Dear Readers in the world

Thank you for reading our templates.

We plan to compare the treatment strategy for ELBW in the first few days. Unfortunately, there is no time for us to show them all in the workshop on October 7, 2023.
Thanks to the Chairperson, Prof. Tanaka, we have an opportunity to put them on the website beforehand.
I would like you to download and compare your NICU with our 6 NICUs.

Hidehiko Maruyama
Seung Han Shin

Our treatment strategy for ELBW in the first few days in Nagano, Japan

Nagano Children's Hospital, Division of Neonatology

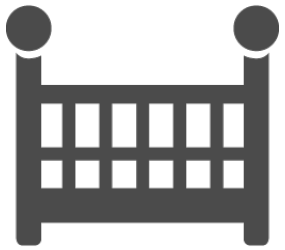
Arata Oda, MD

NICU introduction

- NICU 42 beds (18 NICU bed and 24 step down bed)
- NICU staff 8, fellow 6, resident 1~2

Nagano Children's Hospital

Nagano Children's Hospital NICU



42
NICU beds

400
Admission/year

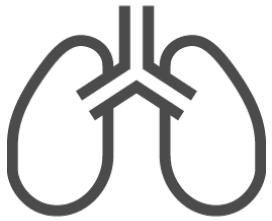
30
ELBW/year

15
Doctor

70
Nurse

250
Emergency transport

100
CHD /year



100
NAVA ventilation /10 year

Family centered care

Management in the delivery room (DR)

Location and temperature control

- In case of C/S
  - DR is located next to OR.
  - Ns transport OR to DR with holding.

- In case of vaginal delivery
  - DR is located in same floor, it takes 2 min.
  - Dr and Ns transport the baby with incubator.

- Delivery room temperature:30℃

- Temperature control modality for baby
  - Warmer:>37, plastic bag(+), thermal mattress(-)
  - <u>All procedures are done in the incubator.</u>

Cord management

- Provide delayed cord clamping?
  - No
- Provide cord milking?
  - Yes

- Any criteria or contraindication for milking?
  - Born less than 28 wk

- Provide skin to skin contact immediate after birth?
  - No. The mother touch her baby’s hand and/or head.

Initial step and monitoring

- Any range of birthweight or GA for skipping initial step?
  - Initial step: warm, dry, position, suction, stimulation
    - Yes and No, we always provide initial step such as warm, dry, suction, rarely stimulation if tolerated.

- Routine use of ECG monitoring?
  - Yes

Respiratory support at delivery room

- Do you use T-piece resuscitator? (in the DR and during transport)
  - No

- Do you routinely give CPAP?
  - Yes and No, if infants have spontaneous breathing, then we do CPAP.

- Selective vs. Prophylactic surfactant
  - Prophylactic surfactant is done after checking ETT position by CXR.

Respiratory management in the first 72 hours.

What is common practice for respiratory supports in NICU?

Item	Comment
Primary mode if spontaneous respiratory efforts are good	CPAP=mask CPAP Maximum settings of pressures on nasal supports ?: 5-8cmH2O
Thresholds for intubation and early rescue surfactant	Mandatory intubation Rarely non-intubated management
Methods of surfactant administration	INSURE/ INRECSURE/ LISA/ MIST :No
Mode of ventilation on first 0-3 days	SIMV+PS sometime use VG
Second dose surfactant	If oxygen demand is more than >30-40% and CXR finding shows the collapse.

The first 72 hours…

Targets in Blood gases (day 0-3)	pH >7.25 pCO2 upto what value is “permitted” :Approximately 40-50 pO2 : is it required if SpO2 is targeted:SpO2>94, pO2> 60
Target X ray findings	Posterior rib spaces :7~8 No collapse lung regions ETT position ideal: Th 2
When is extubation first considered?	Based on respiratory drive, circulatory status, sensorium: Actually 30-32 week in 23-25 week
When is postnatal steroid considered?	Only after 7 days of life: As after as possible How is risk for BPD assessed?:Bubbly/Cystic appearance on CXR What preparation and what regimen of steroids?: HDC: 5-5-3-3-2-2-1-1mg/kg/d Dex: 0.5-0.5-0.5-0.3-0.3-0.2-0.2mg/kg/d
Inhaled nitric oxide in preterm infants	Criteria for administration?: PH is suspected, use 1-5ppm

Often encountered complications/ adverse events ?

Item	Comment
ET tube position changes	Methods of ETT fixation used in individual units: Erastikon tape
Pneumothorax	ICD insertion and fixation protocols: enough space to insert ICD is found
CPAP “Belly”	Feed escalation plans: increase 20ml/kg/d , any decompression methods actively used, Use of glycerin enema as a routine, flatus let out tubes in rectum.
Spontaneous intestinal perforation	With use of CPAP/ Nasal IMV: maximum settings tolerated: 8 cmH2O How to differentiate from peritonitis? Threshold for surgical intervention ? : We do at least drainage if we find SIP.
VAP	Care bundles, Colostrum into the mouth Nurse: patient ratios = 1:2~3, Minimum experience of nurse allocated to ELBW?

Circulatory management in the first 72 hours.

What is your routine for circulatory management ?

Item	Comment
Heart rate	Acceptable range 100 - 160
SpO2	Acceptable range >94 withing 72 hours. 88-94 after 72 hours
Blood pressure	We try to get umbilical arterial line or peripheral arterial line. Target mean BP will be over/same the number of gestational week.
Urination	Keep 1ml/kg/h and without lactate increasing
Blood test	Lactate; we often check it as circulatory status. BNP; we use for heart failure for congenital heart disease. So we rarely use for ELBW.
Input volume	Day 0; 60ml/kg/day+extra (RBC, FFP, Alb, IgG) Day 1; 70 Day 2; 80 Day 3; 100
NIRS	never

How to diagnose “symptomatic PDA”?

Item	Comment
Echocardiography	We use it from the time of admission. We use it 2-3 times / day. We collect the data, LVDD, EF, LA/Ao, Lt PA diastolic flow, DA diameter, DA flow velocity, DA flow pattern, and ACA-RI
Ultrasound	We also check the flow of anterior cerebral artery and systemic artery (such as renal artery).
Heart rate	Consider if HR>180
Urination	Consider if Urination less than 1ml/kg/h

How to treat “symptomatic PDA”?

Item	Comment
Medication	Indomethacin; For less than 25 weekers of less than 27weeks if STA given
	Ibuprofen; rarely use.
Surgery	Refractory cases for indomethacin 3 times or side effect could not torelate Infants with low renal function
…	

How to manage “hypotension”?

Cause	Comment
Hypokinesis	Excessive afterload -> Vasodilators: rare, Diuretics: sometime, sedation: sometime
	No excessive afterload -> Inotropes, steroid Dopamin :start 3-5mcg/kg/min, max 10 Dobutamin :start 3-5mcg/kg/min, max 10 Hydrocortisone: 1-2mg/kg/dose
Hypovolemia	Volume expander -> Saline, RBC(RCC), FFP, albumin

Positioning and Handling in the first 72 hours.

Positioning

Topics	Details/Comments
• **Infant's positioning**	• Do you usually put a baby in midline positioning? • What positions of babies are allowed in your unit during the first 72 h? (supine only*)* • *Age of infants* you allow to put a baby in prone or other positions (after 72 h when UV/UA is removed) • *Equipment* used to support head/ positioning (kind of nest)
• **Leveling bed**	• *Degree* of head elevation (about 15°)

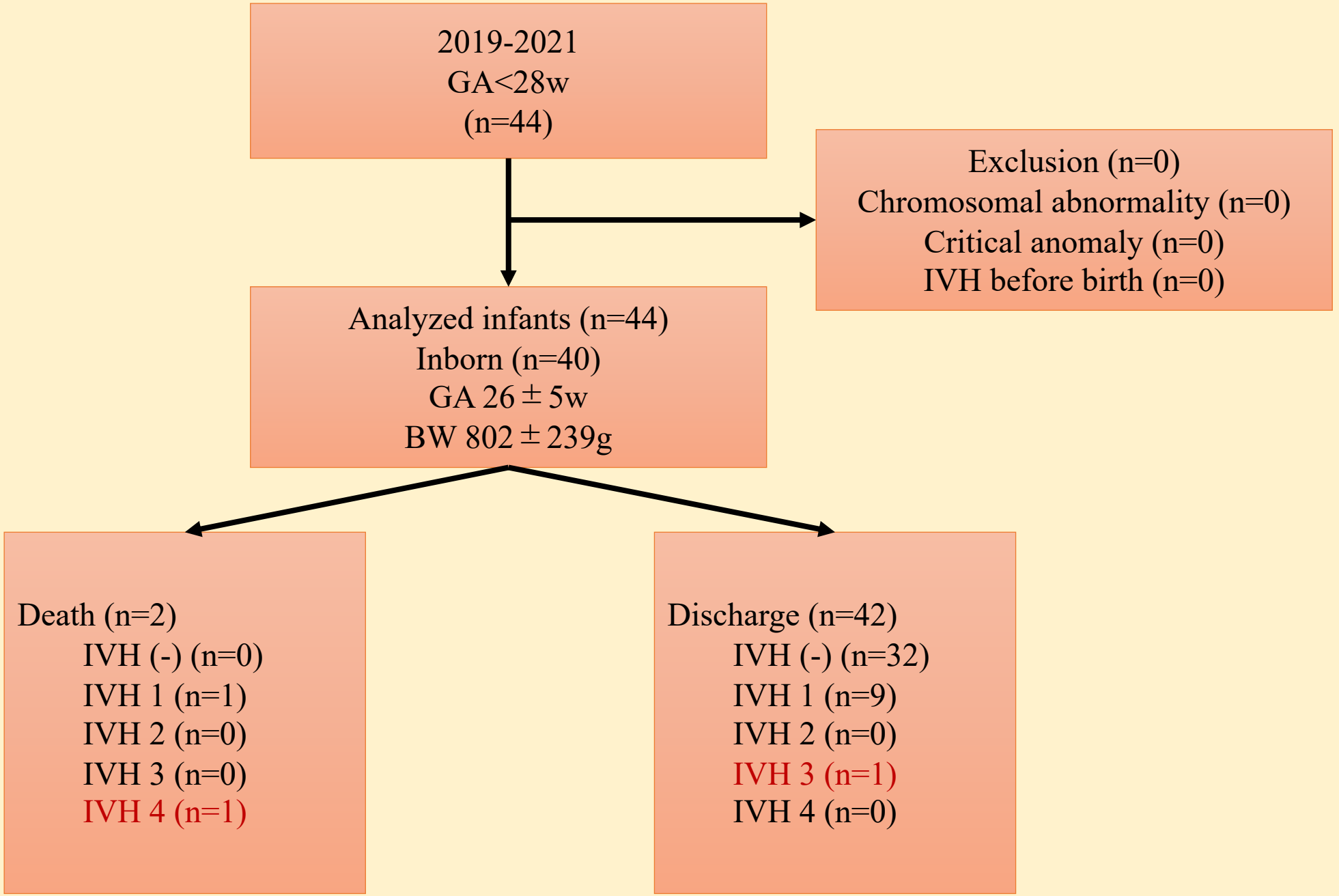
Handling

Topics	Details/Comment
• **Gentle Handling**	• *minimal and handling rules: don't touch frequently*
• **Diaper change**	• How many people your unit use ?:1 until when: <72h • Special technique? : none
• **Changing bed sheet**	• How many people your unit use (1 or 2)? until when?
• **Weigh a baby**	• How many times you weigh a baby/day? • How many people your unit use (1 or 2)? until when ?
• **X-ray**	• Do you usually use incubators with an X-ray cassette tray port

Handling

Topics	Details/Comment
• **Holding or Kangaroo care**	• What ages of infants you allow parents to do Kangaroo care (<72, >72, >7 days?)

