age outcomes of very preterm infants after antenatal treatment with magnesium sulfate vs placebo. JAMA. 2014 Sep;312(11):1105–1

http://www.mfmsm.com/media_pages/MFM_Progesterone_and_preterm_birth_prevention.pdf

Prenatal preventions
Management of preterm labor

6. Antenatal steroid

a **single course** of prenatal corticosteroids **to all** women **at risk of preterm delivery** from when pregnancy is considered potentially viable (24 weeks) until 34 weeks' gestation **ideally at least 24 h before birth** (level of evidence is **A1**).

Prevention of preterm Birth: (prenatal care) cont....

Pharmaceutical care

- Antenatal steroid therapy(RCOG)

- Reduce RDS(44%), IVH(46%), NEC and
- neonatal death(31%)



- MOA

- In response to glucocorticoid, the fetal lung fibroblast produces protein, fibroblast-pneumonocyte factor, which in turn stimulates the formation of saturated phosphatidylcholine

- At what GA?- single course between 24-34 wks of GA
- Most effective?-24 hours after and upto 7 days after 2nd dose of corticosteroid

- **Role of magnesium sulphate**

- Commonly used tocolytic
- Reduced rate of cerebral palsy and gross motor dysfunction
- initial infusion of 4 to 6 grams over 15 to 30 minutes, and then a maintenance dose of 2 to 3 grams per hour.
- Contraindicated in mothers with myasthenia gravis

Prenatal preventions
Management of preterm labor

7. Tocolysis

- **Consider short-term use** of **tocolytic drugs** in very preterm pregnancies
- The aim of tocolysis must be to prolong the pregnancy by at least 48 hours to allow completion of a course of corticosteroids and/or in utero transfer to a perinatal center.
- ❖ Use Safe tocolytic drugs for the mother
(oxytocin antagonists or **Ca-channel blockers**)

Bed rest



- What is known evidence:
 - There is currently no data
 - It increase the maternal risk of thrombosis and contributes to the development of muscular atrophy and osteoporosis.

1. Elliott J P, Miller H S, Coleman S. A randomized multicenter study to determine the efficacy of activity restriction for preterm labor management in patients testing negative for fetal fibronectin. *J Perinatol.* 2005;25:626–630. [[PubMed](#)] [[Google Scholar](#)]
2. Bigelow C A, Factor S H, Miller M. Pilot Randomized Controlled Trial to Evaluate the Impact of Bed Rest on Maternal and Fetal Outcomes in Women with Preterm Premature Rupture of the Membranes. *Am J Perinatol.* 2016;33:356–363. [[PubMed](#)] [[Google Scholar](#)]
3. da Silva Lopes K, Takemoto Y, Ota E. Bed rest with and without hospitalisation in multiple pregnancy for improving perinatal outcomes. *Cochrane Database Syst Rev.* 2017;(03):CD012031. [[PMC free article](#)][[PubMed](#)] [[Google Scholar](#)]

Prevention Bundles

- 1- Prevention of preterm Birth
- 2- prevention of preterm Birth
- 3- **Care of preterm baby**

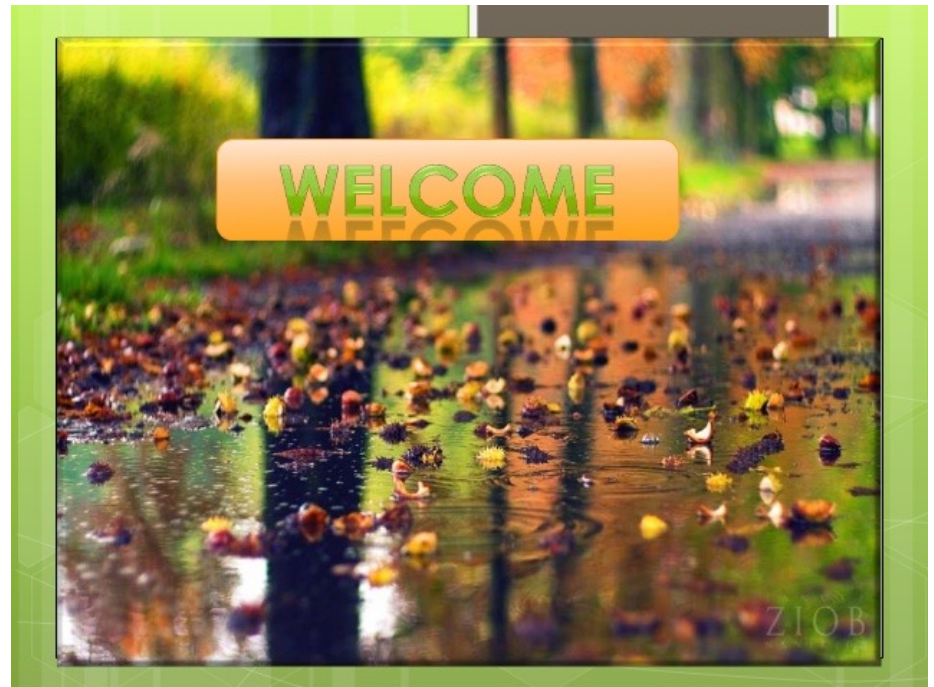
Allow safe transition

Prevention Bundles

- 1- Prevention of preterm Birth
- 2- Management of preterm labor
- 3- **Care of preterm baby**

Care of Preterm Baby Part 2

Eman Badran
Professor of Pediatrics
Fifth year medical
students
2020-2021



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REDUCTION OF
PRETERM BIRTH

MORTALITY
REDUCTION AMONG
BABIES BORN PRETERM

Care of preterm baby

1-Delivery room Management

Delivery room Management

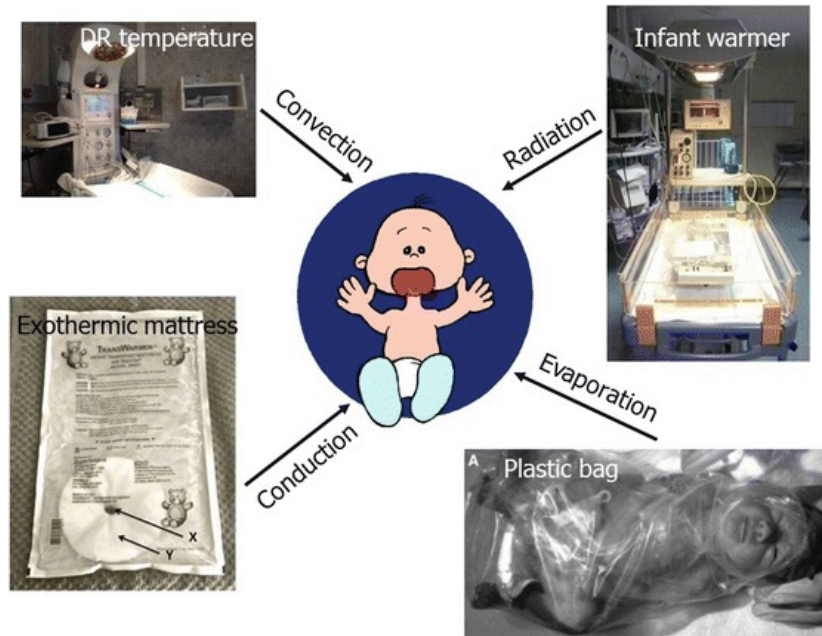
- 1-Prpration before delivery
 - Team
 - Role



Environment

Temperature Management

- 1-Delivery room temperature
 - Keep rooms with temperature set at 24 to 26 °C



Temperature Management

Delivery room management for preterm

2-Pre heated warmer



Temperature Management

DELIVERY ROOM MANAGEMENT

- Resuscitation-

Thermoregulation-a

Plastic bags or occlusive wrapping under radiant warmers should be used during stabilization in the delivery suite for babies <28 weeks' gestation to reduce the risk of hypothermia



Wrap



Bag

Keep baby warm

Thermal care if < 28 weeks



Delivery room management: Thermal Bundle

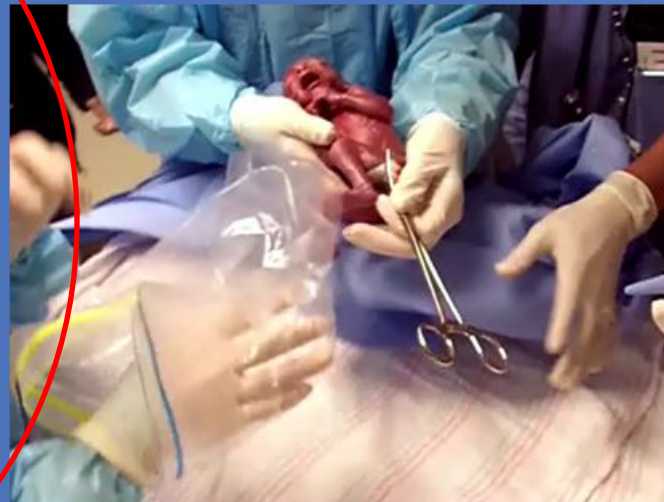
3-

VIEW AND PRINCIPLES OF RESUSCITATION

LESSON

Keeping Premature Babies Warm

- Increase delivery room temperature
- Preheat radiant warmer
- Use warming pad
- Consider polyethylene bag for babies < 28 weeks' gestation



Click on the image to play video



Delay cord clamping (DCC)



Clamping the **cord After Initiation** of
respiration

Delivery room Management

Delay cord clamping. DCC

- Clamping the **cord After Initiation** of respiration
 - If before respiration   will be bad.
 - It results in an acute transient reduction in left atrial filling leading to an abrupt drop in left ventricular output.
 - **Avoid Cord milking (DO IT ONLY IN RESEARCH)**
 - cause Severe intraventricular hemorrhage in preterm)
 - ?Suspected as source of stem cell (research)

Delay cord clamp

Benefits



REDUCE nmr by 30%

Very preterm infants <30 weeks

Delaying cord clamping by 20–45 seconds

2–3-fold reduction in intraventricular hemorrhage

Reduced need for blood transfusions

Greater mean blood pressures in the first hours of life

No difference in Apgar scores at 5 minutes/body temperature

Just short of statistical significance for halving of mortality with DCC
in these infants

Delivery room Management

- Temperature Management
- Delay cord clamping
- Respiratory support

Respiratory support In delivery room :

-Use CPAP (6cm of water) By Mask or short nasal prong

Indication: If baby in respiratory distress (RD) but breathing spontaneously and heart rate > 100



**RD
+ HR $>$ 100**

Respiratory support In delivery room :

What % of Oxygen to use ie what is FiO_2

- Use blended oxygen
- For Term
 - start with 21% oxygen For preterm
- Preterm
 - start with 30% oxygen



Blender

Use T piece resuscitator

Indication:

1- Positive pressure ventilation or CPAP

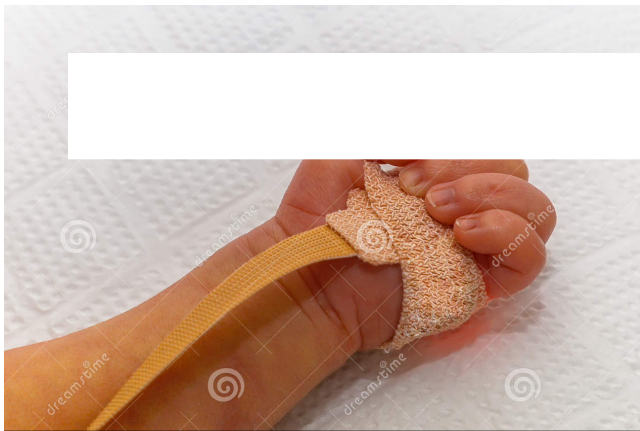
2-has control the inspiratory pressure (PIP) and CPAP



T piece resuscitator



Blender



Download from
Dreamstime.com

85959857
Valentyna Lomova | Dreamstime.com



Use Pulse oximetry and use right side

Neonatal Resuscitation

Quick Tangential Point

- Pulse oximetry
 - Attached to preductal location on right upper extremity
 - Saturation may normally remain low for several minutes after delivery



Targeted Preductal SpO₂ After Birth

1 min	60%-65%
2 min	65%-70%
3 min	70%-75%
4 min	75%-80%
5 min	80%-85%
10 min	85%-95%



One study showed

- Combination of bradycardia (<100/min) and lower SpO₂ (<80%) at 5 min is associated with death or intracranial haemorrhage in preterm

Arch Dis Child Fetal Neonatal Ed. 2018 Sep; 103(5):F446–54.

Saturation protocol

How do you determine heart rate in the delivery room?

- Palpation?



- Auscultation?



- Pulse Oximetry?



- EKG



For
normal
baby

If need
resuscitation

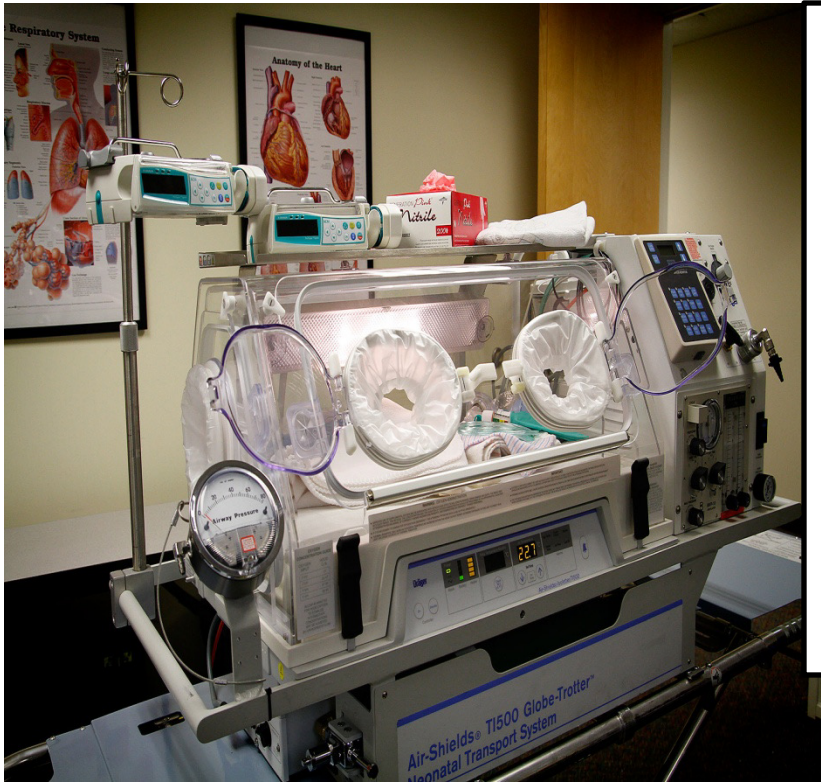
if need CPR

Care of preterm baby

1-Delivery. Room management

**2- Transfer Management From
Delivery room to NICU**

Transport of the preterm from Delivery room



- Preheated incubator
- Stabilize the baby
 - Use Delivery room as ICU concept to stabilize

Care of preterm baby

Allow safe transition

Care of preterm baby

1. Delivery. Room management

**2. Transfer Management From
Delivery room to NICU**

3. Neonatal Management

In Neonatal intensive care Unit

NICU

In Neonatal Intensive Care Unit (NICU) Management. Stages.

