

REDUCING ADMISSION HYPOTHERMIA IN
THE NEONATAL ICU AND SPECIAL CARE
NURSERY FOR VERY LOW BIRTH
WEIGHT (VLBW) AND EXTREMELY LOW
BIRTH WEIGHT (ELBW) BABIES

Hospital Miri Quality Improvement Project
Result from the first PDSA cycle
October 2011

INTRODUCTION

Hypothermia is a major problem for babies with birth weights less than 1.5kg.

WHO defines hypothermia as a skin temperature of less than 36°C.

Based on 2009 Malaysian Neonatal Registry data, 52 of 60 babies had hypothermia on admission.

TEAM MEMBERS

- ◉ Team leader: Dr Teh Siao Hean
- ◉ Systems leaders: Sister Rosalind Deng
- ◉ Technical Experts
 - Dr Teh Siao Hean
 - SN Monica Gupi
- ◉ Day-to-day Leaders
 - NICU nursing staff

PICO

- **Patient population:** babies $\leq 1500\text{gm}$ or ≤ 32 weeks' gestation at birth
- **Intervention:** Implementing a new 'Intervention bundle' protocol for maintaining temperature from birth till admission to the NICU/SCN
- **Comparator:** Earlier practice of routine thermal care
- **Outcome:** Incidence of Hypothermia in VLBW/ELBW

HYPOTHESIS

- Implementation of a protocol comprising additional measures to reduce heat loss will decrease the incidence of hypothermia in very low and extremely low birth weight infants in the Newborn Special Care Unit.

LITERATURE REVIEW

Sources:

- The Cochrane library 2010, issue 3
 - Interventions to prevent hypothermia at birth in preterm and/or low birthweight infants (review)
- Malaysian Perinatal Care Manual
 - Neonatal Care (Section 5) was referred to

LITERATURE REVIEW

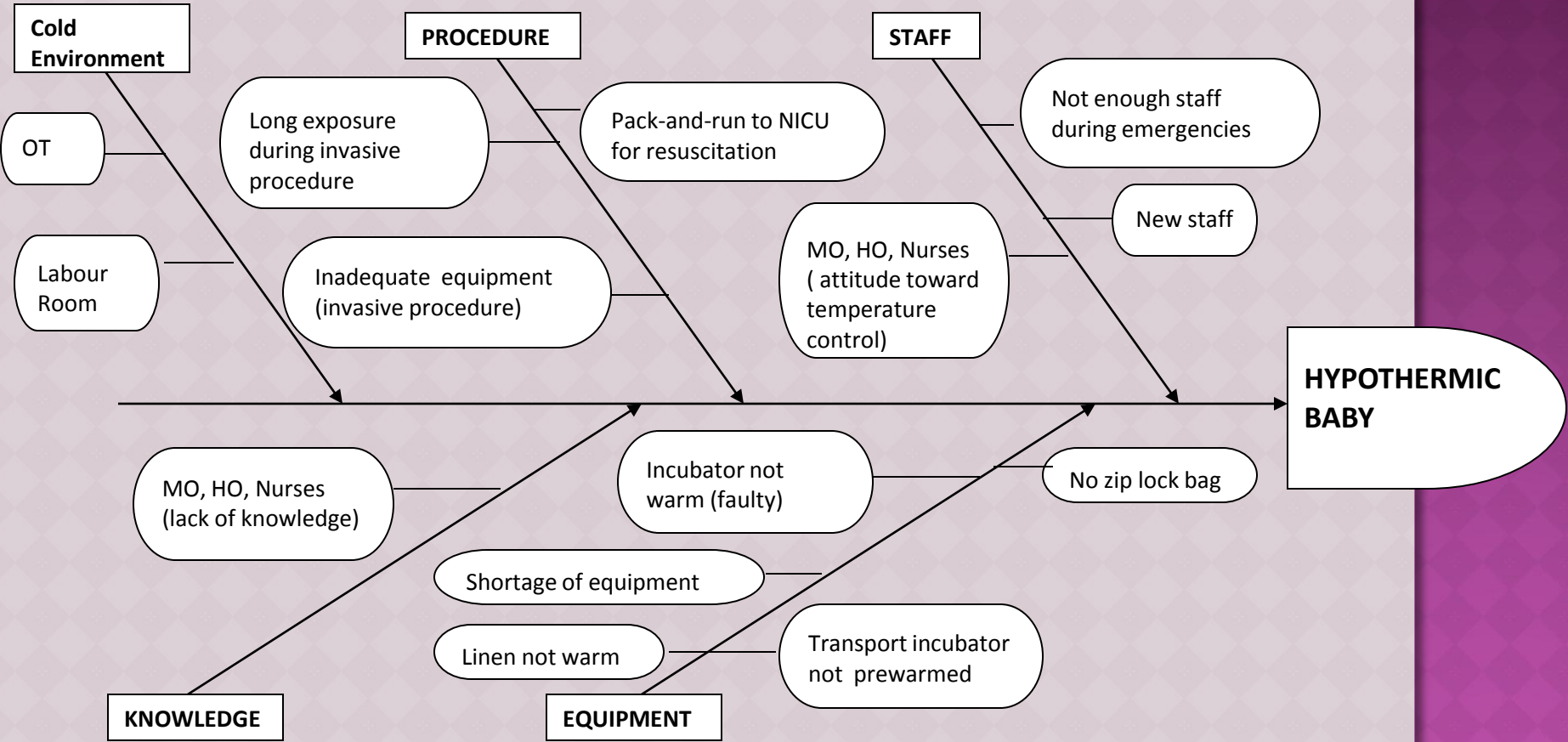
Interventions considered:

1. Plastic wrap/Ziploc bag
2. Head cover
3. Hoods/Heat shields
4. Transfer in a warmed transport incubator

Interventions selected:

- Ziplock (plastic) bag
- Consistent/mandatory use of transport incubators for transfers

Factors Contributing to Hypothermia



⦿ Proposed Protocol/Checklist

MIRI HOSPITAL
NEONATAL ICU/SPECIAL CARE NURSERY

CHECKLIST FOR RECEIVING PREMATURE BABIES (ELBW/VLBW); POG \leq 32 weeks
(Keep in Patient's Case Notes- To be verified by EPIQ QI team Member within 24 hours)

Patient QI Number: _____

ADMIT FROM WARD: LABOUR ROOM / OT / A&E

PATIENT'S NAME: _____

RN: _____

DATE OF BIRTH: _____

BIRTH WEIGHT: _____

DATE, TIME OF ARRIVAL to NICU/SCN _____

GESTATION: _____

MODE OF DELIVERY: SVD / EMLSCS / ELLSCS / INSTRUMENTAL

Admission staff, to *please tick accordingly

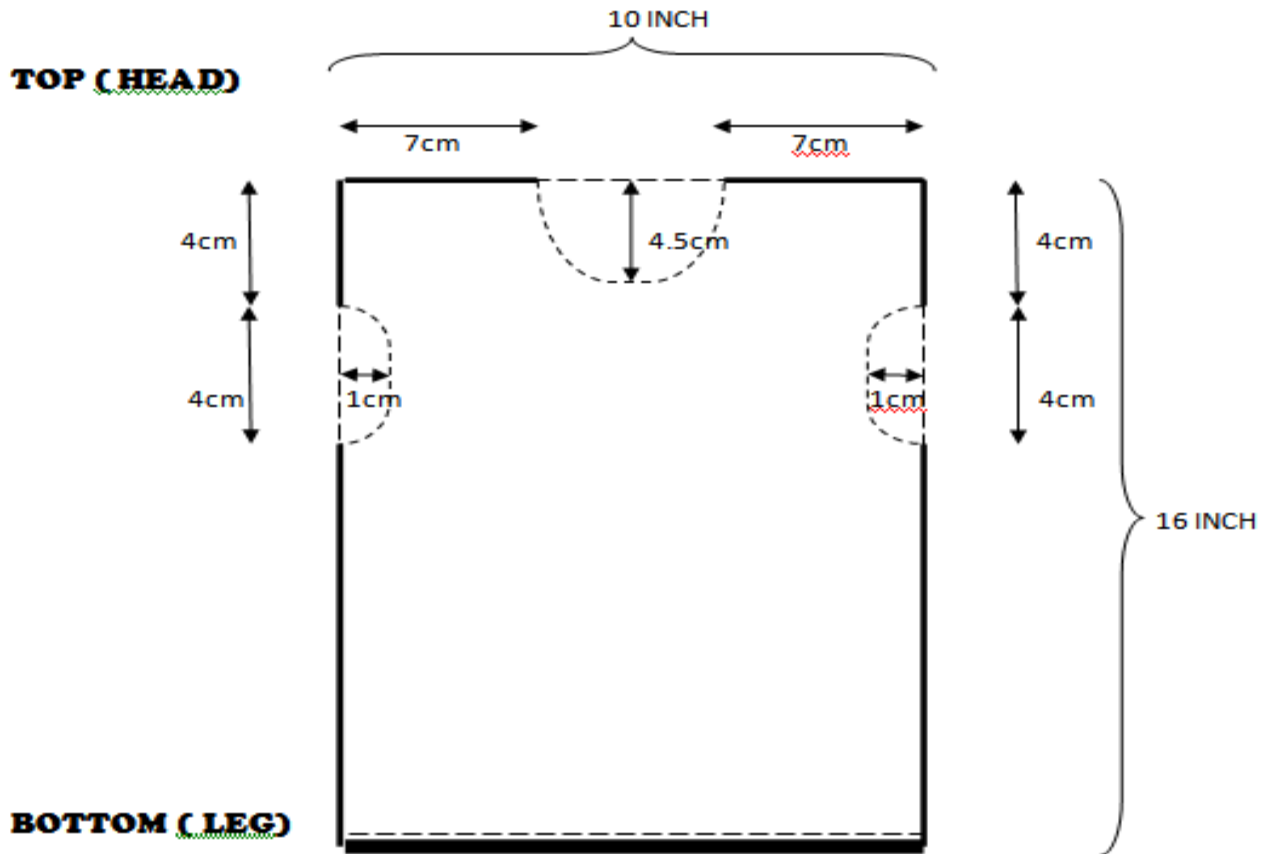
No	INTERVENTION	YES	NO
1	Call received >30min re impending delivery of premature baby. Time of call: _____		
2	<u>Incubator preparation in NICU/SCN</u> Warm transport incubator to 36°C Warm intensive care incubator to 36°C Incubator humidity >60% (state N/A if not available on older incubator) <u>Equipment preparation in NICU/SCN</u> ventilator, oxygen and suction apparatus weighting scale, drip and SpO2 monitoring immersion trolley (KIV immersion)		
3	<u>Open warmer preparation in Labour Room/OT</u> Pre-warm open warmer at 100% for \geq 10 min before arrival		
4	Warm 2 sets of linen under warmer for \geq 10 mins		
5	<u>Resuscitation of baby as per NRP</u> -Place baby in Ziplock bag following 1 st assessment HR, breathing, colour OR when stable -Able to place baby in Ziplock within 10 minutes		