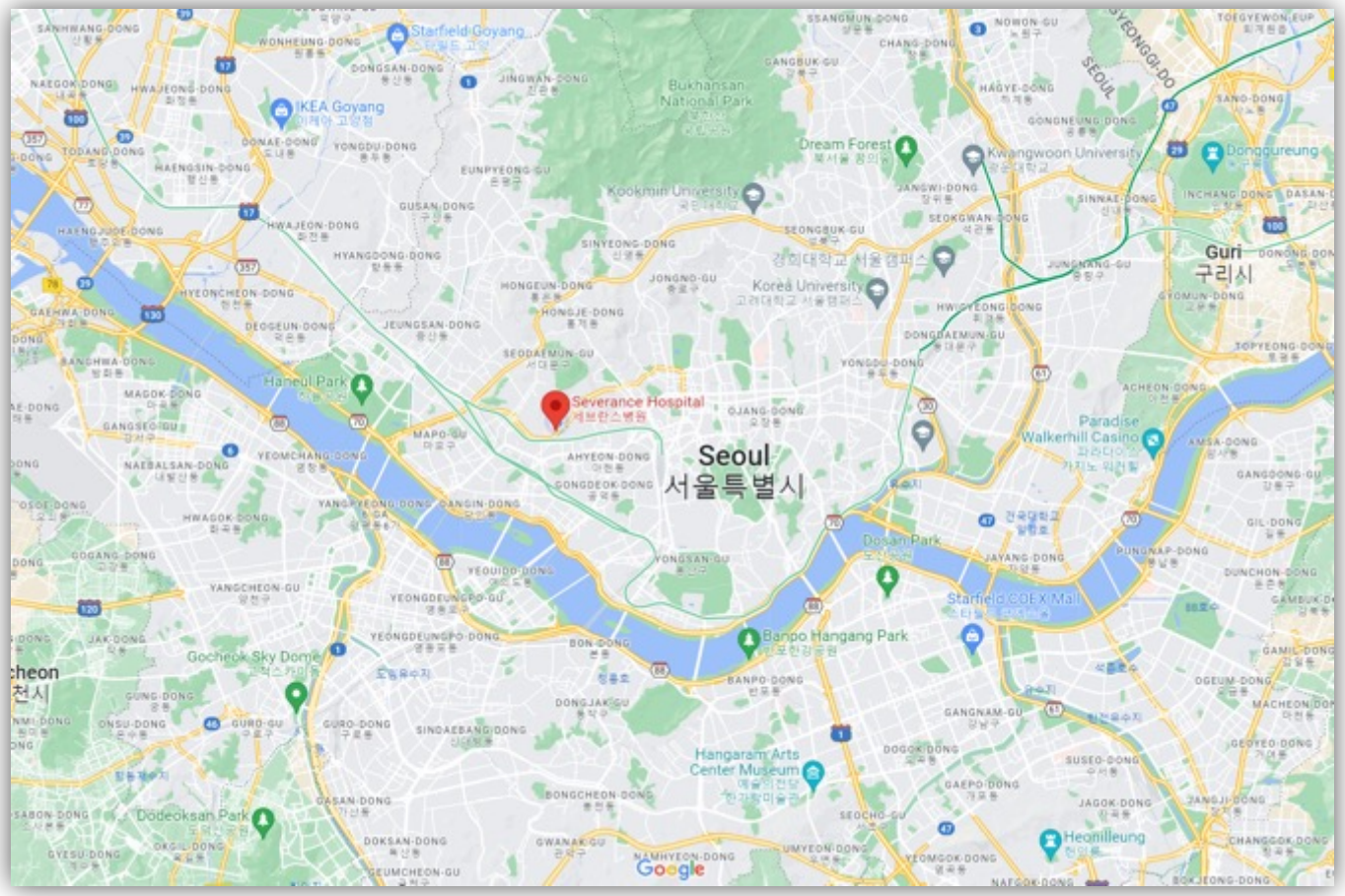
IVH result


2019-2021
GA<28w
(n=44)
Exclusion (n=0)
Chromosomal abnormality (n=0)
Critical anomaly (n=0)
IVH before birth (n=0)
Analyzed infants (n=44)
Inborn (n=40)
GA 26 ± 5w
BW 802 ± 239g
Death (n=2)
IVH (-) (n=0)
IVH 1 (n=1)
IVH 2 (n=0)
IVH 3 (n=0)
IVH 4 (n=1)
Discharge (n=42)
IVH (-) (n=32)
IVH 1 (n=9)
IVH 2 (n=0)
IVH 3 (n=1)
IVH 4 (n=0)

Our treatment strategy for ELBW in the first few days - Seoul, The Republic of Korea

In Gyu Song MD, MPH, PhD
Division of Neonatology, Department of Pediatrics,
Severance Children's Hospital,
Yonsei University College of Medicine

Severance Hospital



Severance Hospital

Founded in 1886 by Dr. H. N. Allen
Total 2,437 beds
280 beds in the children's hospital

NICU 52 beds
NICU 6 staffs, 2 fellows, 2 residents

Severance Hospital

Founded in 1886 by Dr. H. N. Allen
Total 2,437 beds
280 beds in the children's hospital

NICU 52 beds
NICU 6 staffs, 2 fellows, 2 residents

Management in the delivery room (DR)

Location and temperature control

- In case of C/S
  - How far is DR from NICU (how far? how long it takes? any floor change?):
    At another building and one floor below
  - How do you support during transport: portable ventilator
- In case of vaginal delivery: a few cases
  - How far is DR from NICU: one floor above
  - How do you support during transport: portable ventilator
- Delivery room temperature: 25^{o}C
- Temperature control modality for baby
  - Warmer, plastic bag, hat

Cord management

- Provide delayed cord clamping?
  - No
- Provide cord milking?
  - No
- Any criteria or contraindication for DCC/milking?
  - No
- Provide skin to skin contact immediate after birth?
  - No

Initial step and monitoring

- Any range of birthweight or GA for skipping initial step?
  - Initial step: warm, dry, position, suction, stimulation
    - No, we always provide initial step according to NRP

- Routine use of ECG monitoring?
  - Yes

Respiratory support at delivery room

- Do you use T-piece resuscitator?
  - In DR yes, and we use a portable ventilator during transport.

- Do you routinely give CPAP?
  - No

- Selective vs. Prophylactic surfactant
  - Mostly ‘prophylactic’.
  - In Korea it is covered by National Health Insurance (NHI) for GA < 30 or Bwt ≤ 1,250g

Respiratory management in the first 72 hours.

What is common practice for respiratory supports in NICU?

Item	Comment
Primary mode if spontaneous respiratory efforts are good	The primary mode would be one of invasive methods.
Thresholds for intubation and early rescue surfactant	Mandatory intubation
Methods of surfactant admini stration	Traditional method
Mode of ventilation on first 0 -3 days	Mostly SIMV (pressure control) + Pressure support (For 24 weekers, HFOV)
Second dose surfactant	After 6 hrs (according to NHI), FiO2 > 0.4 and RDS features in chest x-ray

The first 72 hours…

Targets in Blood gases (day 0-3)	pH >7.2 We don't check lactate. pCO2 upto 55 mmHg
Target X ray findings	Posterior rib spaces: 8 ~ 9 ETT position ideal: T2 ~ 3
When is extubation first considered?	Based on respiratory drive, circulatory status, sensorium What if sedation was being given? – may not extubate
When is postnatal steroid considered?	Only after 7 days of life? Yes. How is risk for BPD assessed? What preparation and what regimen of steroids? - DART protocol (0.89mg/kg for 10 days)
Inhaled nitric oxide in preterm infants	Practice – 20 ppm Criteria for administration – NHI - FiO2 ≥ 50 % and OI ≥ 15 - EchoCG: RL shunt, D-shape, TR

Often encountered complications/adverse events ?

Item	Comment
ET tube position changes	We don‘t change ET tube position within 2 weeks after birth. If it is needed, we do it with 2 nurses. We don’t use NeoBar®.
Pneumothorax	ICD insertion and fixation protocols – consult to thoracic surgeons
CPAP “Belly”	Feed escalation plans: 20 mL/kg/day Decompression methods: low negative continuous pressure (30 ~ 40 mmHg) Use of glycerin as a routine: not routinely but mostly
Spontaneous intestinal per foration	With use of CPAP/ Nasal IMV: maximum settings tolerated ? How to differentiate from peritonitis? Threshold for surgical intervention ?
VAP	We have care bundles. One nurse (≥ 2 years of experience) takes care 1 extremely preterm infants and other 1 or 2 patients.

Circulatory management in the first 72 hours.

What is your routine for circulatory management ?

Item	Comment
Heart rate	Acceptable range 100 - 160
SpO2	Acceptable range 93 ~ 95 %
Blood pressure	We try to get umbilical arterial line for ≤ 25 weekers. Target mean BP will be over the number of gestational week.
Urination	Based on serum sodium level and body weight.
Blood test	Lactate; we don't check. BNP; For PDA treatment (usually 7 ~ 14 days)
Input volume	Day 0; 50 ~ 60 mL/kg/day Day 1; 70 ~ 80 mL/kg/day Day 2; 90 ~ 100 mL/kg/day Day 3; 110 ~ 120 mL/kg/day
NIRS	We don't use this routinely.

How to diagnose “symptomatic PDA”?

Item	Comment
Echocardiography	We use it once a day. We collect the data, LA/Ao, DA diameter, R-L or L-R shunt
Ultrasound	We also check the flow of anterior cerebral artery and systemic artery (such as celiac trunk or SMA).
BNP	Trend
Chest x-ray	Cardiomegaly Pulmonary edema
Urination	Trend
Blood pressure	Widening pulse pressure and low mean BP
Medication	We only have ibuprofen (IV and PO) in Korea.
Surgery	Refractory cases for ibuprofen 2 cycles. Infants with low renal function or other contraindications of medical treatment.

How to manage “hypotension”?

Cause	Comment
Hypokinesis	Dopamine Hydrocortisone - When dopamine > 10 mcg/kg/min, then HCS 1 mg/kg/dose q8hrs Dobutamine
Hypovolemia	Volume expander - Saline > FFP > RBC(RCC) > 5% albumin

Positioning and Handling in the first 72 hours.