✓ Unstable stage:

❖ **Birth up 3 to 5 days**

✓ THE STABLE STAGE :

❖ **>3-5 days**

✓ Later Problem:

❖ **when the baby is stabilized**

Neonatal Intensive Care Unit (NICU) Management.

Unstable stage Birth 3 to 5 days

1- Thermal control

Unstable stage Birth 3 to 5 days

– 1- prevent Hypothermia

So put the baby in neutral thermal environment

Keep temperature 36.5- 37.4 C°

Thermo regulation care



Why

Premature Susceptibility to *Heat Loss*

Causes of Hypothermia Are:

- High surface area to volume ratio. (SA: V)
- Thin non-keratinized skin
- Lack of insulating subQ fat
- Lack of thermogenic brown adipose tissue
- Inability to shiver
- Poor vasomotor response
- Poor central thermal control



Adverse Consequences of Hypothermia

Definition of Hypothermia :Temp <36.5

C°

- High O₂ consumption → **hypoxia, bradycardia**
- High glucose usage → **hypoglycemia** / decreased glycogen stores
- High energy expenditure → reduced growth rate, **lethargy, hypotonia, poor suck/cry**
- Decrease surfactant production → **RDS**
- Vasoconstriction → poor perfusion → **metabolic acidosis**
- Delayed transition from fetal to newborn circulation
- Thermal shock → **DIC** → **death**

Neonatal Intensive Care Unit (NICU) Management.

Unstable stage Birth 3 to 5 days

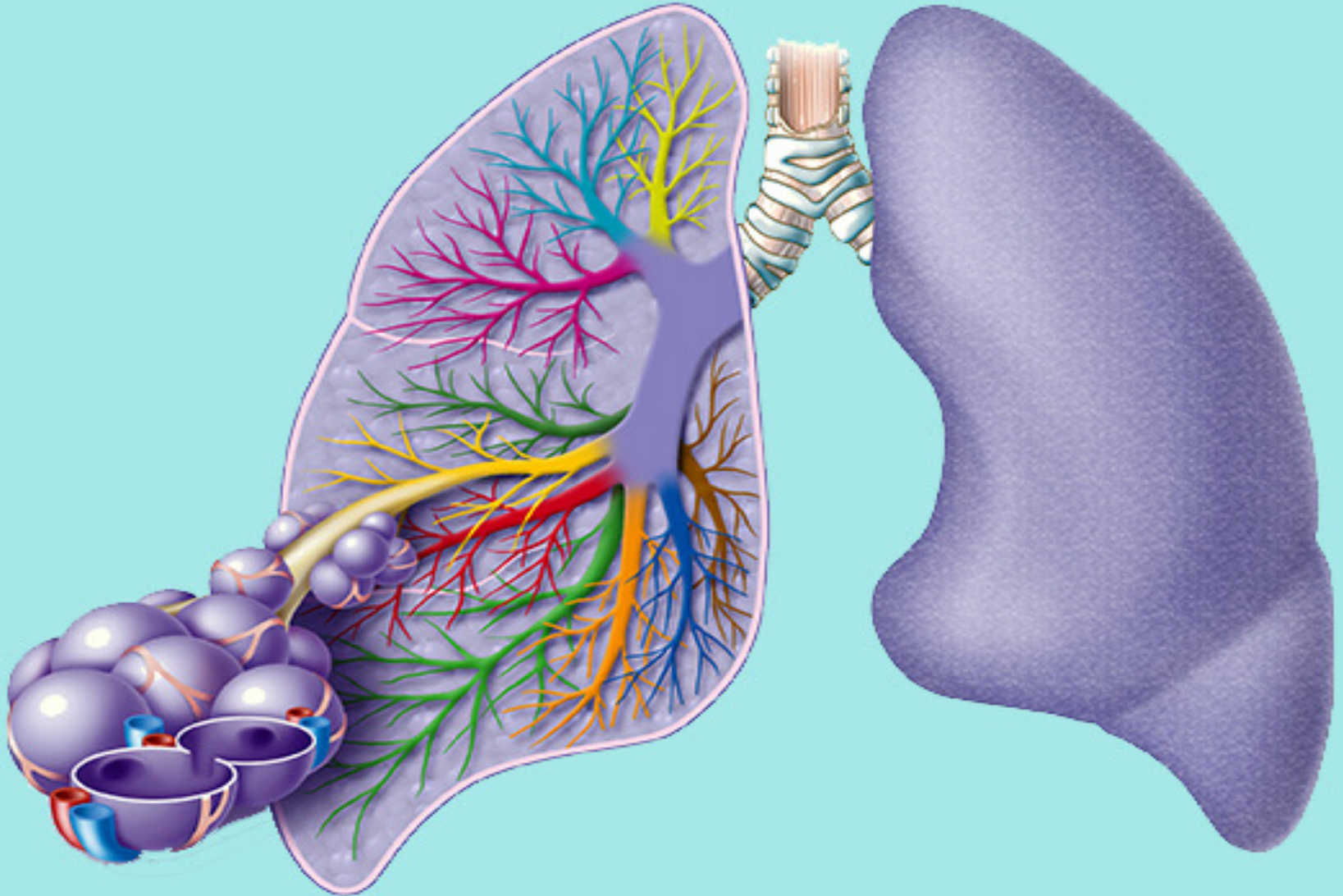
1- Thermal control

2- **Respiratory system management**

-Resp Support

- Be aware of Resp Complication (air leak and Pulmonary Hemorrhage)

Why they need the respiratory support?




Complications of prematurity

RESPIRATORY DISTRESS

- Due to Immature surfactant
- Due to Immature lung :
 - Alveolation and vascularization of the Lungs
- Due to Immature musculature and in sufficient calcification of bony matrix

Due to Immature lung : Alveolation and vascularization of the Lungs

Premature* **Term***

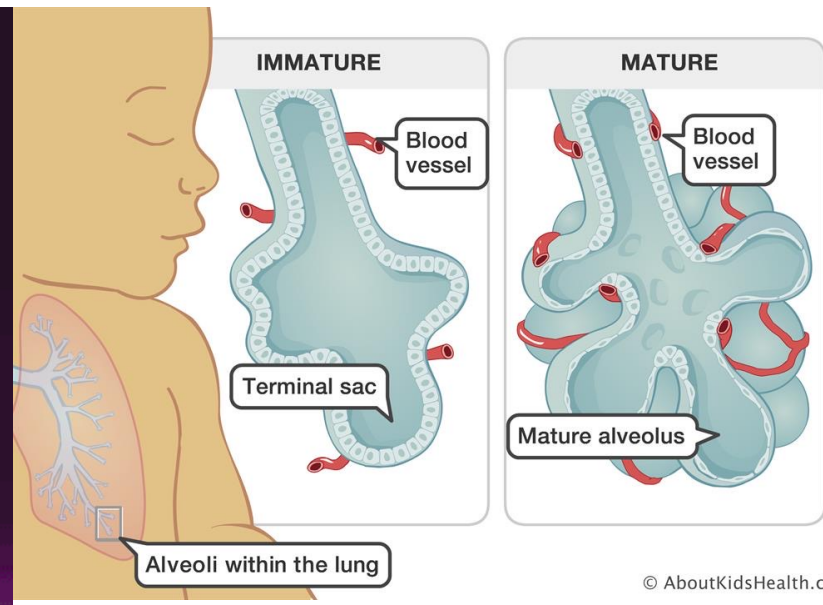


8 weeks GA 16 weeks GA 24 to 35 weeks GA 36 weeks to 3 years

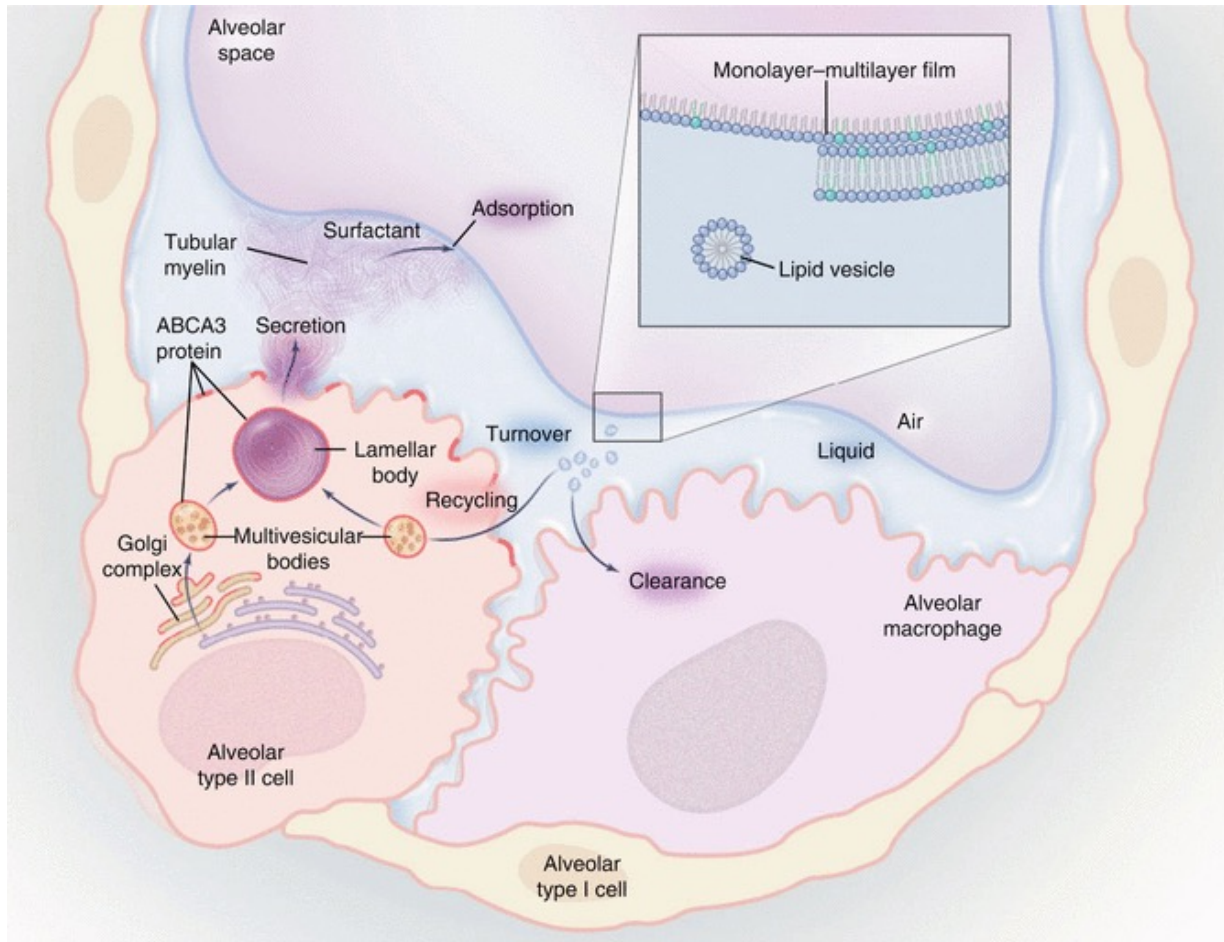
- Although alveoli are present in some infants as early as 32 weeks GA, they are not uniformly present until 36 weeks GA¹

*Pictures are artistic renditions of lung development and are designed to emphasize terminal acinus development and not the entire conducting airway system.²

1. Langston C et al. *Am Rev Respir Dis.* 1984;129:607-613.
2. Adapted from Moore KL, Persaud TVN. *The respiratory system.* In: *The developing human: clinically oriented embryology.* 7th ed. Philadelphia: Saunders, 2003. p. 241-53.

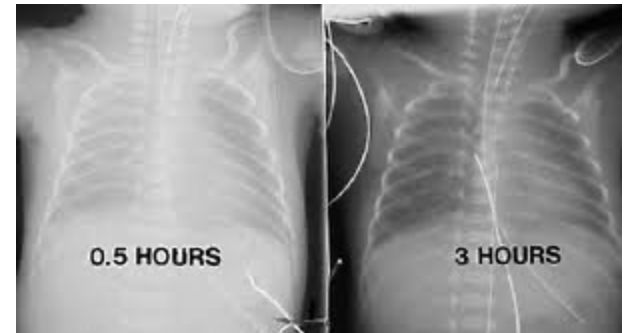
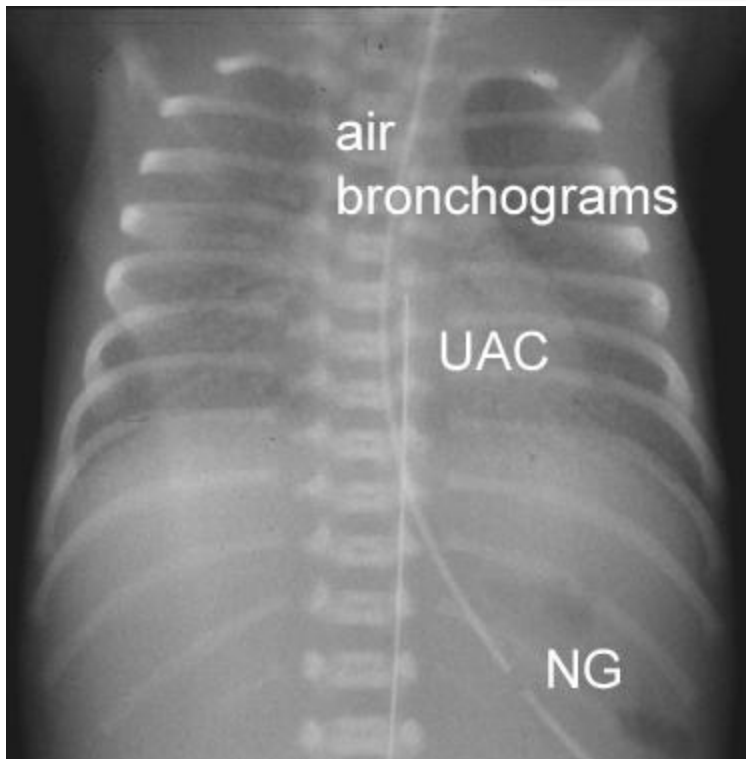


Immature surfactant



Types of Respiratory problems

1- Respiratory distress syndrome



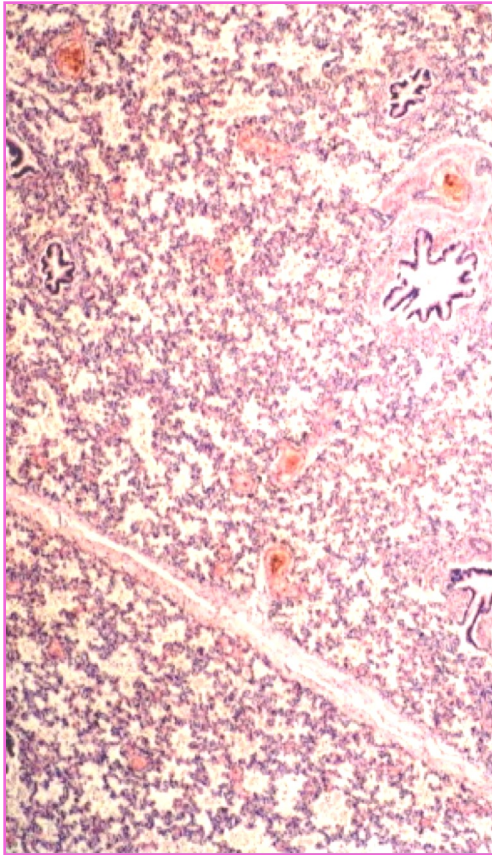
Hyaline membrane disease
=
respiratory distress syndrome.

-

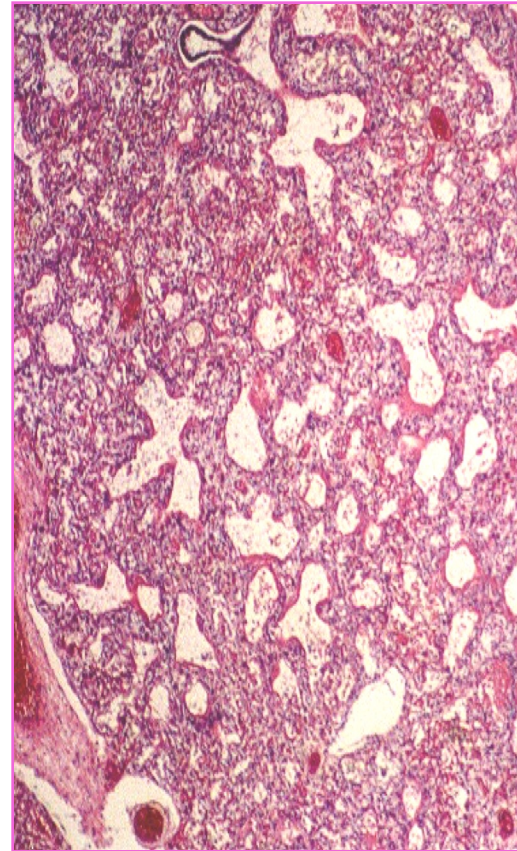
a condition in which the air sacs cannot stay open due to lack of surfactant in the lungs.