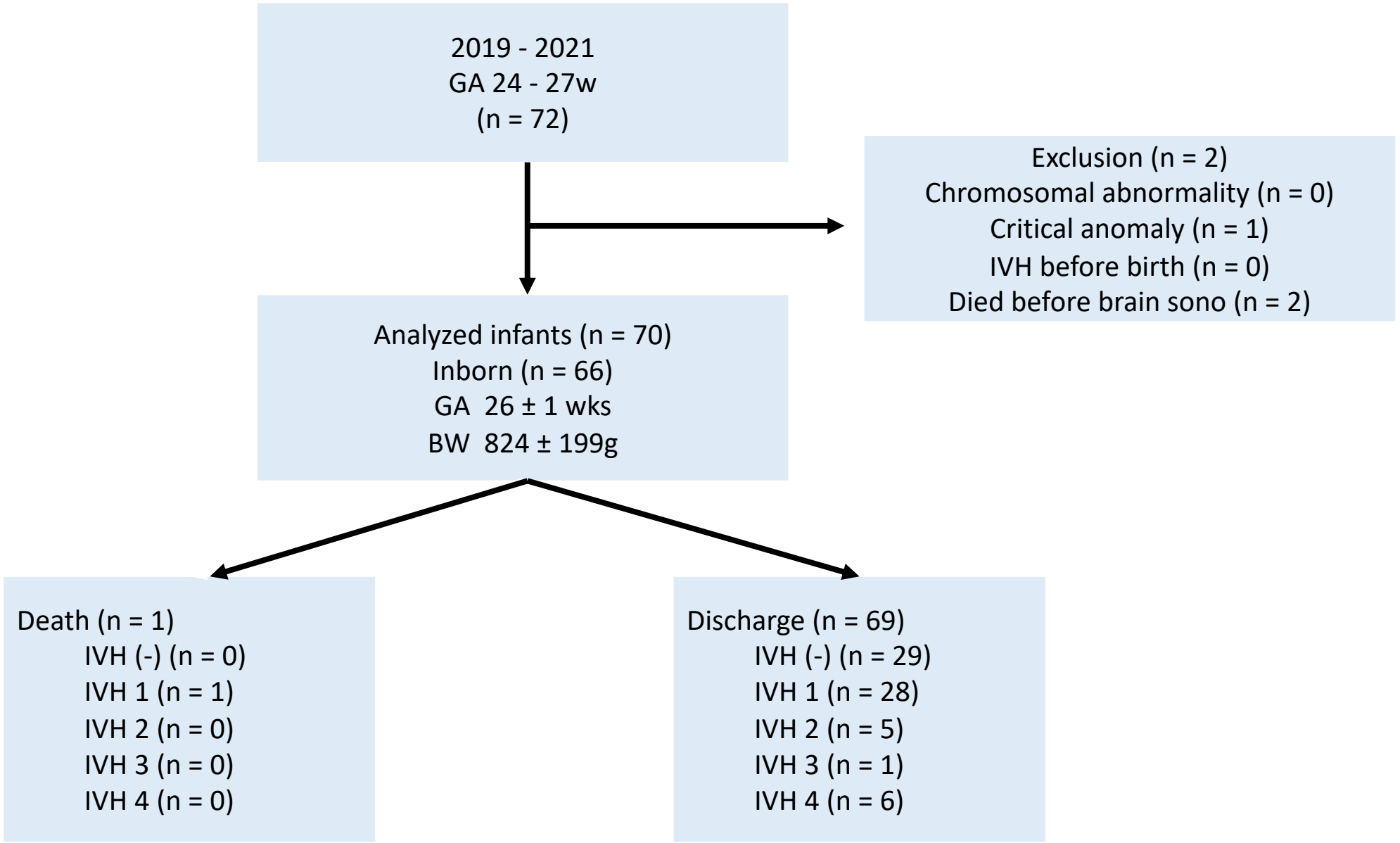
Positioning

Topics	Details/Comments
Infant's positioning	• We put a baby in neutral position for the first week and then change (supine, side lyi ng, prone) • Equipment used to support head/positioning: nest 
Leveling bed	• Degree of head elevation: 15 ~ 20°

Handling

Topics	Details/Comment
Gentle Handling	• We routinely use minimal and gentle handling rules.
Diaper change	• How many people your unit use: one nurse
Changing bed sheet (with weighing a baby)	• How many people your unit use: a baby with a ventilator (invasive or non-invasive), 3 people
Weigh a baby	• We weigh a baby once a day. • How many people your unit use: 2 people
X-ray	• Do you usually use incubators with an X-ray cassette tray port: Yes
Holding or Kangaroo care	• What ages of infants you allow parents to do Kangaroo care: > 14 days and not intubated

IVH results


2019 - 2021
GA 24 - 27w
(n = 72)
Exclusion (n = 2)
Chromosomal abnormality (n = 0)
Critical anomaly (n = 1)
IVH before birth (n = 0)
Died before brain sono (n = 2)
Analyzed infants (n = 70)
Inborn (n = 66)
GA 26 ± 1 wks
BW 824 ± 199g
Death (n = 1)
IVH (-) (n = 0)
IVH 1 (n = 1)
IVH 2 (n = 0)
IVH 3 (n = 0)
IVH 4 (n = 0)
Discharge (n = 69)
IVH (-) (n = 29)
IVH 1 (n = 28)
IVH 2 (n = 5)
IVH 3 (n = 1)
IVH 4 (n = 6)

Thank you for your attention!

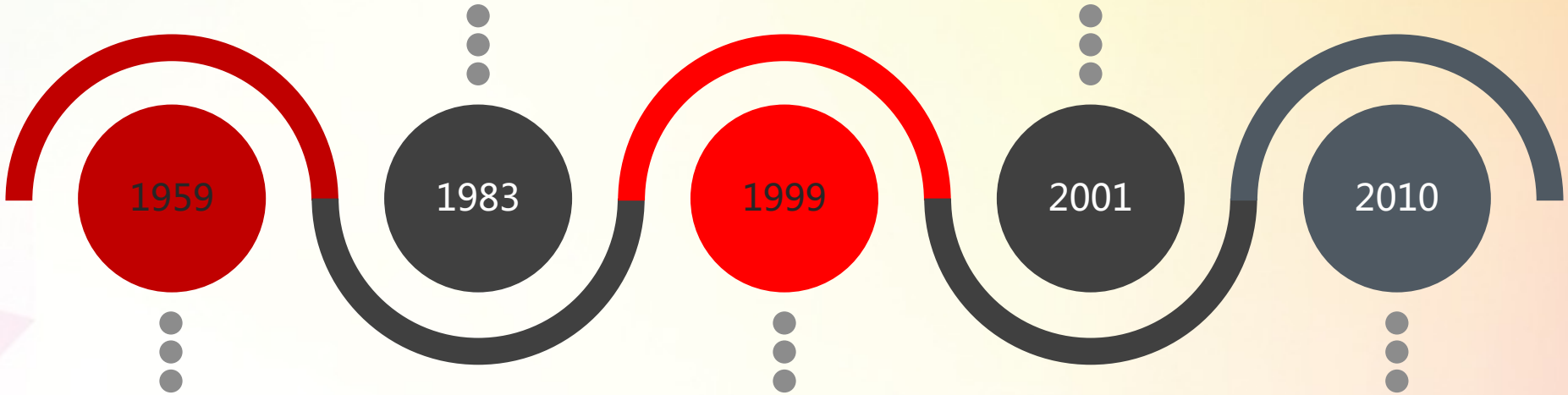
igsong@yuhs.ac / pedigms@gmail.com

YONSEI UNIVERSITY
COLLEGE OF MEDICINE

Strategy for EPIs within 72 hours single center experience

Reporter: Pei Lu
Institution: Department of neonatology
Shanghai Children's Hospital
Shanghai Jiao Tong University

History



The neonatology department created

NICU created

Established as Shanghai Children's Emergency Center

Initiate emergency neonatal transports

Neonatal Emergency Transportation Center established

Introduction

Introduction

Highlighted Techniques

Neonatal ECMO, Neonatal CRRT, Neonatal transfer, etc.

Specialties

The percentage of challenging and critical cases is increasing

The percentage of VLBWs and ELBWs is rising drastically

Workload

Receiving neonates from 30 maternity hospitals

The number of NICU discharges has been stable at around 4,500 per year

2,500+ follow-up appointments annually for infants at high risk

Introduction

上海市儿童医院
CHILDREN'S HOSPITAL OF SHANGHAI

Neonatal CRRT
Since 2012
47 Cases




Introduction

上海市儿童医院
CHILDREN'S HOSPITAL OF SHANGHAI

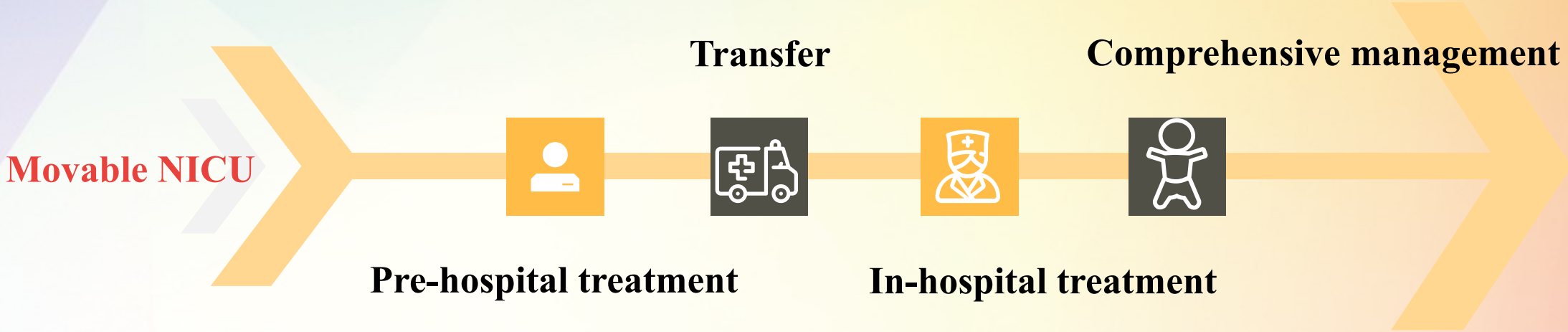
Neonatal ECMO
Since 2018
6 Cases

Catheter insertion

Implement

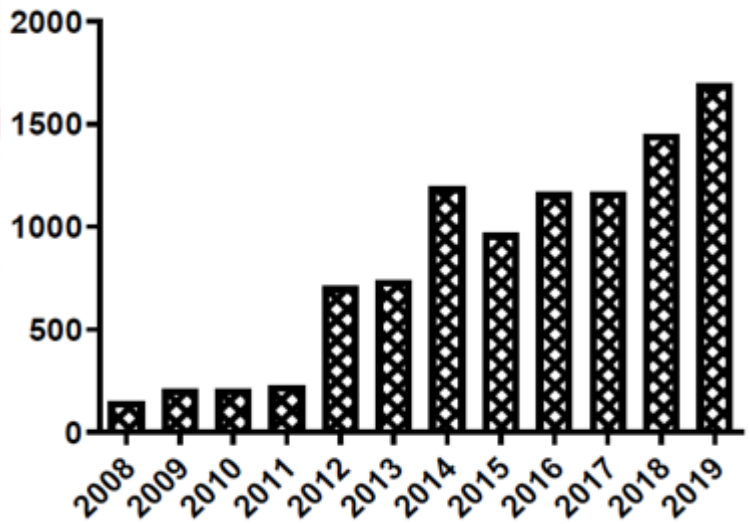
Implement

Introduction of Neonatal Transfer



The "integrated and consolidated management" model unifies pre-hospital emergency transportation, in-hospital critical illness treatment, post-hospital comprehensive follow-up, and health management, improves the standard of care and survival rate for infants discharged from hospitals with critical illnesses

Transfer



Number of newborns transferred per year

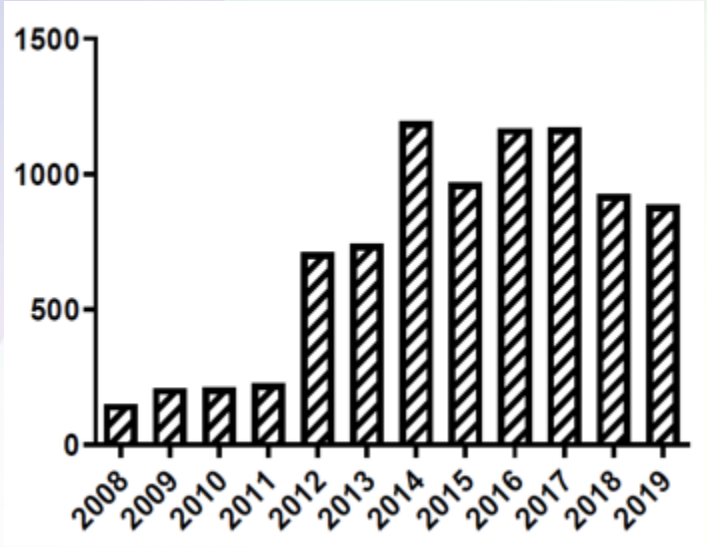
2019: 1862 transfers

2020: 1008 transfers

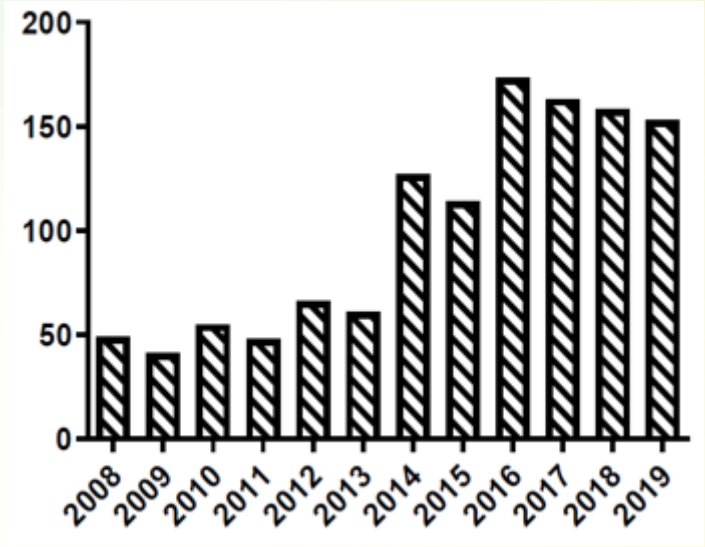
Transfer

Transfer

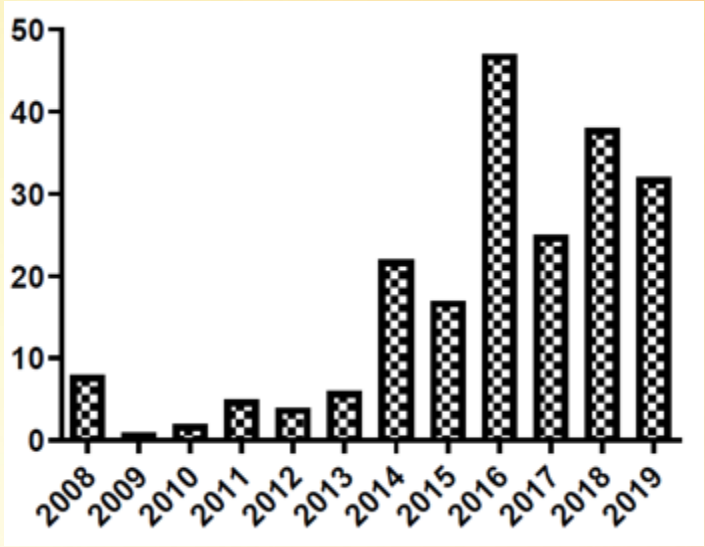
上海市儿童医院
CHILDREN'S HOSPITAL OF SHANGHAI



premature infants 96.7%



VLBWs 93.1%



ELBWs 80%

GA：22^{+2}W
BW：500g

GA：24W
BW：780g

GA：25^{+4}W
BW：665g/760g

Respiratory management

- ✓ Start CPAP or (S) NIPPV as soon as possible in all babies at risk of RDS
- ✓ Surfactant when FiO_2 > 0.3 on CPAP pressure ≥6 cm or <30 weeks and intubated
- ✓ Use natural surfactant given by LISA technique
- ✓ A second and third dose of surfactant can be given if there is ongoing evidence of RDS
- ✓ Lung-protective modes such as VG if MV is required
- ✓ Minimize the duration of MV, tolerate moderate hypercarbia but maintain pH above 7.22
- ✓ Spontaneously breathing babies on MV will be extubated to CPAP or (S)NIPPV
- ✓ Use caffeine routinely in infants <32 weeks to minimize need for MV
- ✓ Oxygen saturation target should be between 90 and 94% with alarm limits 89% and 95%
- ✓ Consider low-dose dexamethasone to facilitate extubation in infants ventilated > 1–2 weeks

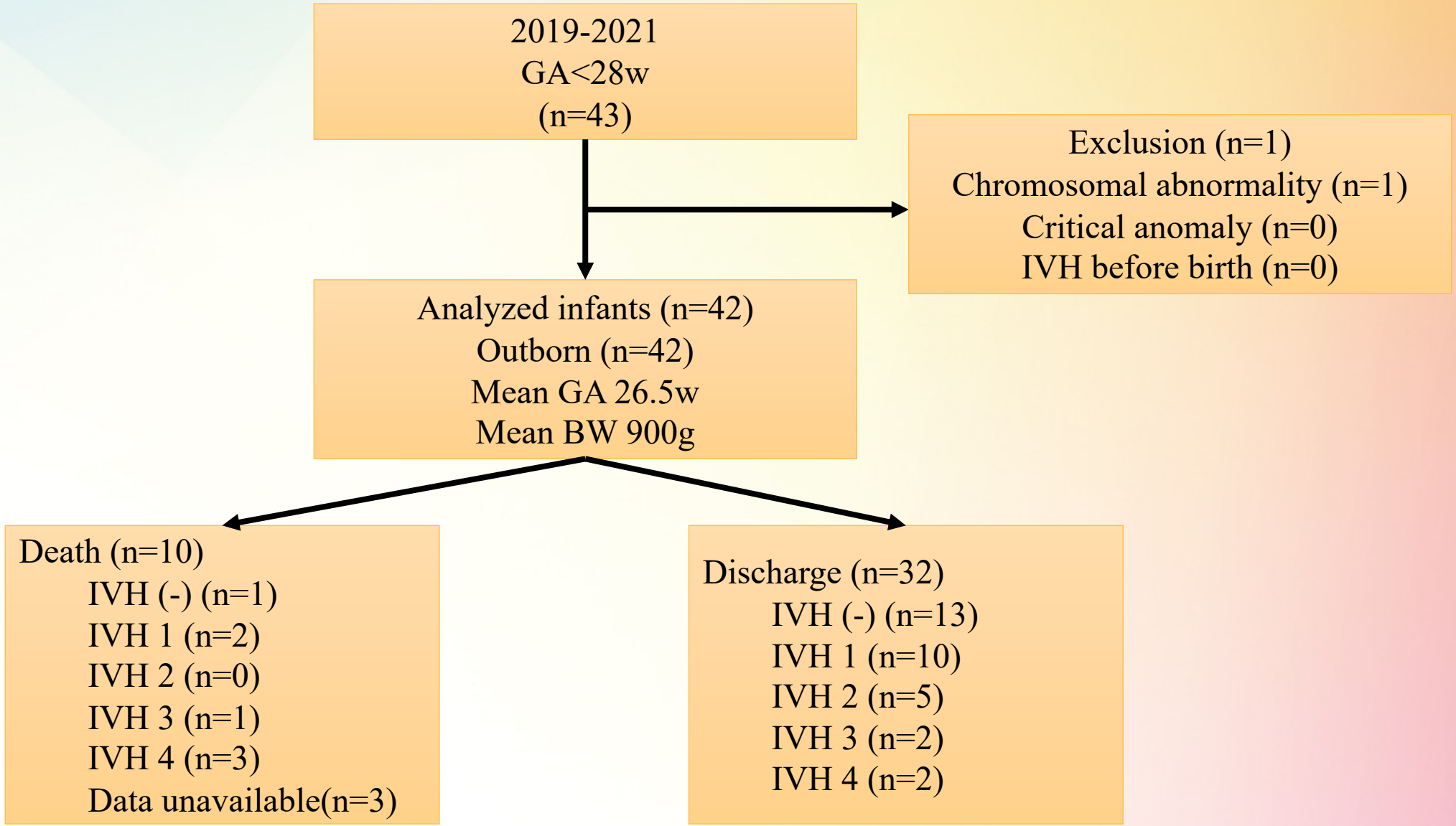
Sweet DG, Carnielli VP, Greisen G, et al. European Consensus Guidelines on the Management of Respiratory Distress Syndrome: 2022 Update. *Neonatology*. 2023;120(1):3-23. doi:10.1159/000528914

Circulatory management

- ✓ Fluids are initiated at about 70–80 ml/kg/day and adjustments individually
- ✓ Treatment of hypotension will only be initiated when there is evidence of poor tissue
- ✓ Treatment of hypotension will depend on the cause, dopamine is more effective
- ✓ The targeted mean BP should be above the level of GA within the first 72 hours
- ✓ Routine treatment of PDA closure is not considered good practice
- ✓ Pharmacologic closure will only be considered when hemodynamically significant PDA is recognized
- ✓ Ibuprofen or paracetamol can be used with a similar efficacy
- ✓ Surgical ligation has a place only if medical therapy has failed

Sweet DG, Carnielli VP, Greisen G, et al. European Consensus Guidelines on the Management of Respiratory Distress Syndrome: 2022 Update. *Neonatology*. 2023;120(1):3-23. doi:10.1159/000528914

IVH Results


2019-2021
GA<28w
(n=43)
Exclusion (n=1)
Chromosomal abnormality (n=1)
Critical anomaly (n=0)
IVH before birth (n=0)
Analyzed infants (n=42)
Outborn (n=42)
Mean GA 26.5w
Mean BW 900g
Death (n=10)
IVH (-) (n=1)
IVH 1 (n=2)
IVH 2 (n=0)
IVH 3 (n=1)
IVH 4 (n=3)
Data unavailable(n=3)
Discharge (n=32)
IVH (-) (n=13)
IVH 1 (n=10)
IVH 2 (n=5)
IVH 3 (n=2)
IVH 4 (n=2)

上海市儿童医院
CHILDREN'S HOSPITAL OF SHANGHAI

THANKS FOR LISTENING!

Н.Гэндэнжамцын нэрэмжит
ЭХ ХҮҮХДИЙН ЭРҮҮЛ МЭНДИЙН ҮНДЭСНИЙ ТӨВ

Our treatment strategy for ELBW in the first few days in Ulaanbaatar, Mongolia

Narantsetseg.Ch
MD. MSc
Division of NICU, Children's hospital.
National Center for Maternal and Child Health.