Histology

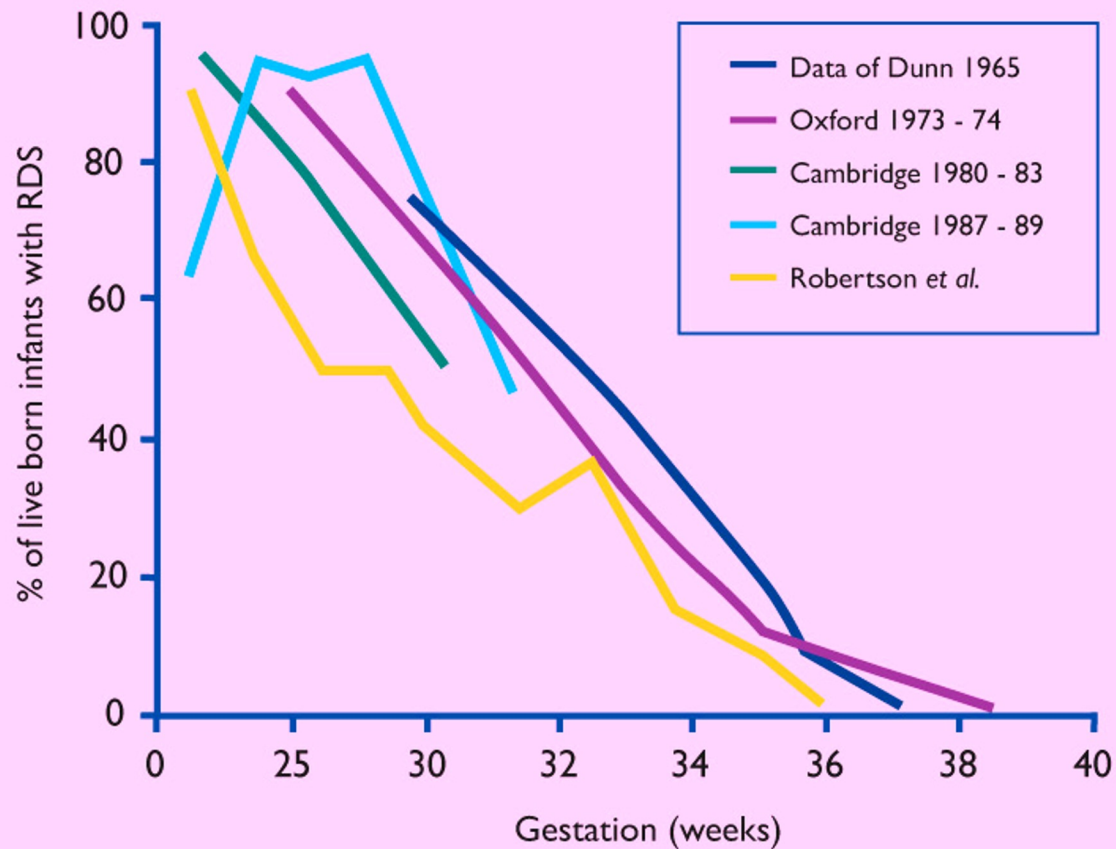
Normal



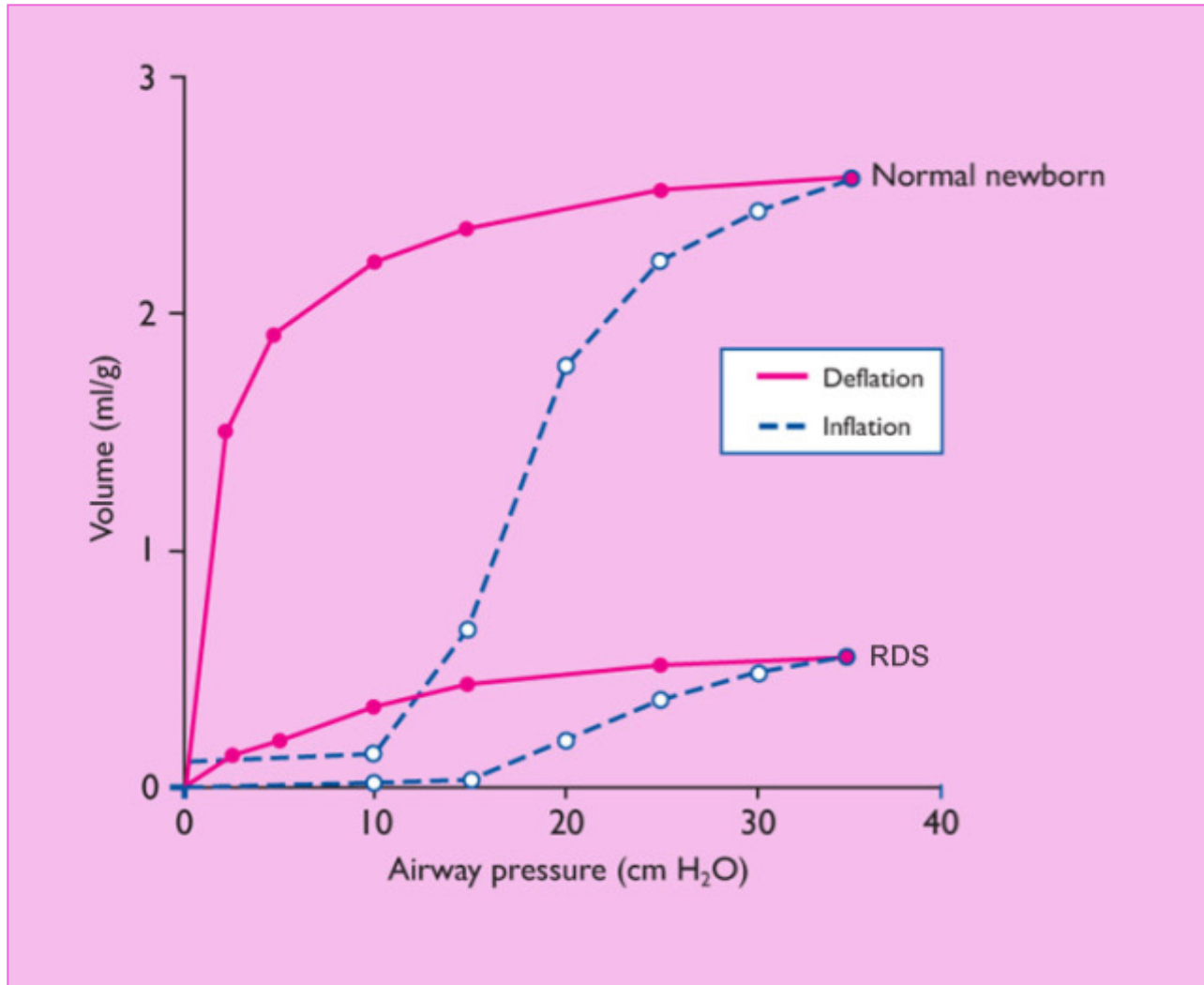
RDS



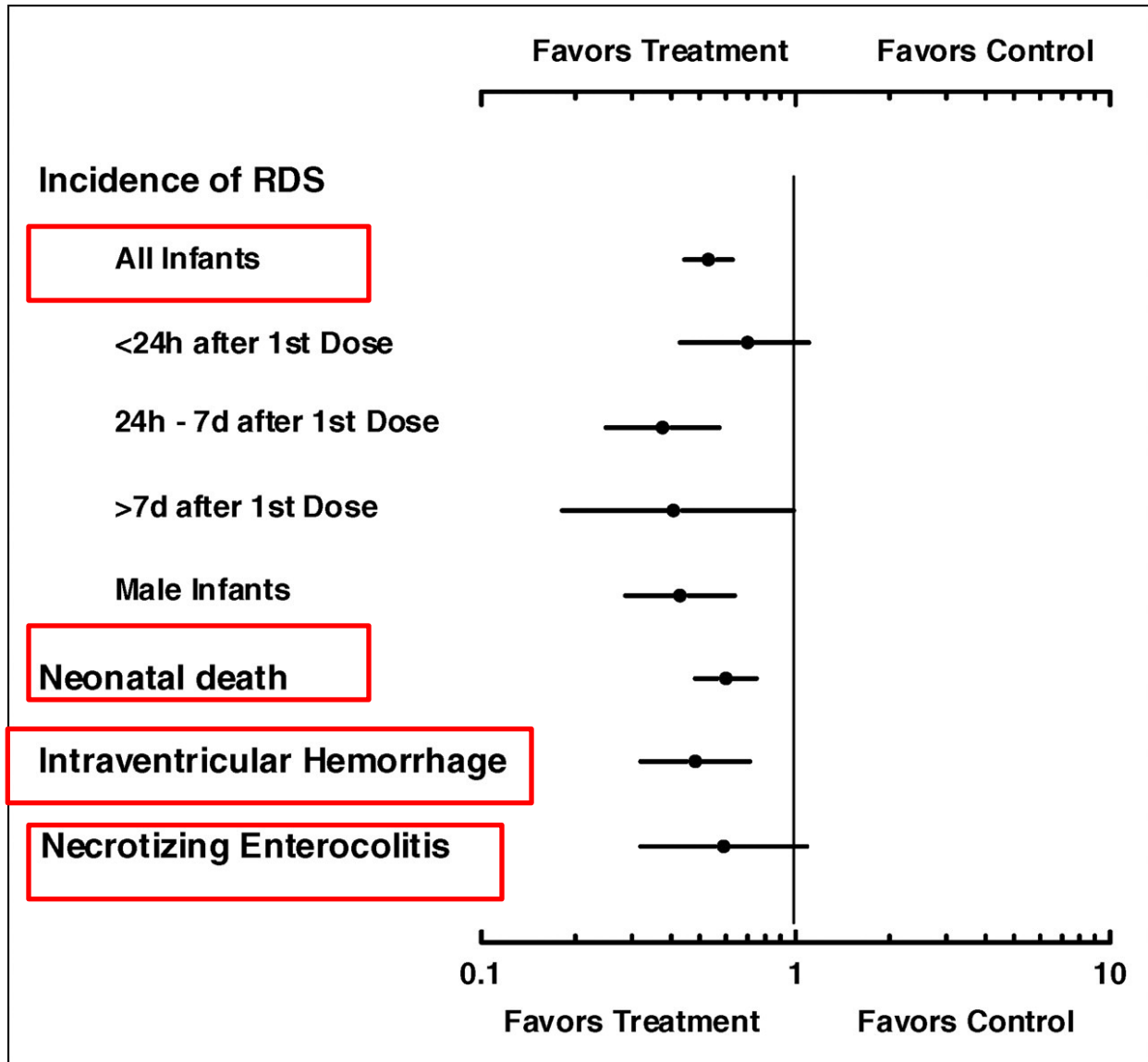
Gestational age and RDS



RDS: Reduction in compliance



Role of antenatal steroids

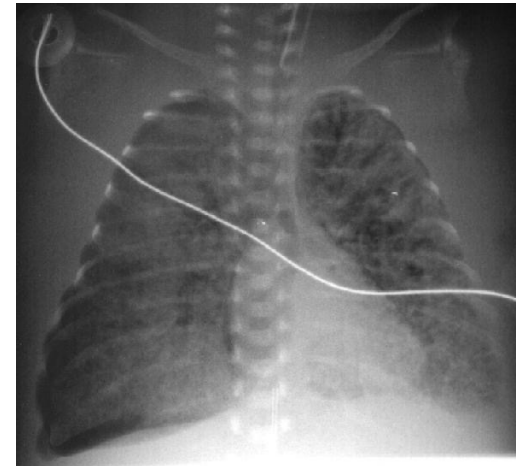
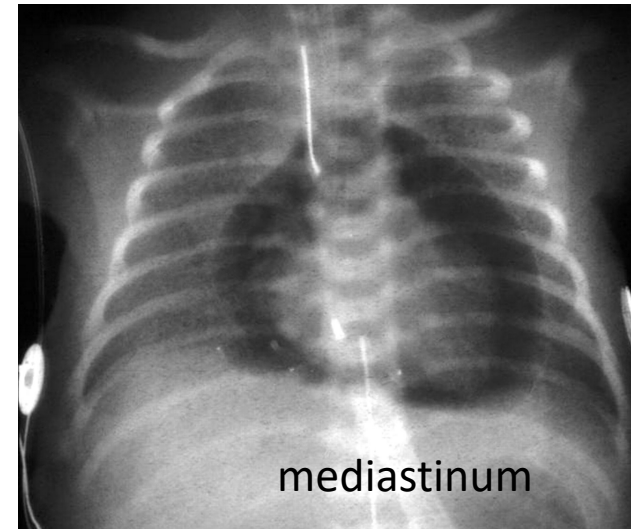
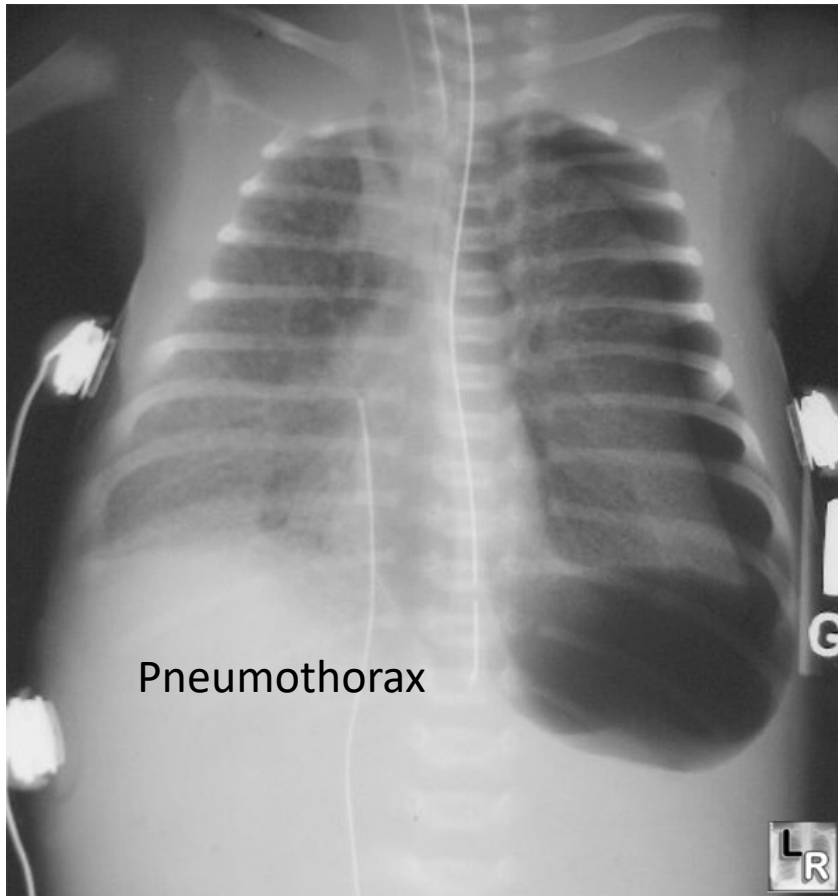


Resp support:

Be aware of complication of Respiratory distress syndrome

Air leaks

Air leaking out of the lung spaces into other tissues



Pulmonary interstitial emphysema

Respiratory Management



- Support ventilation
 - None invasive and invasive
- Surfactant
 - When to give
 - FiO₂ requirement > 30% all babies with a clinical diagnosis of RDS, especially in the early phase of worsening disease.

LISA METHOD for surfactant administration

– https://www.youtube.com/watch?v=nnPSYvXQ_-I

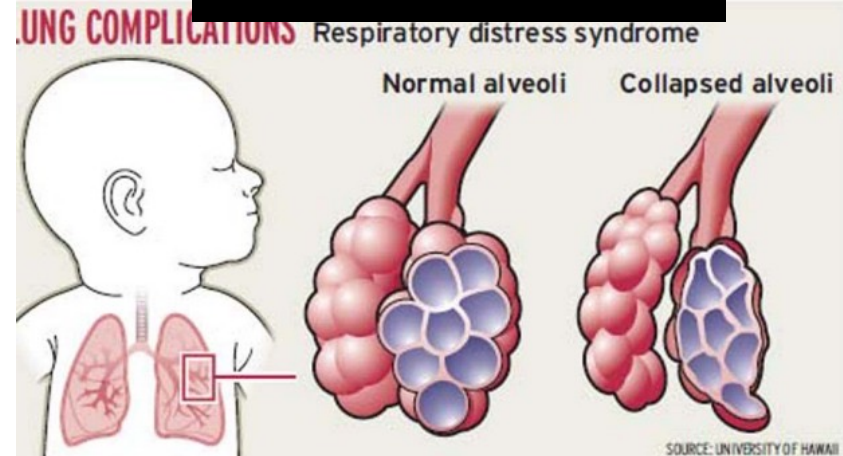
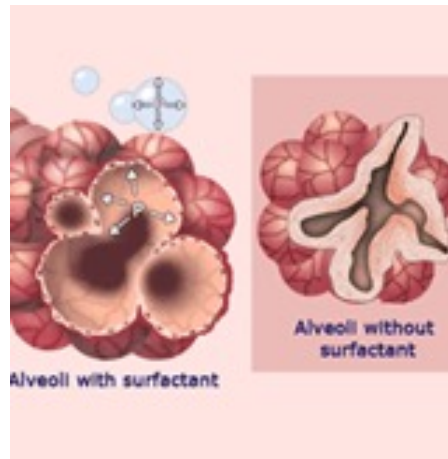


Respiratory management of RDS

1- **SURFACTANT**

2- Respiratory support:

- invasive CONVENTIONAL (MECHANICAL VENTILATION, HFO,)
- None invasive (CPAP, NPPV, High flow NASAL CANNULA)



Resp. Support : continue...

THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Oxygen Saturation and Outcomes in Preterm Infants

The BOOST II United Kingdom, Australia, and New Zealand Collaborative Groups

ABSTRACT

BACKGROUND
The clinically appropriate range for oxygen saturation in preterm infants is unknown. Previous studies have shown that infants had reduced rates of retinopathy of prematurity when lower targets of oxygen saturation were used.

METHODS
In three international randomized, controlled trials, we evaluated the effects of targeting an oxygen saturation of 85 to 89%, as compared with a range of 91 to 95%, on disability-free survival at 2 years in infants born before 28 weeks' gestation. Halfway through the trials, the oximeter-calibration algorithm was revised. Recruitment was stopped early when an interim analysis showed an increased rate of death at 46 weeks in the group with a lower oxygen saturation. We analyzed pooled data from patients and now report hospital-discharge outcomes.

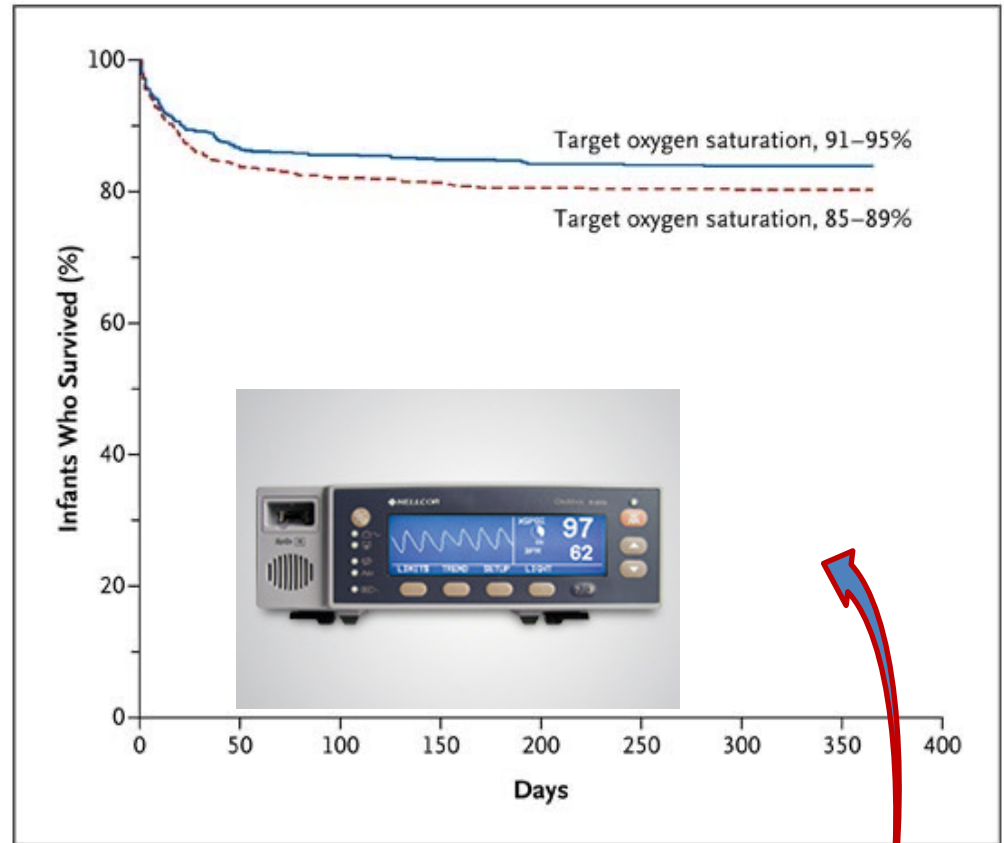
RESULTS
A total of 2448 infants were recruited. Among the 1187 infants whose treatment used the revised oximeter-calibration algorithm, the rate of death was significantly higher in the lower-target group than in the higher-target group (23.3% vs. 21.9%, relative risk in the lower-target group, 1.46; 95% confidence interval, 1.13 to 1.84, $P=0.002$). There was heterogeneity for mortality between the original algorithm and the revised algorithm ($P=0.006$) but not for other outcomes. In all 2448 infants, those in the lower-target group for oxygen saturation had a reduced rate of retinopathy of prematurity (30.6% vs. 23.3%, relative risk, 0.79; 95% CI, 0.63 to 1.00, $P=0.049$) and an increased rate of necrotizing enterocolitis (10.4% vs. 8.0%, relative risk, 1.31; 95% CI, 1.02 to 1.68, $P=0.04$). There were no significant between-group differences in rates of other outcomes or adverse events.

CONCLUSIONS
Targeting an oxygen saturation below 90% with the use of current oximeters in extremely preterm infants was associated with an increased risk of death. Funded by the Australian National Health and Medical Research Council and others. BOOST II Current Controlled Trials number, ISRCTN0842661, and Australian New Zealand Clinical Trials Registry numbers, ACTRN1260900005666 and ACTRN1260600251666.

2094

DOI:10.1056/NEJMoa1604044

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Answer keep 91% -95% < 32 weeks

Monitor O2 Saturation

Oxygen should be warmed and humidified AND MONITORED

Resp. Support

Be Aware of PULMONARY COMPLICATION

- Rare

2- PULMONARY HEMOHRAGE

- Bleeding into the lungs

- Increases the need for ventilatory support

- Occurs mainly 2-4 days after birth

- Predisposing factors include mechanical ventilation, immaturity and PDA

Neonatal Intensive Care Unit (NICU) Management.

Unstable stage Birth 3 to 5 days

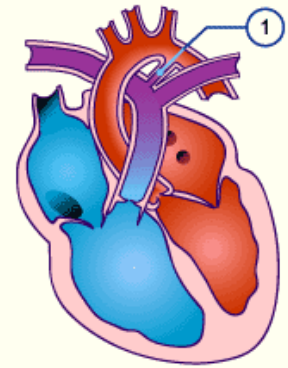
1- Thermal control

2- Respiratory system management

-Resp Support and Be aware of Resp Complication (air leak and Pulmonary Hemorrhage)

3- **Cardiac Support.**

- **Anticipate cardiac Complications**

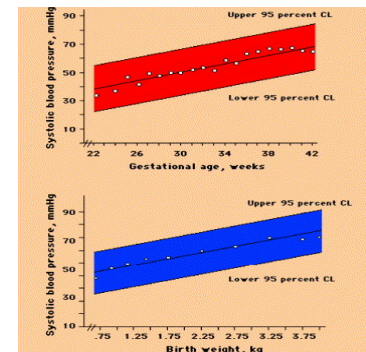


3-cardiovascular:

a. Patent ductus arteriosus (PDA)

b. Hypotension (DUE TO CARDIAC DYSFUNCTION , HYPOVOLEMIA OR SEPSIS)

Maintain BP (MEAN BLOOD PRESSURE = GA first few days



Patent Ductus Arteriosus (PDA)

- Premature infants at risk AT 24-48 hours
- Duct does not respond to “close” signals (O₂+PGs)
- Leads to symptoms of congestive heart failure
- Echo will confirm
- Treated by fluid restriction, NSIAD, Paracetamol, interventional catheter closure (rare surgical ligation)

Neonatal Intensive Care Unit (NICU) Management.

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2- Respiratory system management

-Resp Support and Be aware of Resp Complication (air leak and Pulmonary Hemorrhage)

3- Cardiac Support. (Anticipate PDA and Hypotension)

4- **Metabolic Support**

Complications of prematurity?

4 - Metabolic problems

- fluid loss through skin
 - (thin skin, no Keratin, Rapid Respiratory rate, from warmer and large Surface area)
- Have immature kidney
 - that cannot concentrate or regulate electrolytes and the buffer well)
- Na Imbalance
- Ca Imbalance
- K imbalance
- Glucose imbalance (Risk of hypo and hyperglycemia)

Neonatal Intensive Care Unit (NICU) Management.

Unstable stage Birth 3 to 5 days

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2- Respiratory system management

-Resp Support and Be aware of Resp Complication (air leak and Pulmonary Hemorrhage)

3- Cardiac Support. (Anticipate PDA and Hypotension)

4- Metabolic Support

5- Skin care

Complications of prematurity?

5-Skin care

Has: Fragile, thin transparent skin

Respiratory care



MANAGEMENT DURING 72 HOURS

- NO TAPES ON SKIN
- **Use hydro gel tapes**



NASAL INJURY

Neonatal Intensive Care Unit (NICU) Management.

Unstable stage Birth 3 to 5 days

1- Thermal control

2- Respiratory system management

-Resp Support and Be aware of Resp Complication (air leak and Pulmonary Hemorrhage)

3- Cardiac Support. (Anticipate PDA and Hypotension)

4- Metabolic Support

5- Skin care

6- **INFECTIONN**

Complications of prematurity?