NEONATOLOGY UNITED DEPARTMENT

CHILDREN'S HOSPITAL

NICU / BEDS -12/

NICU-Highly specialized area in the hospital where critically ill, high risk newborn /Neonatal cared reduce mortality and morbidity whole country

-Management of complex life threatening disease provision of Intensive monitoring & initiation of life sustaining therapies in and organized manner to critically high risk newborn

-Higher equipped ; Ventilator management

/SIMV, IMV, NIV HFOV, blended oxygen therapies

Hip, ROP, Hearing screening .Metabolic some test

LEVEL-III

Neonatal Pathology

45 beds

Grow care

Follow up high risk PRETERM

HIP and ROP,

Hearing screening +

LEVEL-III

OBG hospital

Preterm NICU

bed-15/

Nursery beds – 60

Preterm NICU

Initial stabilizing RESPIRATORY care of preterm and term newborn

HIP screening +

LEVEL-III

Introduction: NCMCH NICUs

- We have 2 NICUs in separate buildings , one NICU with 15 beds and the other for preterm infants with 12 beds
- NICU staff – 29 in the NICU and 56 in the preterm nursery
- Neonatologists – 6/9/7 total -22 physician
  - In the NICU, there are 4 pediatric (residents) on for 2 week rotations
- 1-3 Neonatology fellows for 6 month rotations
- One nurse shift : 4-5 person
- 4 nursing assistants every shift in the NICU

Management in the delivery room (DR)

Location and temperature control

C/S Deliveries:

- From the delivery room to NICU Preterm deliveries are on the same floor as the nursery; (1-2 minutes away)
- Full term deliveries occur 4 floors above the NICU (about 5-10 minutes depending on the elevator)
- During transportation we mostly use PPV by Ambubag and Neo Puff, and swaddle the infants for thermoregulation
- Vaginal deliveries:
  - Between DR and NICU takes around 5 minutes by elevator. The delivery room for term infants is on the sixth floor and the nursery is on the second floor
  - We swaddle the infants with a blanket during transport ; respiratory support by PPV or oxygen by mask or cannula or ... Ambubag is used for full term babies and flow inflating mask for preterm infants.
- Delivery room temperature: Average 24-25 degrees celcuis
- Temperature control modality for baby
  - For preterm infants : Infant warmer, plastic wrap, thermal mattress, incubator
  - For term infants : Infant warmer and swaddle, hat, with a blanket during transport

Cord management

- We successfully implemented (ENC) essential newborn care for every delivery and delayed cord clamping until the cord pulsations stop - at least for 60 seconds
- We do not routinely milk the umbilical cords.

- Delayed cord clamping is not performed if the baby requires emergency resuscitation NRP or but we …
- Skin to skin contact is provided immediately after birth for most vaginal deliveries, breathing well if there are no difficulties during birth.

Initial steps and monitoring

For all other infants, we same always provide initial step according to NRP (AAP guidelines)

- ✓We skip initial some steps ELBW and <1000 gr birth weights, and only suction , if visible secretions in the mouth; most cases are directly intubated in the DR.
- ✓We do not routinely monitor the ECG on all babies because we do not have small enough gel electrodes (the big size is too difficult)
- ✓A pulse oximeter is used on all babies .

Respiratory support in the delivery room

- We use a T-piece resuscitator in the DR but not during transport
- Do you routinely give CPAP? Any indication?

  -CPAP is routinely given to Babies <30 weeks gestation or with BW <1000g, to those with moderate and severe respiratory failure and to preterm infants with RDS

  - Before and after Surfactant replacement therapy

  -CPAP is also given after admission if the baby's respiratory status is worsening.

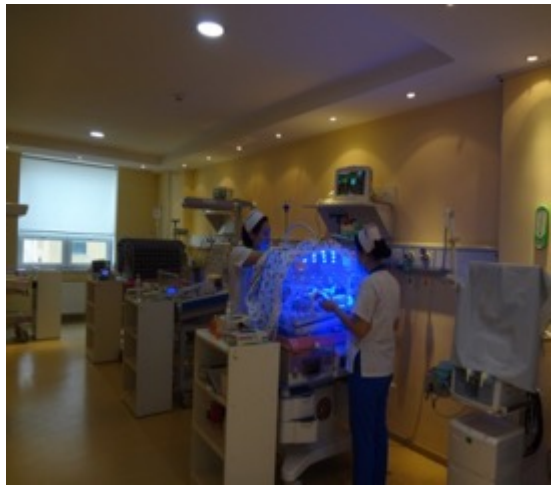
  -Apnoec episode more than >3 times a day, required PPV
- Selective vs. Prophylactic surfactant. Any indication?

  -We following the AAP Clinical guidelines for RDS updated 2022

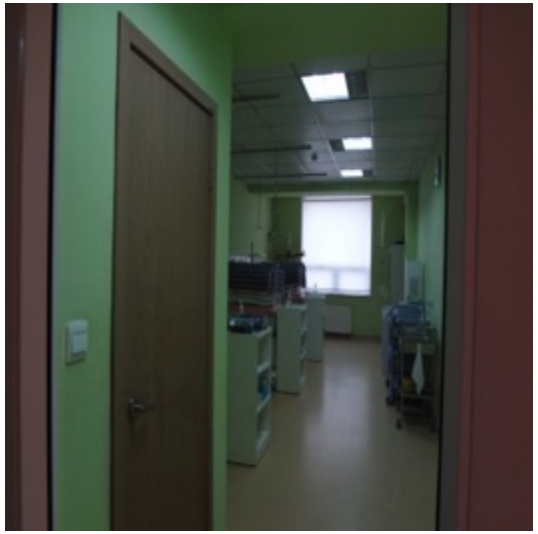
  -In addition, surfactcant is given if X ray shows severe RDS and ground glass appearance or if

  -There is continued high FIO2>0.4-0.5 requirements after CPAP and CMV


mindray








Respiratory management in the first 72 hours.

What is common practice for respiratory support in the NICU?

Item	Comment
Primary mode if spontaneous respiratory efforts are good	We use initially CPAP and SIMV modes short time, also simple Bubble nCPAP Our ventilator mode does not offer NIPPV ..? Maximum settings of pressures on nasal supports ? PEEP <6-8 cm H2O Flow 5-10 l/min
Thresholds for intubation and early rescue surfactant	Mandatory intubation/ trial non invasive methods/ need of FiO2 >30-40% for Intubation; If on NIV the infant needs more than FIO2>0.5 and RDS worsening
Methods of surfactant administration	Most of them INSURE methods given Curosurf Now we changed to LISA methods , (small feeding tube and angiocath…)
Mode of ventilation on first 0-3 days	SIMV and PC/AC mode pressure support
Second dose surfactant	If X ray still continued worse sign, clinically not stable, high FIO2 required: we

The first 72 hours…

Targets in Blood gases (day 0-3)	pH>7.28. Lactate < 4 permitted pCO2 up to 50 mm Hg; Po2>60 mm Hg SpO2 targeted >90-95%
Target X ray findings	Posterior rib spaces (8) No collapse lung regions ETT position ideal? Determined by auscultation, and clinical observation
When is extubation first considered?	Based on respiratory drive and hemodynamic status We avoid to use for preterm ; IF needed we use short time fentanyl 0.5 mcg /kg or phenobarbital Sedation is stopped at least 4 hours prior to extubation
When is postnatal steroid considered?	Delay of administration is desired, (7day) but often given by three days of life… How is risk for BPD assessed? Clinical findings , X-ray findings and oxygen requirements after 28 days of age; Considered high risk if intubated AND ventilator supporting more than 7 days; Dexamethasone; 0.15 mg/kg once daily at least 3 days BPD diagnosed: We use DART protocols 9 days
Inhaled nitric oxide in	We do not have this available yet

Often encountered complications/ adverse events ?

Item	Comment
ET tube position changes	The ET is taped to the side of the mouth We do not change between 7 days. If no any self extubation or any mispositioning
Pneumothorax	ICD insertion and fixation protocols: Not own protocol yet, but in emergency situation Neonatologist do needle aspiration , than the surgeon insert tube and secures it We have a lot of case complication pneumothorax and air leaks syndrome… ?
CPAP "Belly"	-We use open feeding tube for decompression before feeding time and actively suction if dependent drainage is not successful -Skip feeding one time and decrease oral intake 4-5 ml/per feeding
Spontaneous intestinal perforation	With use of nCPAP/ Nasal IMV: Maximum PEEP of 7 cm We have few cases of SIP ; How to differentiate from peritonitis? Clinical evalution and critiria of infection Threshold for surgical intervention ? Check in X-ray (free air) and clinical appearance of abdomen
VAP	Care bundle .1:2-3 nurse: patient ratio Respiratory hygiene is important, routinely care mouth

Circulatory management in the first 72 hours.

What is your routine for circulatory management ?

Item	Comment
Heart rate	Acceptable range 100 – 160. Newborn 120-160 preterm <180
SpO2	Acceptable range 88-96% saturation: We do not aim at SpO2 >95% with oxygen. We monitor by oxygen saturation target by GA target
Blood pressure	We never try to get umbilical arterial line on aim for measure BP : We use non invasive methods Target mean BP will be over the number of gestational age weeks. (AAP guedlines ,Uptodate)
Urination	2-6.5 ml/kg/h
Blood test	Lactate; we often check it as circulatory status. BNP; we not use for heart failure for congenital heart disease. So we rarely use for ELBW.
Input volume	Day 0; 60-80 ml/kg/day Day 1; 60 full term, preterm -80 ml/kg increase next day 10-15 ml/kg/day , depending on patients with warmer table or incubator care Day 2; 70 ml/kg/d Day 3; 80-100 ml/kg/d day 4 -120 ml/kg day 5; 6;-..130 …. upto 150 ml/kg

How to diagnose “symptomatic PDA”?

Item	Comment
Echocardiography	Echocardiograms are available on admission if needed. We consult cardiologist for echocardiogram after 72 hours if clinically indicated. Our pediatric cardiologist recommends if an echocardiogram is needed. IV Indomethacin is not available us. We collect the data, LVDD, EF, LA/Ao, Lt PA diastolic flow, DA diameter, DA flow velocity, DA flow pattern, Cardiologists collect data as needed.
Ultrasound	We also check the flow of anterior cerebral artery and systemic artery (such as renal artery). No , our radiologists do not routinely measure it . Not any practice yet
Heart rate	Clinical Symptomatic (160-180 per /min) If murmur is auscultated
Urination	2.5-6 ml/kg/min (if urine output is out of normal range) Check sodium level diuresis and fluid balance/day

How to treat “symptomatic PDA”?

Item	Comment
Medication	We do not have IV indomethacin or Ibuprofen available to treat PDA
	Orally used some symptomatic PDA.
Surgery	Refractory cases for indomethacin and/or ibuprofen Infants with low renal function Our pediatric surgeon has performed open chest ligation on a few preterm cases in babies more than 2000gr,
…	

How to manage “hypotension”?

Cause	Comment
Hypokinesis	Vasodilators and diuretics To avoid hypovolemia , keep systemic circulation defending on HF stages (to evaluate LV and RV function)
	Dopamin : We use Dopamine and if shock will use Dexamethazone Dobutamine is available but rarely used. Hydrocortisone-not yet use it
Hypovolemia	Volume expander
	Saline and Ringer’s lactate solution , Albumin or RBCs if anemia
…	

Positioning and Handling in the first 72 hours.

Positioning

Topics	Details/Comments
• **Infant's positioning**	• We do and keep *neutral* midline and head tilt position • During the first 72 h? (*supine, side-lying, prone?) : Supine AND side-lying* • A baby in prone or other positions (48 h, 72 h, 7 days?) : More than 7 days • *Equipment* used to support head/ positioning: Cloth and cotton materials are prepared by the nurse based on the newborn's weight and used to support the baby's position
• **Leveling bed**	• *Degree* of head elevation (e.g. 0°, 15-30°, other?) • Mostly recommended 15-30 degrees,

Handling

Topics	Details/Comment
• **Gentle Handling**	• To avoid much touching and not frequently
• **Diaper change**	• Our unit 1 nursing assistant per every nurse shift. She will change diapers every 3-6 hours before feeding • We avoiding Hip dysplasia, so use special techniques to support the infant following and during diaper changing
• **Changing bed sheet**	• Every 12-24 hours done by nursing assistant and nurse together (2)
• **Weigh a baby**	• (EENC)After 24 hours. Once a day • All nurse and nurse assistant can do and we weigh at 6 am
• **X-ray**	• We have Xray cassette ports but they are not used by our technician. The cassette size may not be correct for port . Our radiologists recommend the infants be supine for x-rays.

Handling

Holding or Kangaroo care

If preterm vital signs and hemodynamic status is stable we do Kangaroo care if possible.

It is not done on intubated patients. It is offered if the NICU nursery is not too busy and staff is available to assist.

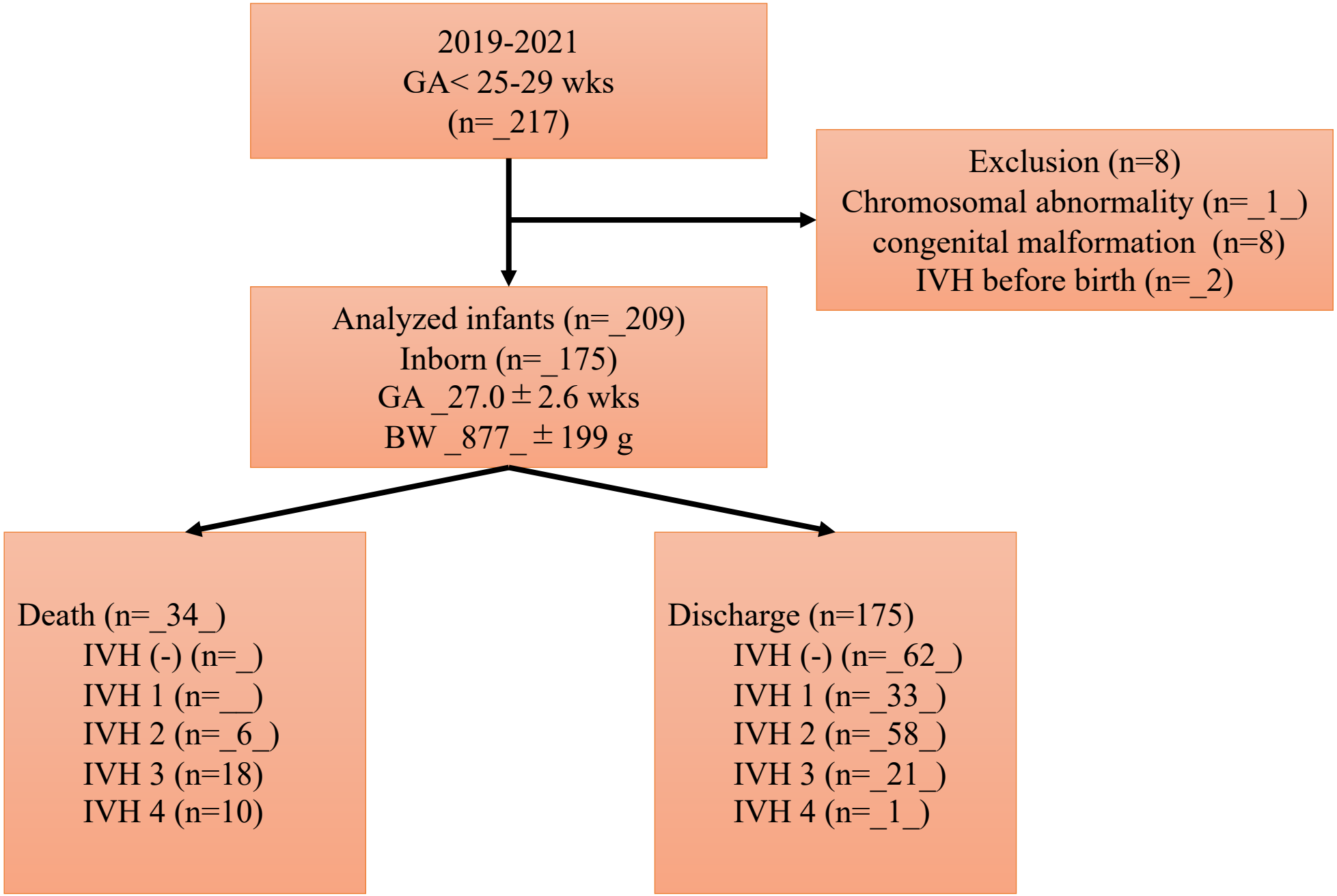
KMC: We start if baby on CPAP or HFNO

New technology

- Noninvasive and invasive ventilation mode (PC/PS ;SIMV, VG/Vt IMV, NIV HFOV, CPAP, blended oxygen therapy)
- Surfactant replacement therapy (LISA)
- HFNC-high flow nasal cannula
- HFO-Oxygen treatment
- PICC-Periperally inserted central line
- HFV-High frequency ventilation
- Nasal intubation
- Continues sedation after operation
- New Standartised Parenteral nutrition for preterm and term (Numeta G13%E, Numeta G16%E)

-To measured Intra abdominal pressure

Kapnomonitoring and Nasal intubation


2019-2021
GA< 25-29 wks
(n=_217)
Exclusion (n=8)
Chromosomal abnormality (n=_1_)
congenital malformation (n=8)
IVH before birth (n=_2)
Analyzed infants (n=_209)
Inborn (n=_175)
GA _27.0 ± 2.6 wks
BW _877_ ± 199 g
Death (n=_34_)
IVH (-) (n=_)
IVH 1 (n=__)
IVH 2 (n=_6_)
IVH 3 (n=18)
IVH 4 (n=10)
Discharge (n=175)
IVH (-) (n=_62_)
IVH 1 (n=_33_)
IVH 2 (n=_58_)
IVH 3 (n=_21_)
IVH 4 (n=_1_)


Эх хүүхдийн эрүүл мэнд-Эх орны эрхэм баялаг
Healthy mothers and children-State's greatest wealth


Thank you!

Mahidol University
Faculty of Medicine Ramathibodi Hospital

Our Treatment Strategy for ELBW in the First Few Days in Bangkok, Thailand

Buranee Swatesutipun M.D.
Division of Neonatology
Faculty of Medicine
Ramathibodi Hospital
Mahidol University
Bangkok, Thailand

NICU Introduction

Mahidol University
Faculty of Medicine Ramathibodi Hospital

- Total 15 NICU beds
- 5 NICU attending staff
- 7 Neonatology fellows (2-year training program)
- 45 Pediatric residents (3-year training program)
- Team composition / 1 rotation: 2 NICU staff, 2-4 fellows, 2-3 residents

Photo Courtesy of T. Surakupt

Management in the Delivery Room (DR)

Delivery Room (DR) & Operating room (OR)

Mahidol University
Faculty of Medicine Ramathibodi Hospital

Location

- DR are in the same area of OR
- Both are not located near NICU (different floor)
- Average transport time from DR to NICU is 5-10 min
- DR management & transport are handled by the same team using a transport incubator, t-piece resuscitator & monitors

Management

- Prenatal care: dexamethasone, $MgSO_4$, tocolytic agents
- DR temperature 23°C
- Use a radiant warmer, plastic bag/hat to control body temperature
- A warmer mattress is not available

Cord Management

- Delay clamping the cord (DCC) at least 30 sec for all preterm infants
- A baby is placed at the level of lower abdomen
- Contraindications for DCC are
  - Placental circulation not intact
  - Not vigorous after gentle stimulation or suction by OB providers
- We do not provide umbilical cord milking

Steps of Neonatal Resuscitation

- Follow the steps of the NRP algorithm (AAP) – ABCD in all cases
- Monitor temperature and oxygen saturation
- Plan to implement routine ECG monitoring in DR/OR in the near future

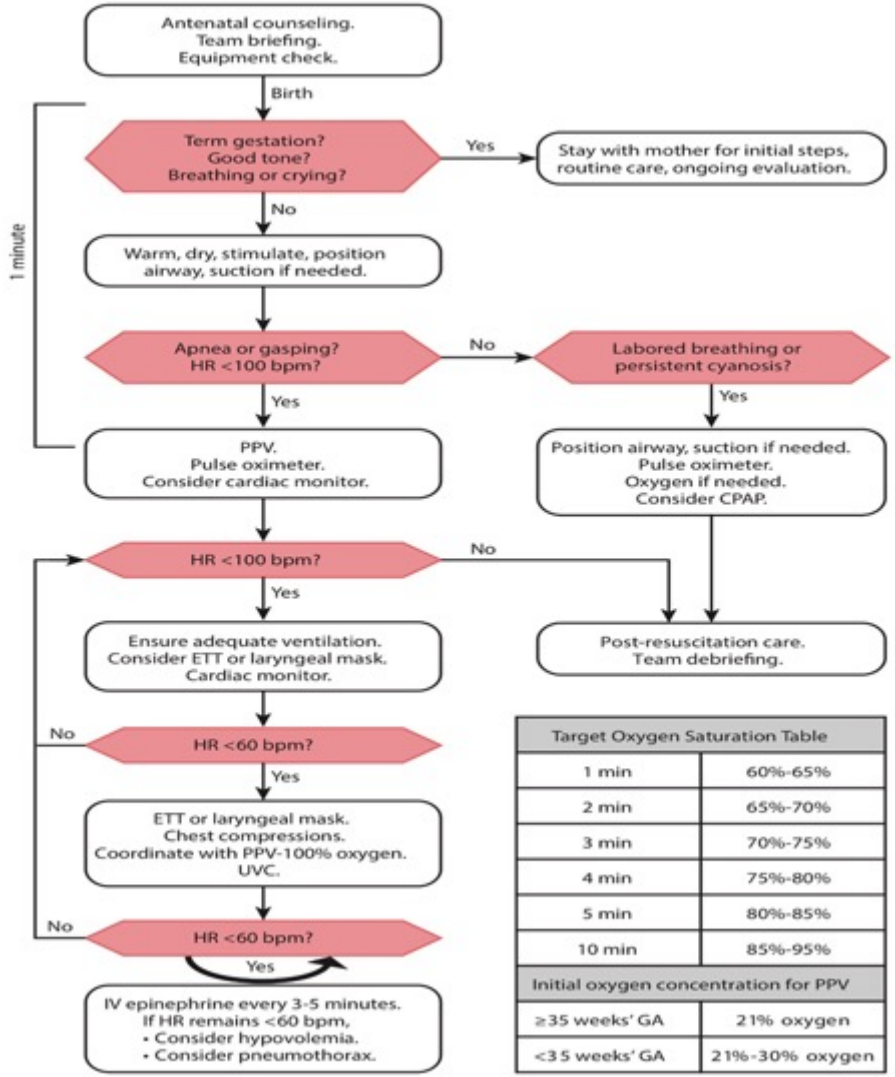


Figure of the NRP 8th Edition algorithm from AAP

Respiratory Support in DR/OR

- Routinely use a t-piece device when require CPAP or PPV
- Give CPAP 5-7 cmH_2O with FiO_2 0.3 if labored breathing (grunting or retraction) but HR >100/min
- PPV with the initial setting: PIP 20-25/PEEP 5 cmH_2O, FiO_2 0.3
- Surfactant therapy is not given in DR/OR