6- INFECTION

- Risk of infection

Decrease IGs
Complement , T cell and B cell
dysfunction

Follow infection control regulations

7- Nutrition problems

Nutritional support

- NUTRITION FOR METABOLICALLY STABLE INFANT

- A) **parenteral nutrition**- on admission
- aminoacids start at 3-3.5g/kg/d increase by 0.5g/kg/d ----
max 3.5-4g/kg/d
- intravenous lipids(20%)- start by 24 hrs-0.5-1g/kg/d increase
by 0.5g/kg/d upto 3g/kg/d
Monitor TG levels - <200mg/dl

Neonatal Intensive Care Unit (NICU) Management.

Unstable stage Birth 3 to 5 days

- 1- Thermal control
- 2- Respiratory system management
 - Resp Support and Be aware of Resp Complication (air leak and Pulmonary Hemorrhage)
- 3- Cardiac Support. (Anticipate PDA and Hypotension)
- 4- Metabolic Support
- 5- Skin care
- 6- INFECTIONN
- 7- **Nutritional management**

Nutritional Support

Start 10 -20 ml/kg/day
Best is breast milk

Early enteral nutrition

Trophic feeding/ Gut priming

Practice of feeding very small amounts of enteral nourishment to stimulate development of the immature GIT

Advantages:

- Improves GI motility
- Enhances enzyme maturation
- Improves mineral absorption
- Lowers incidence of cholestasis
- Shortens time to regain birth weight

Neonatal Intensive Care Unit (NICU) Management.

Unstable stage Birth 3 to 5 days

- 1- Thermal control
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 - Resp Support and Be aware of Resp Complication (air leak and Pulmonary Hemorrhage)
- 3- Cardiac Support. (Anticipate PDA and Hypotension)
- 4- Metabolic Support
- 5- Skin care
- 6- INFECTIONN
- 7- Nutritional management
- 8- **Gastrointestinal Problems**

9- Gastro intestinal problems

Feeding problems

- Difficulty in self feeding
- In coordination of sucking and swallowing
- Abdominal distension
- Regurgitation and aspiration



➤ **UNABLE TO COORDINATE SUCK AND SWALLOW BEFORE 34 WEEKS GESTATION.**

Neonatal Intensive Care Unit (NICU) Management.

Unstable stage Birth 3 to 5 days

- 1- Thermal control
- 2- Respiratory system management
 - Resp Support and Be aware of Resp Complication (air leak and Pulmonary Hemorrhage)
- 3- Cardiac Support. (Anticipate PDA and Hypotension)
- 4- Metabolic Support
- 5- Skin care
- 6- INFECTIONN
- 7- Nutritional management
- 8- Gastrointestinal Problems
- 9- communication with parents

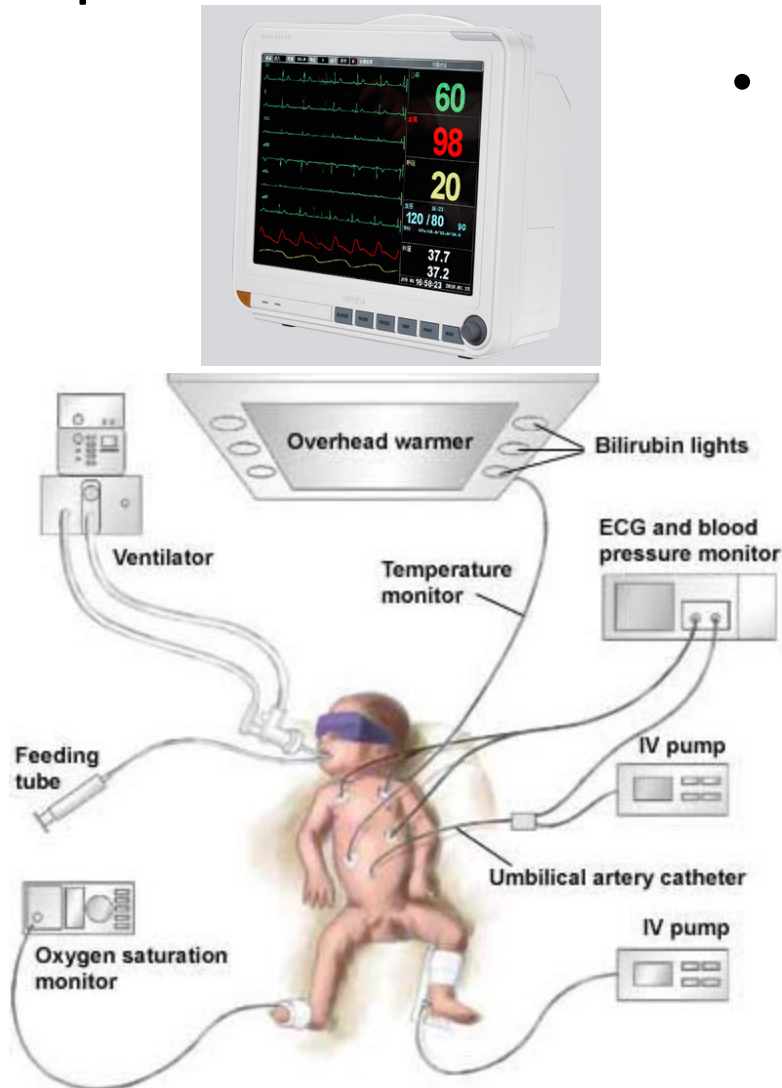
7-Communication With parents

Preterm & Low-birth-weight Infants

- Parents & Preterm Neonates
 - Physically less attractive babies
 - Cries are high pitched and grating
 - More irritable, passive, and less social
 - Mothers may feel alienated, harbor guilt, and sense of failure and low self-esteem
 - Fear of hurting may discourage handling
 - Preterms fare better with responsive caring parents



7-Communication With parents



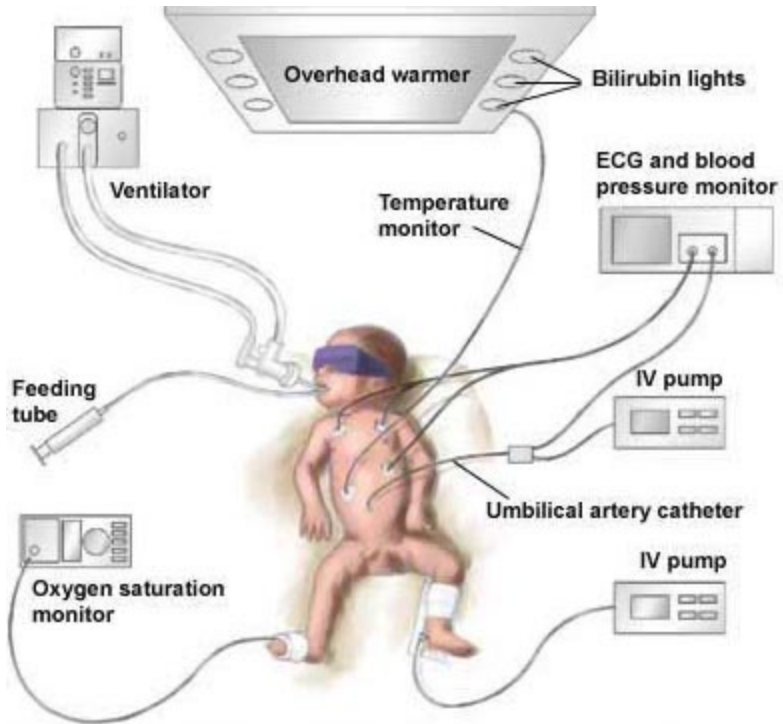
- Care of premature babies needs include:

- - monitoring of temperature, and Vital signs
 - blood pressure, heart and breathing rates, and oxygen levels
 - Input Out put

-Need respiratory support

- giving extra oxygen by a CPAP, nasal cannula, or mechanical ventilators
- intravenous (IV) fluids and parenteral nutrition -

Care of preterm



ORIGINAL ARTICLE  PEER-REVIEWED

Parents' Experience of Having an Infant in the Neonatal Intensive Care Unit: A Qualitative Study

Shahd H. Rihan , Laila M. Mohamadeen, Sara A. Zayadneh, Furqan M. Hilal, Hidaia A. Rashid, Neveen M. Azzam, Dua'a J. Khalaf, Eman F. Badran, Reema R. Safadi

Published: July 30, 2021 ([see history](#))

DOI: 10.7759/cureus.16747

Cite this article as: Rihan S H, Mohamadeen L M, Zayadneh S A, et al. (July 30, 2021) Parents' Experience of Having an Infant in the Neonatal Intensive Care Unit: A Qualitative Study. *Cureus* 13(7): e16747. doi:10.7759/cureus.16747

Abstract

Introduction: Admission to the neonatal intensive care unit (NICU) is usually unexpected and can be stressful to the parents causing strenuous psychosocial effects. Parents of these infants are subject to suffering stress, depression, and feelings of powerlessness. This study aimed at describing parents' experience of having their infant in the neonatal intensive care unit.

Method: A qualitative descriptive design was used. Parents (six couples and four mothers) of infants hospitalized for at least ten days regardless of gestational age, gender, or medical diagnosis were selected from a teaching hospital in Amman, Jordan. Semi-structured interviews were conducted between June 2019 and November 2019.

Results: Thematic analysis of the data revealed four emerging themes: (1) Living the ambiguities of the admission to the NICU, (2) Living the burdens of their infants' hospitalization, (3) Coping with the stresses of a hospitalized infant, and (4) Reflecting on interactions with

Article
Abstract
Introduction
Materials & Methods
Results
Discussion
Conclusions
References

Disclosures & Acknowledgements

Community discussion

Categories

Keywords

ADVERTISEMENT

Family support



- The family dynamics are greatly disturbed.
- The problems and issues should be handled with equanimity, compassion, concern and caring attitude of the health team.
- Encouraged to touch and talk with her baby.
- Provide kangaroo-mother-care.
- Emotional support and guidance.





Complications of prematurity?

In Neonatal Intensive Care Unit
NICU

✓ Unstable stage Birth 3 to 5 days

✓ THE STABLE STAGE >3-5
days

✓ THE STABLE STAGE >3-5 days

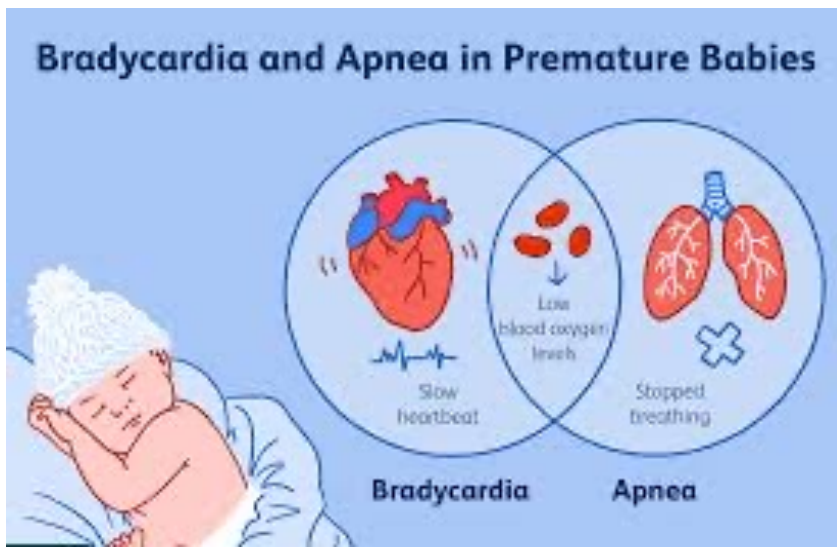
- **APNEA OF PREMATUREITY**
- **GI problems**
- VESSEL ACCESS
- Infection
- NEC
- Neurologic



Defined as:

- the cessation of breathing for > 20 seconds (apnea)
- or
- cessation of breathing for less than 20 seconds if it is accompanied by bradycardia or oxygen (O₂) desaturation.

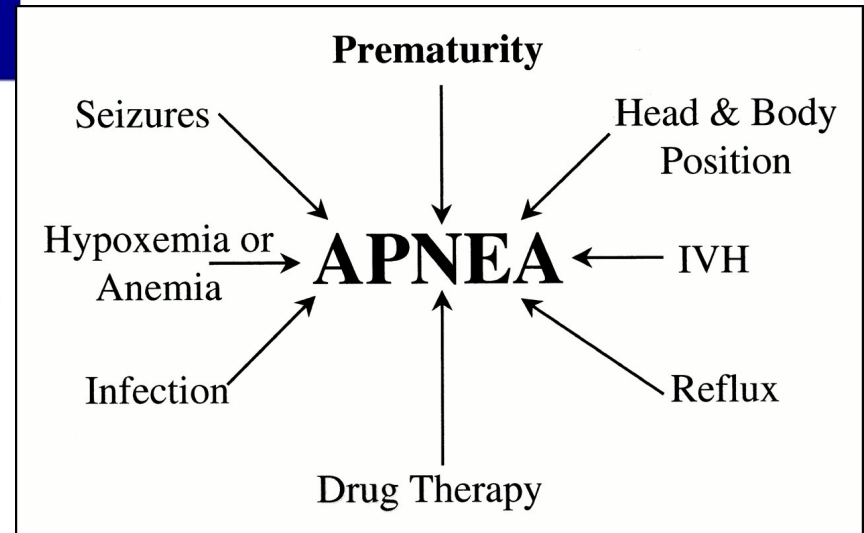
PEDIATRICS Vol. 111 No. 4 April 2000



Cause of Apnea of prematurity

Apnea of Prematurity

- Prevention
 - Prevent preterm birth
- Treatment
 - First, rule out underlying cause, such as atelectasis or infection, and treat cause
 - If it is true apnea, what is the predominant type of apnea – central or obstructive?
 - If central, treat with caffeine, theophylline, or aminophylline
 - If obstructive, consider CPAP



✓ THE STABLE STAGE >3-5 days

- APNEA OF PREMATUREITY
- **GI problems**
- VESSEL ACCESS
- Infection
- NEC
- Neurologic

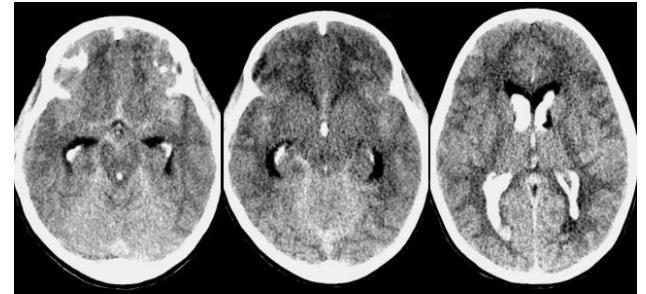
GI problems

- NEC



Neurologic complications :

– intraventricular hemorrhage IVH -.