Respiratory Management in the First 72 Hours

Photo Courtesy of parents and N. Tongsawang

Respiratory Support in NICU

- Use CPAP as a primary mode for spontaneous breathing infants
- A flow-driver CPAP with maximum PEEP 7 cmH_2O
- Administer surfactant (Poractant alfa) with less-invasive technique (prefer LISA) if require FiO_2 >0.3 to keep SpO_2 90-95%
- Second dose of surfactant is given if require FiO_2 >0.3 - 0.4
- Intubation if
  - Require FiO_2 >0.6
  - Increased WOB
  - Frequent apnea
  - Severe respiratory acidosis
- If use MV, always start with VTV (VG) with Pmax 25, VG 5 mL/kg

Respiratory Support in NICU

- Target blood gases
  - pH 7.25-7.35, pCO_2 45-55, pO_2 50-70, BD <-10, and aim to keep lactate <2
- Target CXR
  - Inspiration: posterior rib 8-9th
  - Position of ETT: T1-T2 level (above the carina)
- Consider extubation when stable vital signs and
  - Has spontaneous breathing
  - Require MAP $\leq$8, FiO_2 $\leq$0.4, and back up RR <30/min
  - No / minimal sedative drug use
- Postnatal corticosteroids
  - Consider DART regimen when prolonged intubation >1 week
  - Consider inhaled steroids if high risk to develop BPD
- Start inhaled NO if PPHN is diagnosed and OI >15

Circulatory Management in the First 72 Hours

Circulatory Management in NICU

- Acceptable vital signs and urine volume
  - HR 100-160, RR 40-60/min
  - Mean BP ≥GA (weeks) and SBP / DBP >3rd percentile
  - Urine 1-4 mL/kg/h
- Blood tests
  - Often check blood gases / lactate
  - Use BNP only in research
- Fluid volume/day: 60 → 80 → 100 → 120 mL/kg/day, depends on clinical status
- NIRS is currently not available

How to diagnose and treat hsPDA

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Faculty of Medicine Ramathibodi Hospital

Diagnosis by using clinical status, CXR and echocardiogram

- Tachycardia, wide PP, low DBP, active precordium, respiratory acidosis, etc.
- CXR: cardiomegaly / pulmonary congestion
- Targeted echo (TnECHO) by NICU team and/or Full echo by cardiologists
  - 1 time/day
  - Usually perform at DOL 1-2
  - TnECHO: DA flow diameter, DA flow pattern, LA/Ao, EF

Treatment

- In the past
  - IV Indomethacin / oral ibuprofen
- Now
  - IV paracetamol as a first choice
- PDA ligation
  - Refractory cases
  - Has contraindications to use NSAID such as renal failure

*hsPDA, hemodynamically significant PDA

How to manage hypotension

- Depends on the cause
- Hypovolemia
  - NSS
  - Blood products
- Cardiogenic shock
  - Dobutamine / Dopamine
- Septic shock
  - NSS
  - Epinephrine / Norepinephrine / Dopamine
  - Hydrocortisone
  - Blood products

Positioning and Handling in the First 72 Hours

Photo Courtesy of parents and N. Tongsawang

Positioning

- Infant's positioning
  - 0-72 h: neutral / midline and supine
  - >72 h: side-lying is allowed
  - >7 d: prone is allowed
- Equipment used to support head and position
  - Nest, clothes, gloves
- Levelling bed
  - Head elevation 15-30°

Photo Courtesy of parents and N. Tongsawang

Handling

- Gentle, minimal handling and cluster of care
- Diaper change (no special technique)
  - Use 1-2 persons to change a diaper during the first 3 days
- Bed sheet change
  - Use 2 persons to change a sheet during the first 3-7 days
- Weigh a baby: 1-2 times / day
  - Use 2 persons to weigh a baby during the first 3-7 days
- X-ray
  - Incubators with an X-ray cassette tray port are not always available
- Kangaroo care
  - Is allowed for stable infants aged >3 days

Problems in these tiny babies

Photo Courtesy of T. Surakupt

Problems in NICU

- CPAP belly, abdominal distension
- Feeding problem / meconium obstruction
- Displacement of ETT
- Air leak (rarely pneumothorax)
- Lung Collapse / atelectasis
- Infection

NICU guidelines and protocols

- Abdominal distension / Feeding Problems / CPAP belly
  - Use donor human milk
  - Adjust feedings per feeding protocol & gastric residual volume guideline management
  - Mini-volume gavage feeding
- Meconium related ileus
  - Rectal irrigation with NSS if no passing stool >48-72 h
  - Diluted glycerin enema in some cases

Standardized feeding protocol

Enteral Feeding Data Collection for Infants < 1000 g

Date of Birth ..... Time of Birth.....

GA..... Birth Weight ..... APGAR.....

Signed for DBM ☐ yes ☐ no

Goal to begin trophic feeding before: Date ..... Time ..... (DOL 3)

Days of Enteral Feeding	Date	time	Standard volume	Goal Feeding Volume Q3Hrs.	Actual Feeding Volume Q3Hrs.	Goal Caloric density of Human Milk	Comments
Infant's first feeding was: ☐ Mom's milk ☐ Donor Milk ☐ 24 kcal preterm formula							
1			1 mLx8 feeds			20 kcal/oz	
2			1 mLx8 feeds			20 kcal/oz	
3			1 mLx8 feeds			20 kcal/oz	
Advance by 15 mL/kg every 24 hours							
4			30 mL/kg			20 kcal/oz	
5			45 mL/kg			20 kcal/oz	
6			60 mL/kg			20 kcal/oz	
7			75 mL/kg			20 kcal/oz	
8			90 mL/Kg			20 kcal/oz	
Fortified to 24 kcal/oz							
9			105 mL/kg			24 kcal/oz	
10			120 mL/kg			24 kcal/oz	
11			135 mL/kg			24 kcal/oz	
12			150 mL/kg			24 kcal/oz	
Continue to advance feedings volume ; use current weight to determine what these advancement will provide (ml/kg) and to prescribe total fluids							
13							
14							
15							

NICU guidelines and protocols

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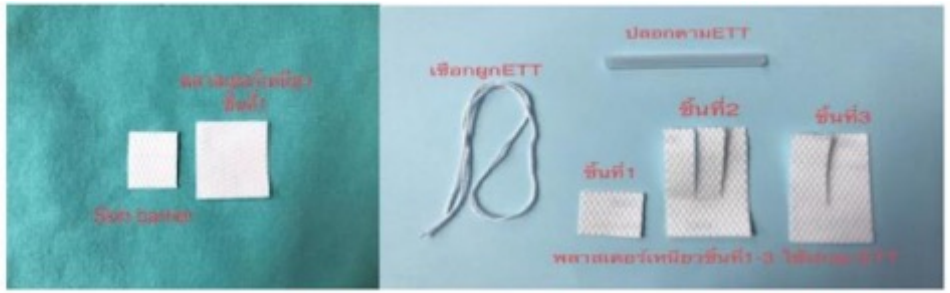

NICU guidelines and protocols

Mahidol University
Faculty of Medicine Ramathibodi Hospital

- VAP and CLABSI

IVH Result in Ramathibodi Hospital

Mahidol University
Faculty of Medicine Ramathibodi Hospital

Total cases, N = 72
No IVH, 35%
Severe IVH, 12.5%

Year 2019 – 2021
GA $24^{0/7}$ – $27^{6/7}$ wk
N = 74

Exclusion, N = 2
Chromosome defect, N = 0
Critical anomalies, N = 2
IVH before birth, N = 0

Analyzed infants, N = 72
[Inborn, N = 66 (91.6%)]
GA 26.3 ± 1.1 wk
BW 823.9 ± 161.7 g

Death, N = 10 (12.3%)
No IVH, N = 0
IVH gr I, N = 3
IVH gr II, N = 2
IVH gr III, N = 2
IVH gr IV, N = 3

Discharge, N = 62
No IVH, N = 25
IVH gr I, N = 28
IVH gr II, N = 5
IVH gr III, N = 3
IVH gr IV, N = 1

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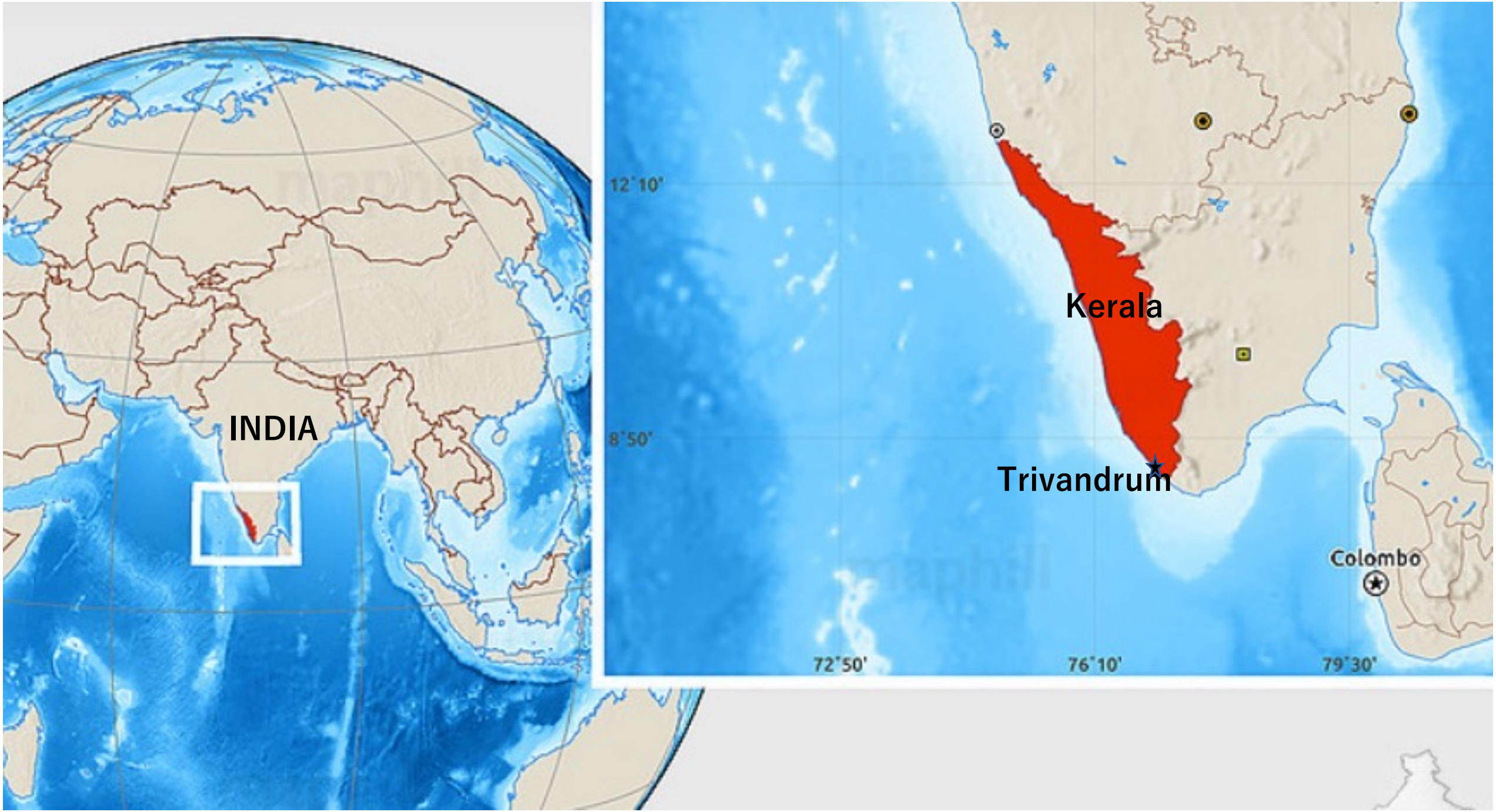
Thank you


INDIA
Kerala
Trivandrum
Colombo
12°10'
8°50'
72°50'
76°10'
79°30'

Differences and Diversity!

Management of Extreme preterm neonates- Our policies and practices

Dr Femitha Pournami
MBBS, MD Pediatrics, DM Neonatology
Senior Consultant and Academic Coordinator, Neonatology
KIMS Health, Trivandrum
India

Our NICU:

Level IIIB (accredited by National Neonatology Forum, India)

Parameter	Number
Beds	**33**
Consultants	6
Senior residents	10
Nurse manager	3
Staff nurses	33
Patient care assistants	5
Housekeeping	4
High risk follow up – development team	2

Management in the delivery room (DR)

Delivery room and transport to NICU

Parameter	Specifications
Temperature control in DR	Radiant warmer (Open care) Plastic wrap Isothermal mattress
Distance of DR from NICU	
Time taken for transport	2-3 minutes
Mode of temperature support	Isothermal mattress Plastic wrap

Cord management

- Delayed cord clamping is attempted
- Not done if non vigorous at birth
- Compliance is 9% for extreme preterm
- No cord milking
- No skin to skin immediately after birth

Initial steps and monitoring

- Policy revised in 2023
- Active management of 22-23 weeks initiated
- Skip initial steps for <=24 weeks (intubation)

Respiratory support at delivery room

- T-piece resuscitator (in the DR and during transport)

- CPAP prophylactic for <=28 weeks

- Early rescue surfactant (<2 hours of life)
- CPAP trial (30% O2, 6 cm H2O CPAP)
- NIMV trial (usually for larger babies)
- ET surfactant (beractant/ Bovine Lung lavage)

Respiratory management in the first 72 hours.

What is common practice for respiratory supports in NICU?

Item	Comment
Primary mode if spontaneous respiratory efforts are good	CPAP Synchronization in non-invasive modes (NIMV) not available
Thresholds for intubation and early rescue surfactant	Need of FiO2 >30-40%
Methods of surfactant administration	We try INSURE for >25 weeks when respiratory efforts are good
Mode of ventilation on first 0-3 days	SIPPV or SIMV VG, HFO as rescue mode
Second dose surfactant	>30-40% O2 need 4-6 hours after first dose surfactant

The first 72 hours…

Targets in Blood gases (day 0-3)	pH >7.2 Lactate <4 mmol/L pCO2 up to 50 mm Hg
Target X ray findings	Posterior rib spaces 7 to 8 No collapse lung regions ETT position T1-T2 vertebra
When is extubation first considered?	<=25 weeks: Up to 5-7 days electively 26 weeks onwards: if comfortable; as early as possible
When is postnatal steroid considered?	Only after 14 days of life DART regimen if ventilator dependent No active signs of infection
Inhaled nitric oxide in preterm infants	Not routinely used Sildenafil if refractory hypoxia in <26 weeks

Often encountered complications/ adverse events ?

Item	Comment
ET tube position changes	Hydrocolloid base adhesive, Elastic plaster above that
Pneumothorax	8 Fr trocar ICD, fixation with Hydrocolloid base dressing
CPAP “Belly”	Standard feed regimen Rectal saline wash outs if feed intolerance and not passed stools
Spontaneous intestinal perforation	Suspected if acute abdominal distension X ray: free intraperitoneal air
VAP	Care bundles Nurse: patient ratios = we try 1:1 for 22-23 weeks Minimum experience of nurse allocated to ELBW: 6 months in NICU

Circulatory management in the first 72 hours.

What is your routine for circulatory management ?

Item	Comment
Heart rate	Acceptable range 100 - 160
SpO2	Acceptable range 85-95. We do not aim at SpO2 >95 with oxygen.
Blood pressure	We try to get umbilical arterial line <=25 weeks Target mean BP will be over the number of gestational week.
Urination	>1 ml/kg/hour
Blood test	Lactate BNP: we rarely use for ELBW
Input volume	Day 0: in incubator 50-60 ml/kg/day Increase based on Serum Sodium, Circulatory status
NIRS	Not available

How to diagnose “symptomatic PDA”?

Item	Comment
Echocardiography	If symptomatic For 22-24 weeks, we try to do daily LVDD, EF, LA/Ao, Lt PA diastolic flow, DA diameter, DA flow velocity, DA flow pattern,
Ultrasound	Not routinely done for PDA related changes in systemic circulation

How to treat “symptomatic PDA”?

Item	Comment
Medication	IV Indomethacin and IV Ibuprofen are not available in India IV Paracetomol is available
	Ibuprofen enteral diluted: if on at least >20 -30 ml/kg/day feed (more than minimal enteral nutrition)
Surgery	Done only for chronic / persistent PDA with failure Not done in first few weeks of life

How to manage “hypotension”?

Cause	Comment
Hypokinesis	Inotropes: Dobutamine, Adrenaline
Hypotension No hypokinesis	Vasoconstrictors - Dopamine - Adrenaline
Hypovolemia	Volume expander: cautious use -Saline -RBC

Positioning and Handling in the first 72 hours.

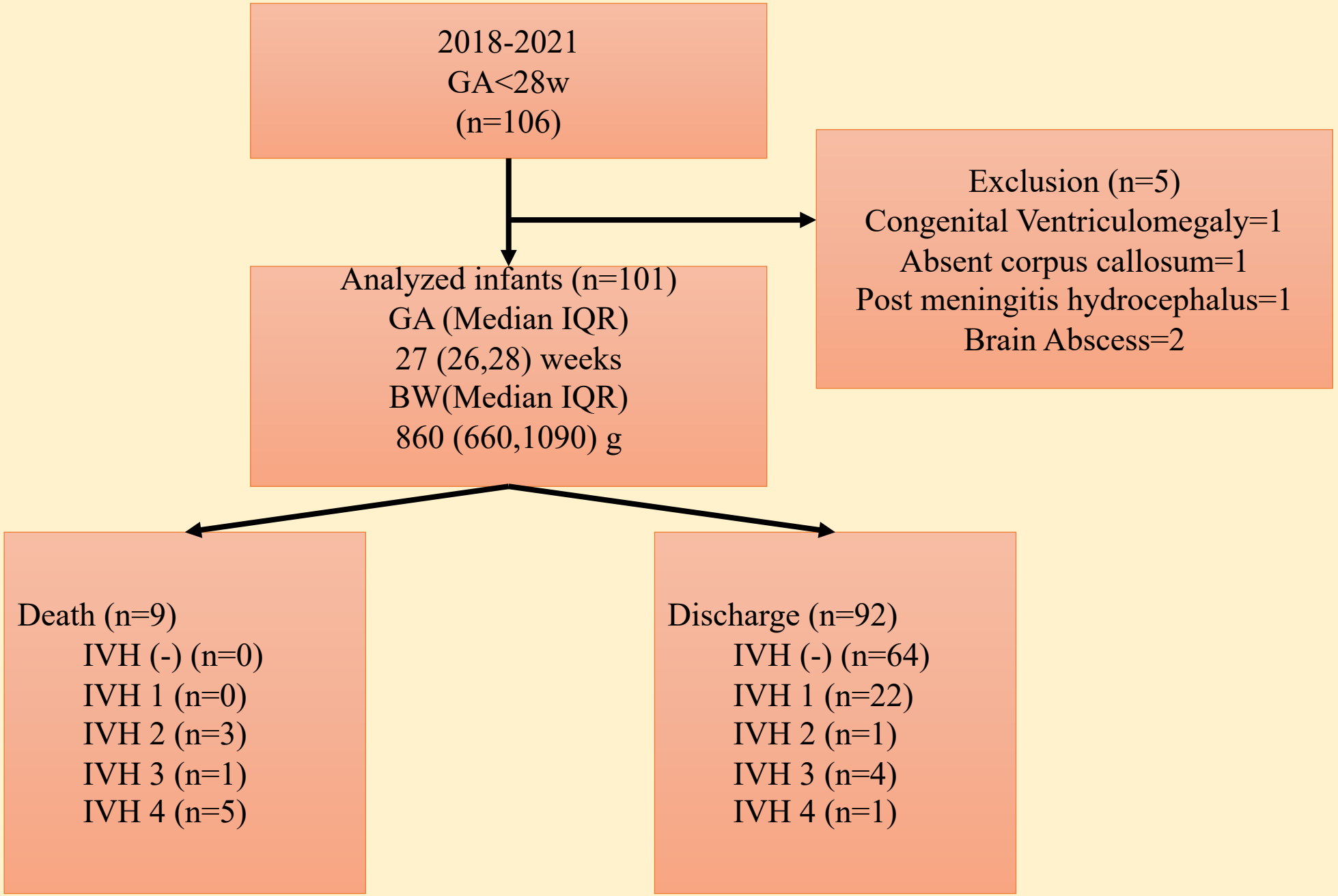
Positioning

Topics	Details/Comments
• **Infant's positioning**	• Head in midline • Supine, left-up and right-up positions • *Prone after extubation* • *Equipment* used to support head/ positioning: nest: cloth roll
• **Leveling bed**	• *Degree* of head elevation: 30 degree

Handling

Topics	Details/Comment
• **Gentle Handling**	• Routinely use *minimal and gentle handling rules*
• **Diaper change**	• Nurse-patient ratios 1:1 when possible. 1 nurse usually
• **Changing bed sheet**	• 2 people when intubated/ CPAP
• **Weigh a baby**	• After 72 hours only usually • 1-2 people
• **X-ray**	• Incubators with an X-ray cassette tray port : Yes
• **Parent participation**	• Early, as soon as possible • KMC started: when on HFNC

IVH result


2018-2021
GA<28w
(n=106)
Exclusion (n=5)
Congenital Ventriculomegaly=1
Absent corpus callosum=1
Post meningitis hydrocephalus=1
Brain Abscess=2
Analyzed infants (n=101)
GA (Median IQR)
27 (26,28) weeks
BW(Median IQR)
860 (660,1090) g
Death (n=9)
IVH (-) (n=0)
IVH 1 (n=0)
IVH 2 (n=3)
IVH 3 (n=1)
IVH 4 (n=5)
Discharge (n=92)
IVH (-) (n=64)
IVH 1 (n=22)
IVH 2 (n=1)
IVH 3 (n=4)
IVH 4 (n=1)