✓ Can lead to PHH :post hemorrhagic hydrocephalus

✓ THE STABLE STAGE >3-5 days

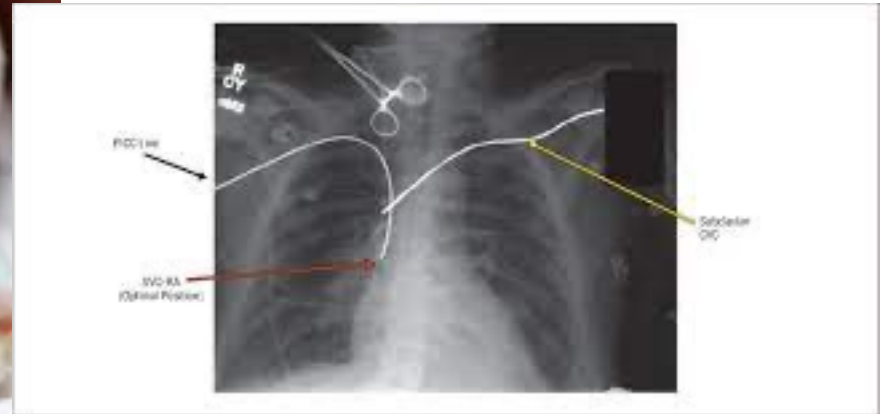
- APNEA OF PREMATURITY
- GI problems
- VESSEL ACCESS
- Infection
- NEC
- Neurologic

Vascular Access



Umbilical cord
catheterization

Vascular Access



Peripheral inserted central catheters catheterization

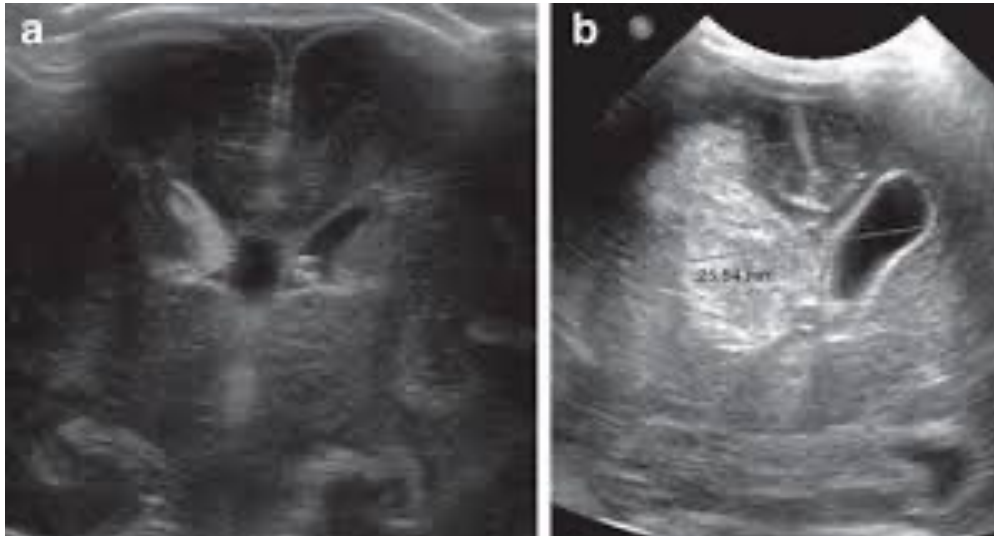
PICC Lines

- Infections –
 - premature infants are more susceptible to infection and may require antibiotics

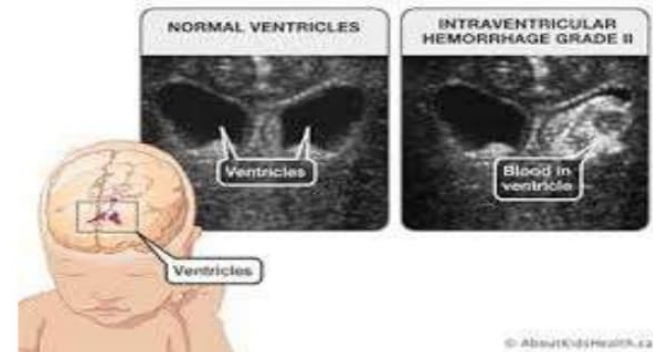


Invasion of
barrier

Neurologic



INTRAVENTRICULAR HEMORRHAGE



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BY,
Ms. Sheen. S. P. Belsylin
M.Sc Nursing 1st year

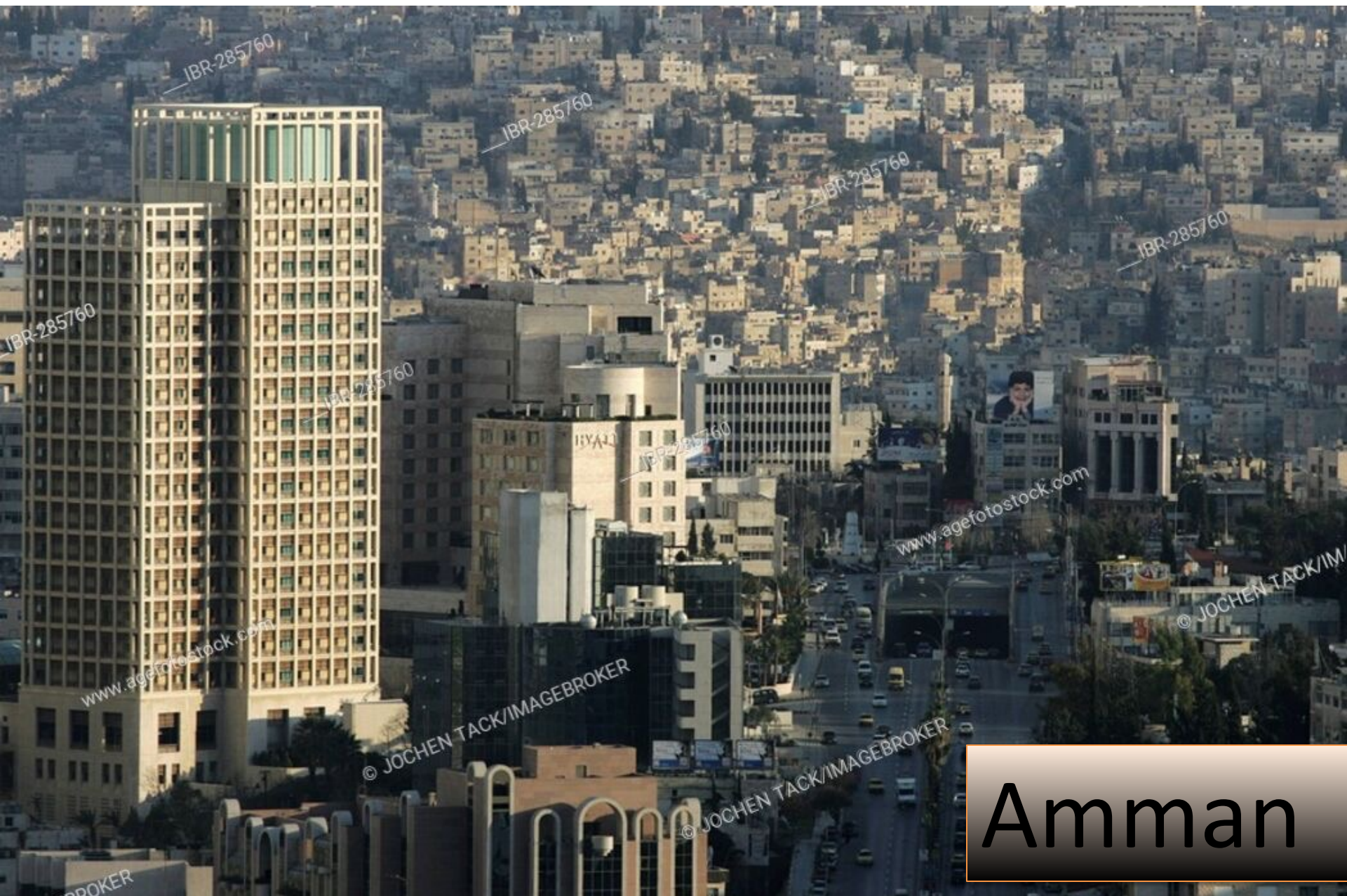


Amman

25 YEARS

JAKOB FOLGNER

629014286



Amman

Complications of prematurity?

In Neonatal Intensive Care Unit
NICU

✓ Unstable stage Birth 3 to 5 days

✓ THE STABLE STAGE >3-5 days

Later Problem when the baby is stabilized

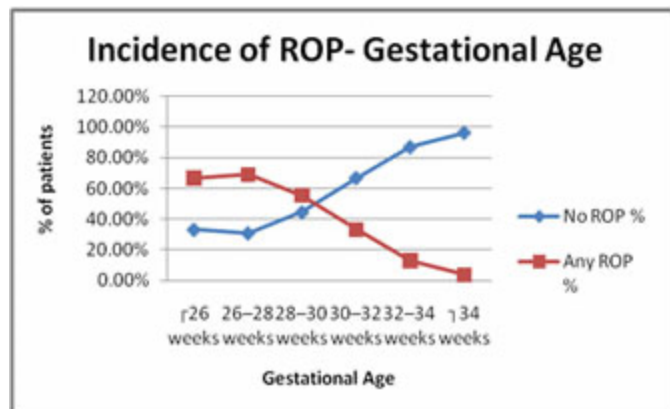
Later Problem when the baby is stabilized

- Retinopathy of prematurity (ROP)
- Infection
- Chronic lung disease
- Metabolic Bone disease
- Neurologic
 - Post hemorrhagic hydrocephalys
 - Periventricular Leukomalacia (PVL)
- Anemia of prematurity

Retinopathy of prematurity (ROP)

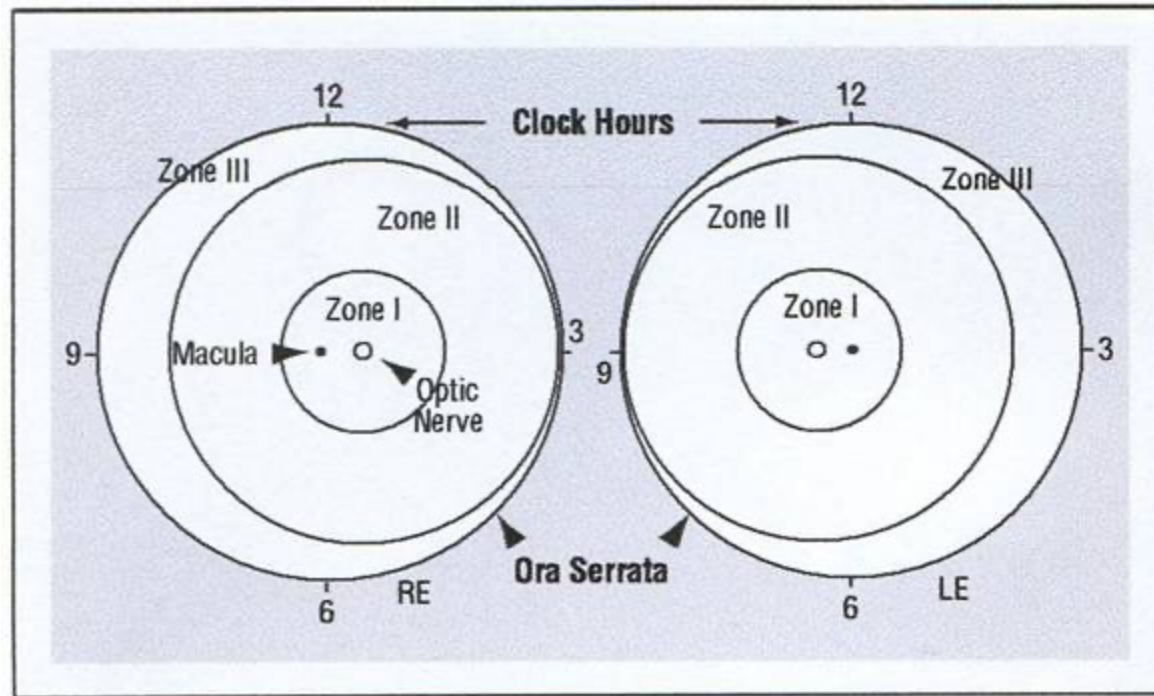
Pathogenesis and clinical features

- Incomplete retinal vascularisation.
- Vessels migrate from disc to periphery weeks.
- Mature vessels extend to nasal ora at 36 weeks.
- Vessels extend to temporal ora at 39-41 weeks.
- Related to gestational age (GA) and birth weight (bw).



Classification of ROP

- International Classification of Retinopathy of Prematurity (ICROP)
- Describe ROP according to - Zone, Extent and Stage.



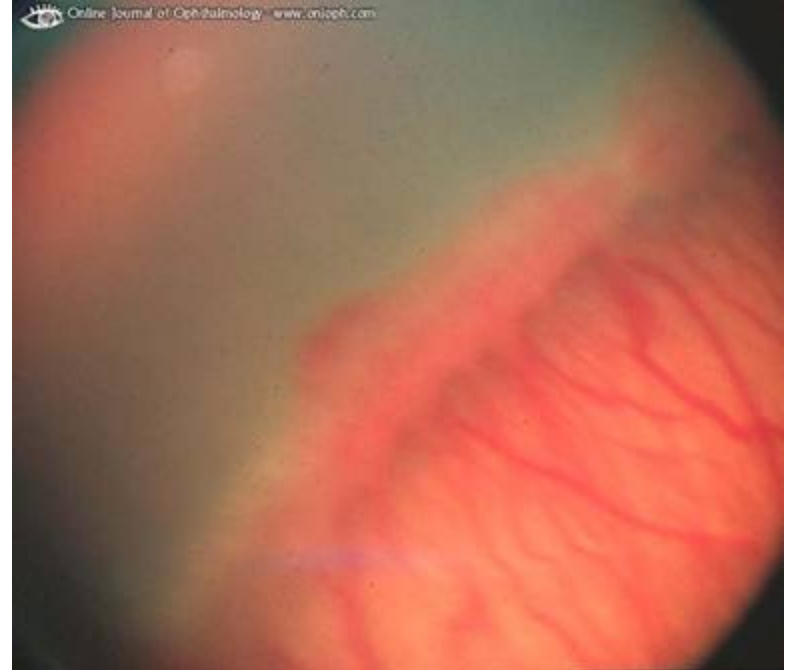
Classification of ROP cont.

- Staging:
5 stages - describe abnormal vascular response. Most severe stage is used to determine the stage of the eye as whole.

■ Stage 1: Demarcation line

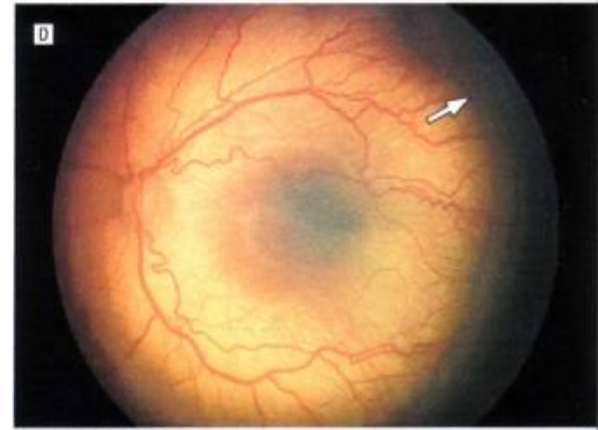


■ Stage 2: Ridge



Classification of ROP cont.

- Stage 3: Extaretinal Fibrovascular Proliferation
- Stage 4: Partial Retinal Detachment
- Stage 5: Total Retinal Detachment



Classification of ROP cont.

- Plus disease –
signs indicating severity.
Venous dilatation or
arteriolar tortuosity



Later Problem when the baby is stabilized

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- Infections –
 - premature infants are more susceptible to infection and may require antibiotics

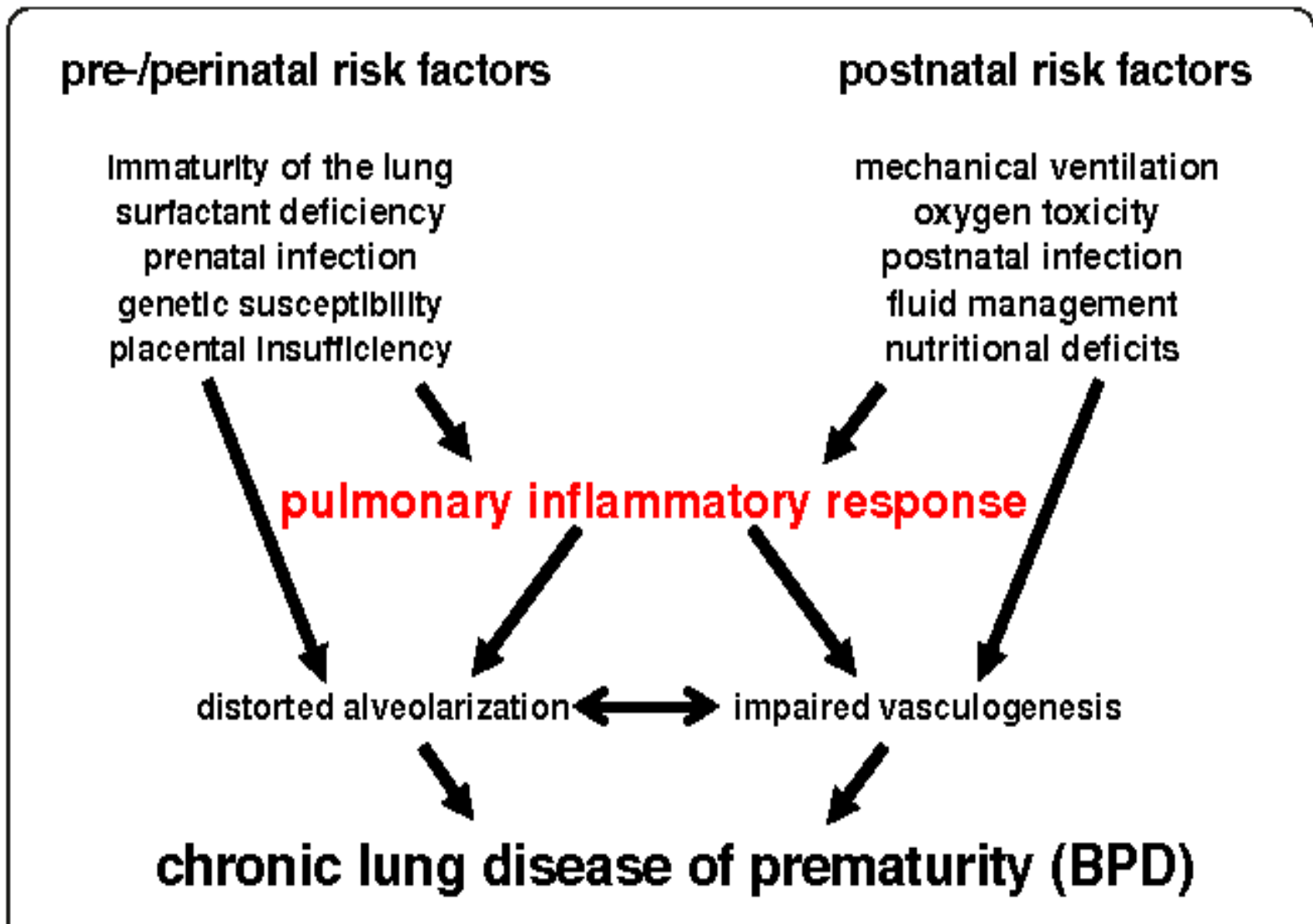


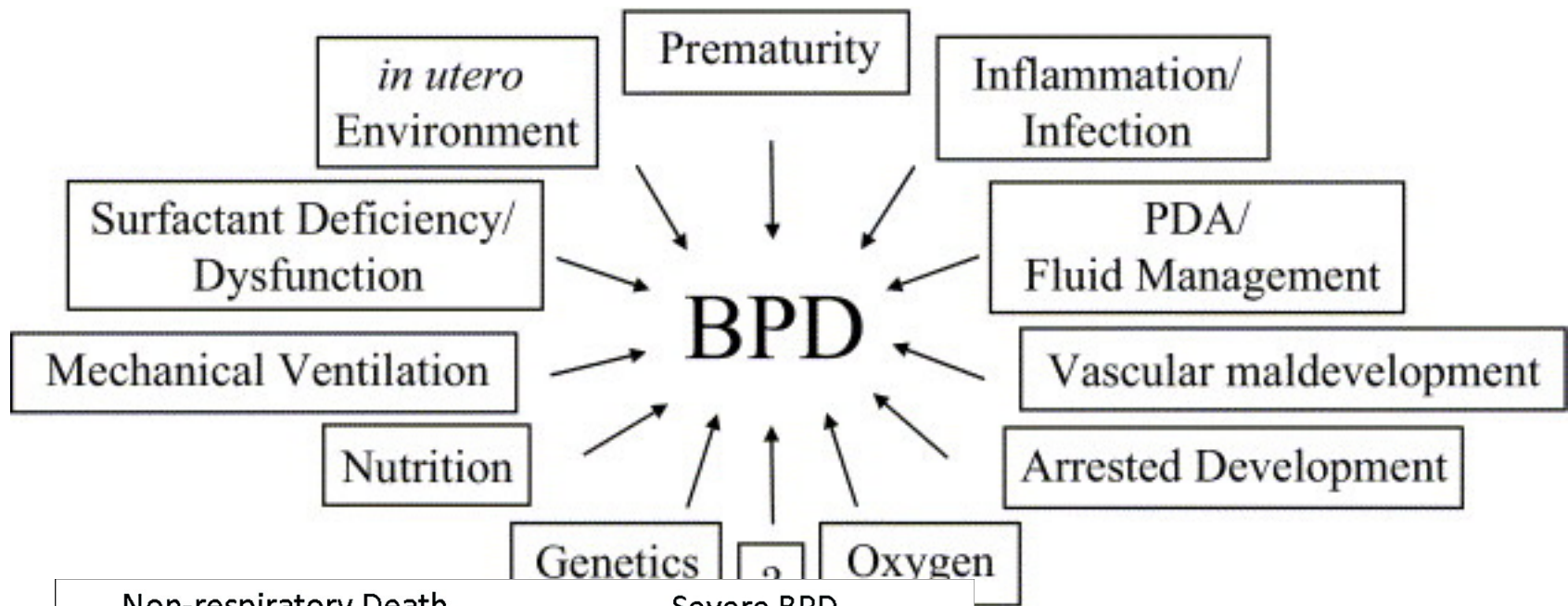
Invasion of
barrier

Later Problem when the baby is stabilized

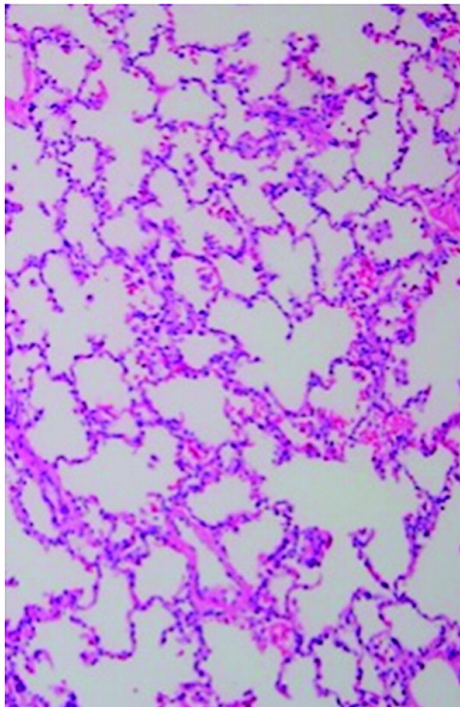
- Retinopathy of prematurity (ROP)
- Infection
- Chronic lung disease CLD or BPD
- Metabolic Bone disease
- Neurologic
 - Post hemorrhagic hydrocephalys
 - Periventricular Leukomalacia (PVL)
- Anemia of prematurity

What happens in Broncho pulmonary dysplasia (BPD) =
(chronic lung disease (CLD)?

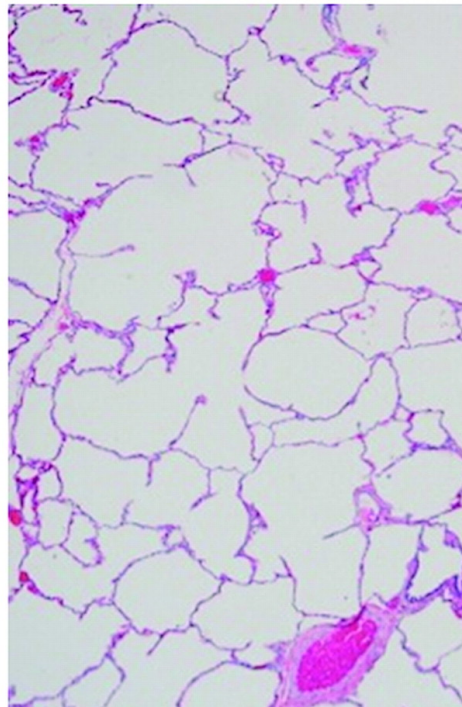




Non-respiratory Death



Severe BPD



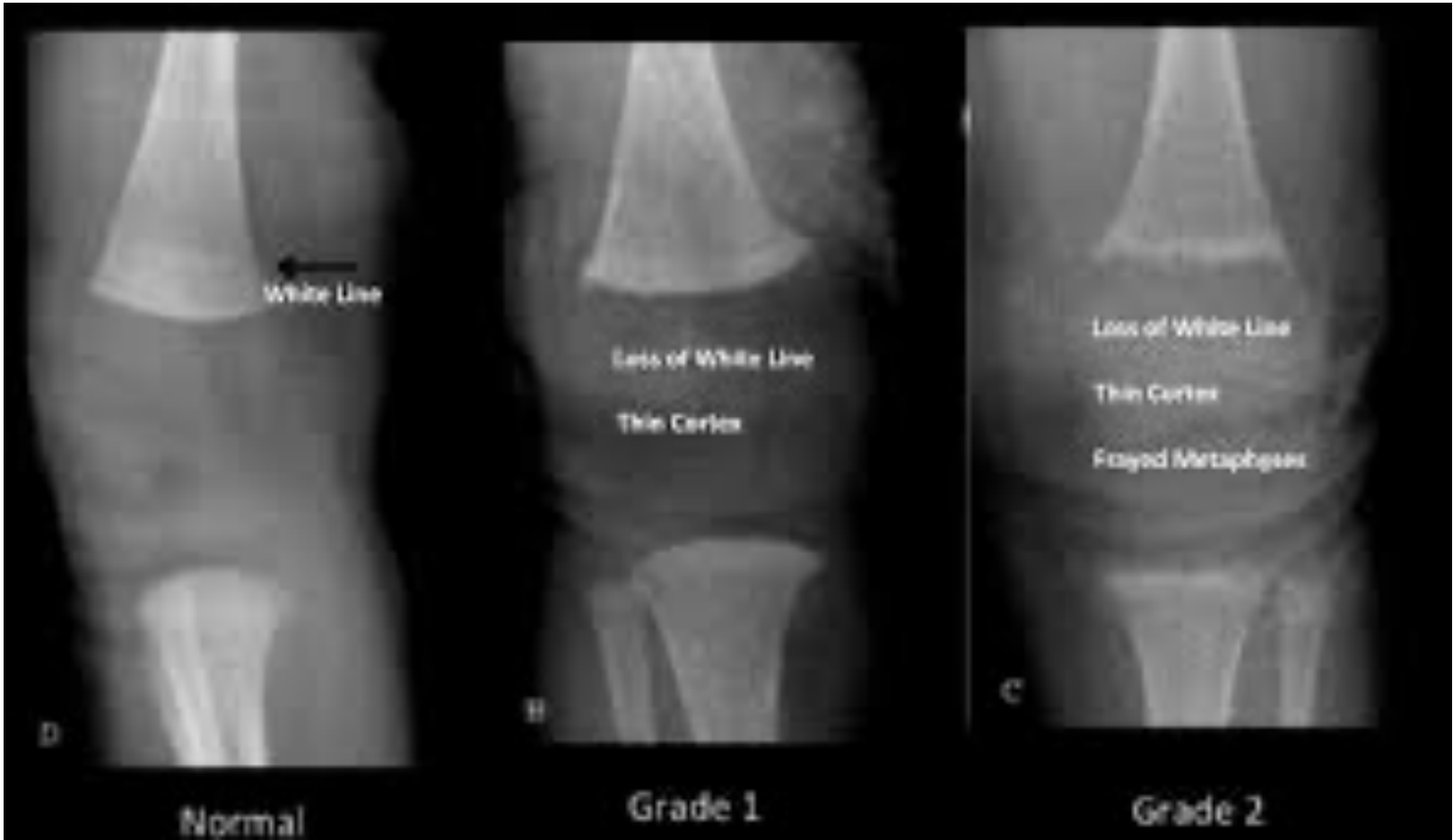
Later Problem when the baby is stabilized

- Retinopathy of prematurity (ROP)
- Infection
- Chronic lung disease CLD=BPD
- **Metabolic Bone disease Of preterm**
- Neurologic
 - Post hemorrhagic hydrocephalys
 - Periventricular Leukomalacia (PVL)
- Anemia of prematurity

Metabolic bone disease of preterm (MBDP)

- DEFINITION

- Is a **Metabolic Bone Disease of Preterm** infants
- in which **decreased bone mineral content** occurs mainly as a result of lack of adequate Ca & P
- From
 - decrease intake in extra uterine life
 - insufficient in utero supply (mainly last trimester and last trimester .
- Screen. (If ≤ 30 wks if ≤ 1.5 kg) at 4 weeks then weekly (mainly if < 1 kg, < 28 wk and TPN > 2 wks)
- Dx
 - Low P < 4 mg/dl IU/L. (< 1.25 mmol/l)
 - High Alk P > 600
 - PTH. > 7 pmol/L
 - Bone on Xray (osteopenia, Fraying, Fracture)



Normal

OOP

OOP

Metabolic bone disease of preterm (MBDP)

- Biomarker to screen
 - Corrected CA
 - Inorganic phosphate
 - Alkp
 - PTH
 - 25 (OH) vitamin D
- Pediodic Xrya
- Dexa /Us ???

Metabolic bone disease of preterm (MBDP)

- Management
 - Fortification of BREAst milk
 - Vitamin D
 - D/C medication
 - (steroid, caffien, frusimide.PPI)
 - Physical therapy
 - Safe handling
 - /PARENT EDUCATION of safe handlinh



Complication (MBDP)

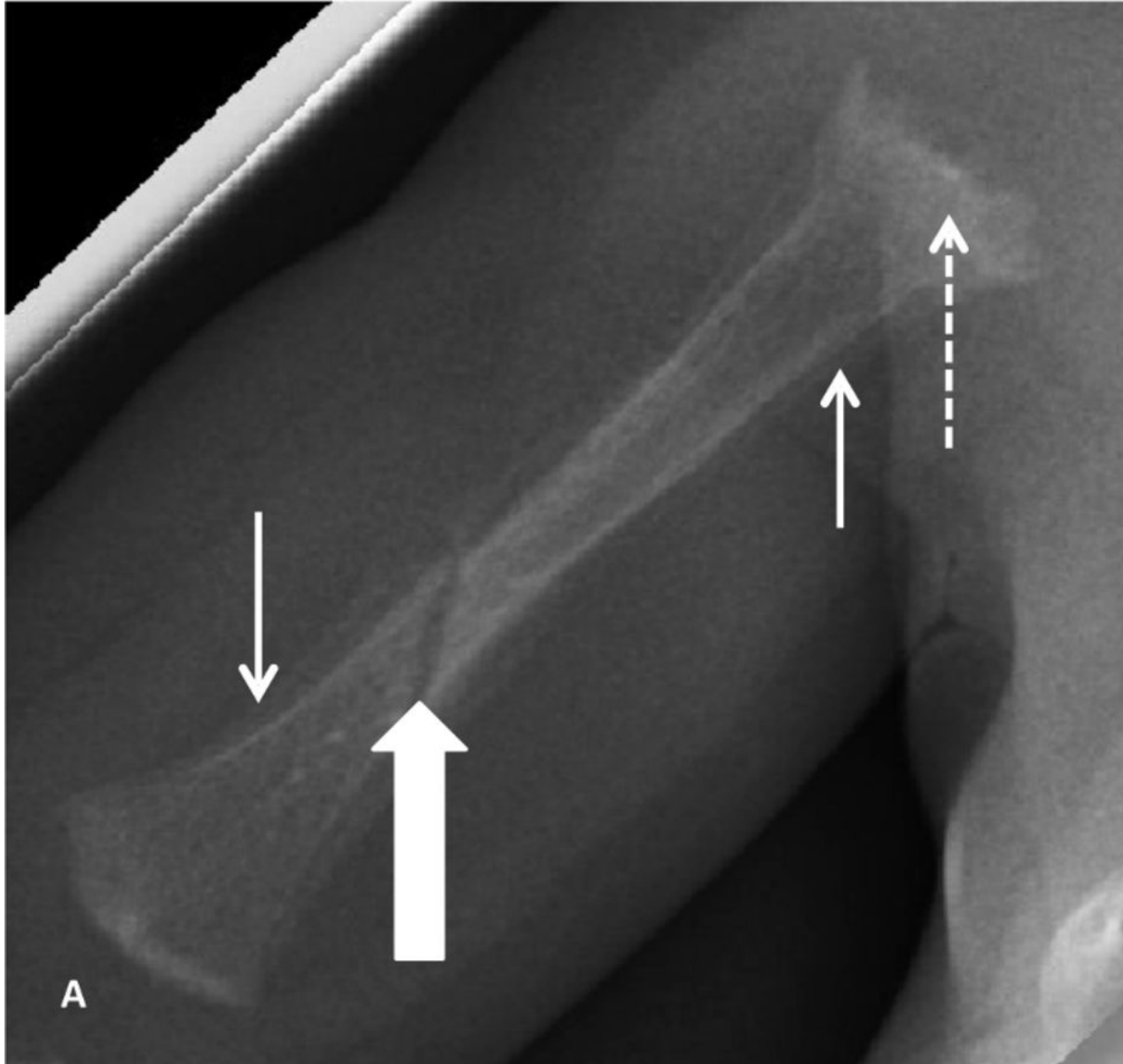
or

osteopenia of premterm (OOP)

- Fractures
- Chronic lung. Disease
- higher mortality (14.1 vs 4.4%) and longer hospital stay (140.2 ± 51 vs 101.0 ± 42 days; $P < .01$).

- Reference : EN J Parenter Enteral Nutr. 2014 Nov;38(8):982-90. doi: 10.1177/0148607113499590.Epub 2013 Aug 20.

MBDP



Later Problem when the baby is stabilized

- Retinopathy of prematurity (ROP)
- Infection
- Chronic lung disease CLD=BPD
- Metabolic Bone disease Of preterm (MBDP)
- **Neurologic**
 - Post hemorrhagic hydrocephalus
 - Periventricular Leukomalacia (PVL)
- Anemia of prematurity

Neurologic complications :

- periventricular leukomalacia - softening of tissues of the brain around the ventricles



✓ Later Problem when the baby is stabilized

Later Problem when the baby is stabilized

- Retinopathy of prematurity (ROP)
- Infection
- Chronic lung disease CLD=BPD
- Metabolic Bone disease Of preterm (MBDP)
- Neurologic
 - Post hemorrhagic hydrocephalus
 - Periventricular Leukomalacia (PVL)
- Anemia of prematurity

Anemia of Prematurity

- Why does it happen ?
- Blood loss
- Shortened RBC lifespan
 - Preterm 40-60 days
- Inadequate RBC production
 - Suboptimal erythropoiesis in response to hypoxia
 - Switch from hepatic to renal O₂ sensor not till term

When can a premature baby go home from the hospital



When can a premature baby go home from the hospital?

- serious **illnesses** are resolved
- stable **temperature** - able to stay warm in an open crib
- taking all **feedings** by breast or bottle
- no recent **apnea** or low heart rate
- - **parents** are able to provide care including medications and feedings
- > **35** weeks and > **1.8-2** kg



What to do before

- Before discharge

Screening before discharge

Screening

1. Congenital anomalies – Internal and external; SpO2 screening for CHD (>10% difference suggestive)
2. Hearing screening prior to discharge in all newborn (AAP)
 - Risk factors- F/h/o SNHL, In utero infections, NNH requiring Exchange transfusion, Ototoxic medication >5d/+loop diuretics, Mech ventilation >10d
 - OAE- Simpler, Middle & inner ear assessed, all ages.
 - ABR- Can diagnose auditory neuropathy(dyssynchrony), recommended for high-risk infants admitted in NICU, within 1st 3mo.
3. Visual impairment: ROP screening using indirect ophthalmoscopy at PN age of 3wks in high risk infants: Severe RDS, Hypotension req vasopressors, Surgery in 1st several wks
- 4- Metabolic screen and repeat. Thyroid function and 6-8 weeks

- **Hearing follow up-** hearing loss in 2% to 11% of VLBW infants-both sensorineural and conductive hearing loss
- BERA/OAE before discharge
Screening – neonatal period and 1 yr
- Auditory dys-synchrony(auditory neuropathy) and central auditory processing problems



What to Teach Parents before discharge

long-term sequela

- SIDS
- Cosmetic
- Sleep cycle
- Bonding
- BPD
- ROP
- Neurologic
- Growth
- Hearing

Teach Parents before discharge

- CPR



WHICH INFANTS ARE AT GREATEST RISK for SIDS?

- Increase risk with
- The lower the gestational
- The lower the birthweight
- A combination of these increases the risk by more than each factor alone





For parents



For Baby < 28 weeks in RSV season

Rsv-igiv

means

Respiratory Syncytial Virus
Immune Globulin Intravenous

FOLLOW UP CARE

- **Respiratory syncytial virus** –most important cause of respiratory infection in premature infants

Good hand hygiene, avoid passive cigarette smoking exposure

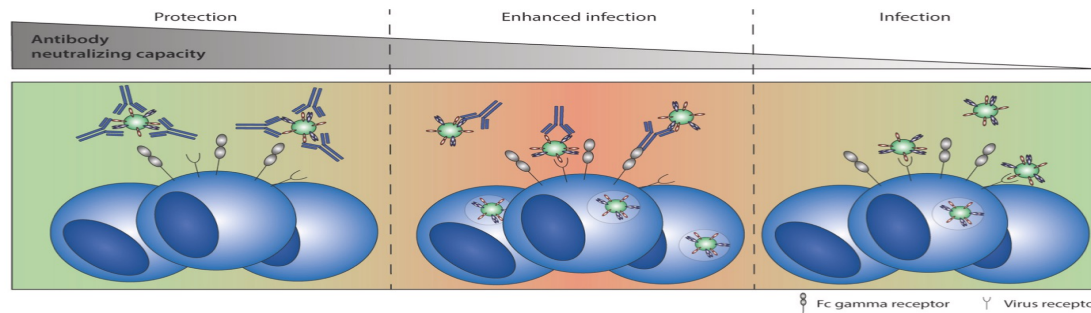


FIGURE 6 | Antibody-dependent enhancement (ADE) of infection. ADE of infection has been shown *in vitro* for multiple viruses, including RSV. High antibody titers neutralize the virus completely. Sub-neutralizing antibody titers form immune complexes that can interact with both the virus receptor and Fc gamma receptors, leading to enhanced infection levels compared to infection in the absence of antibodies.



RSV prophylaxis < 28 weeks

<https://europepmc.org/backend/ptpmcrender.fcgi?accid=PMC6438959&blobtype=pdf>

Fc-Mediated Antibody Effector Functions During Respiratory Syncytial Virus Infection and Disease

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Later follow up Screen for Neurodevelopment Delay

Early Preterm (EPT) Infants Experience Multiple Delays

Compared with full-term infants, EPT are more likely to have :

- Delays in fine and gross motor functioning
- Delays in sensory integration
- Delays in cognitive functioning
- Delays in communication
- Behavioral and socio-emotional problems



(Kerstjens, et al., 2011 citations: Stephens & Vohr, 2009; Saigal & Doyle, 2008; Taylor, Klein, & Hack, 2000; Marlow, 2004; Hokken-Koelega, 2017)

Table 2. Survival and Neurodevelopmental Outcomes at 18 to 22 Months of Corrected Age.

Outcome	Epoch 1 (2000–2003)		Epoch 2 (2004–2007)		Epoch 3 (2008–2011)		P Value†
	no./total no.	% (95% CI)*	no./total no.	% (95% CI)*	no./total no.	% (95% CI)*	
All infants‡							
Survival without neurodevelopmental impairment	217/1391	16 (14–18)	250/1535	16 (15–18)	276/1348	20 (18–23)	0.001
Survival with neurodevelopmental impairment	207/1391	15 (13–17)	209/1535	14 (12–15)	211/1348	16 (14–18)	0.29
Death	967/1391	70 (67–72)	1076/1535	70 (68–72)	861/1348	64 (61–66)	<0.001
Survival without neurosensory impairment	340/1380	25 (22–27)	391/1533	26 (23–28)	395/1348	29 (27–32)	0.01
Survival with neurosensory impairment	73/1380	5 (4–7)	66/1533	4 (3–5)	92/1348	7 (6–8)	0.01
Infants born at 22 wk							
Survival without neurodevelopmental impairment§	2/241	1 (0–3)	4/274	1 (1–4)	3/234	1 (0–4)	0.80
Survival with neurodevelopmental impairment§	4/241	2 (1–4)	9/274	3 (2–6)	5/234	2 (1–5)	0.46
Death	235/241	98 (95–99)	261/274	95 (92–97)	226/234	97 (93–98)	0.39
Infants born at 23 wk							
Survival without neurodevelopmental impairment	34/496	7 (5–9)	55/489	11 (9–14)	59/450	13 (10–17)	0.005
Survival with neurodevelopmental impairment	63/496	13 (10–16)	41/489	8 (6–11)	51/450	11 (9–15)	0.08
Death	399/496	80 (77–84)	393/489	80 (77–84)	340/450	76 (71–79)	0.11
Infants born at 24 wk							
Survival without neurodevelopmental impairment	181/654	28 (24–31)	191/772	25 (22–28)	214/664	32 (29–36)	0.007
Survival with neurodevelopmental impairment	140/654	21 (18–25)	159/772	21 (18–24)	155/664	23 (20–27)	0.44
Death	333/654	51 (47–55)	422/772	55 (51–58)	295/664	44 (41–48)	<0.001

* Unadjusted binomial confidence intervals were determined with use of the Wilson method.

† P values were determined using chi-square tests.

‡ Included are 4274 infants who had data available on the primary outcome.

§ Among the 27 surviving infants born at 22 weeks, the median (interquartile range) gestational age was 22 weeks 5 days (22 weeks 4 days to 22 weeks 6 days) and birth weight was 570 g (510 to 620).

Dental problems



Enamel hypoplasia

- **RECOMMENDATIONS:** For immunizationn

- Medically stable preterm infants who remain in the hospital at 2 months of chronologic age should receive all inactivated vaccines recommended at that age.

[A medically stable infant is defined as one who does not require ongoing management for serious infection; metabolic disease; or acute renal, cardiovascular, neurologic, or respiratory tract illness and who demonstrates a clinical course of sustained recovery and a pattern of steady growth.]

- All immunizations required at 2 months of age can be administered simultaneously to preterm or low birth weight infants, **except for oral rotavirus vaccine**, which should be **deferred until the infant is being discharged** from the hospital *to prevent the potential health care-associated spread of this live vaccine virus.*



Did
you
know...



born **preterm**
worldwide

14.9
million
babies are



powered by
EFCUNI

#WorldPrematurityDay

#letthemthrive

that are
more than
11% of
all live born
babies*



*Blencowe et al., 2012

**Preterm birth is the major cause of death of under
5 years of age all
around the
world...**



**and a significant
cause of long-term
loss of human potential amongst survivors**

Thank You