6	Transfer baby to pre-warmed (36°C) transport incubator post resuscitation		
7	Receive baby in NICU/SCN: (Time of receiving= _____) -Baby inside transport incubator -Baby in Ziplock bag		
8	Weigh baby when transferring from transport incubator to pre-warmed intensive care incubator, still in ziplock bag.		
9	Take the temperature on admission within 10 min : (Time of Temp = _____) • with digital thermometer via armpit _____ °C OR • put skin probe temperature _____ °C		
10	Recheck temperature 1 hour later: pre-warmed °C . locality temp = _____ °C (Time = _____) Recheck temperature 2 hours later: _____ °C locality temp = _____ °C (Time = _____) If still hypothermic <36°C to inform MO. Not to remove zip lock bag till further order from MO. Recheck temperature 6 hours later: _____ °C locality temp = _____ °C Remove zip lock bag if body temperature within normal range.		
11	Invasive Procedures done in intensive incubator Y/N Surfactant, Time Given UAC/UVC; Time done: _____ Others (Describe: _____) Time done: _____		

Verified by Team Member: (Name, signature)

Date/Time:

THE SIZE OF ZIP LOCK BAG : 10 INCH × 16 INCH.

HOW TO CUT A ZIP LOCK BAG :





OUTCOME MEASURES

- Skin/Axillary temperature on admission to NICU/SCN
- Skin/Axillary temperature 1 hour post-admission to NICU/SCN
- Skin/Axillary temperature 2 hours post-admission to NICU/SCN

SECONDARY OUTCOME MEASURES

- Incidence of Hypothermia in the 6 hours of life
- Incidence of Hyperthermia

MAGNITUDE OF THE PROBLEM

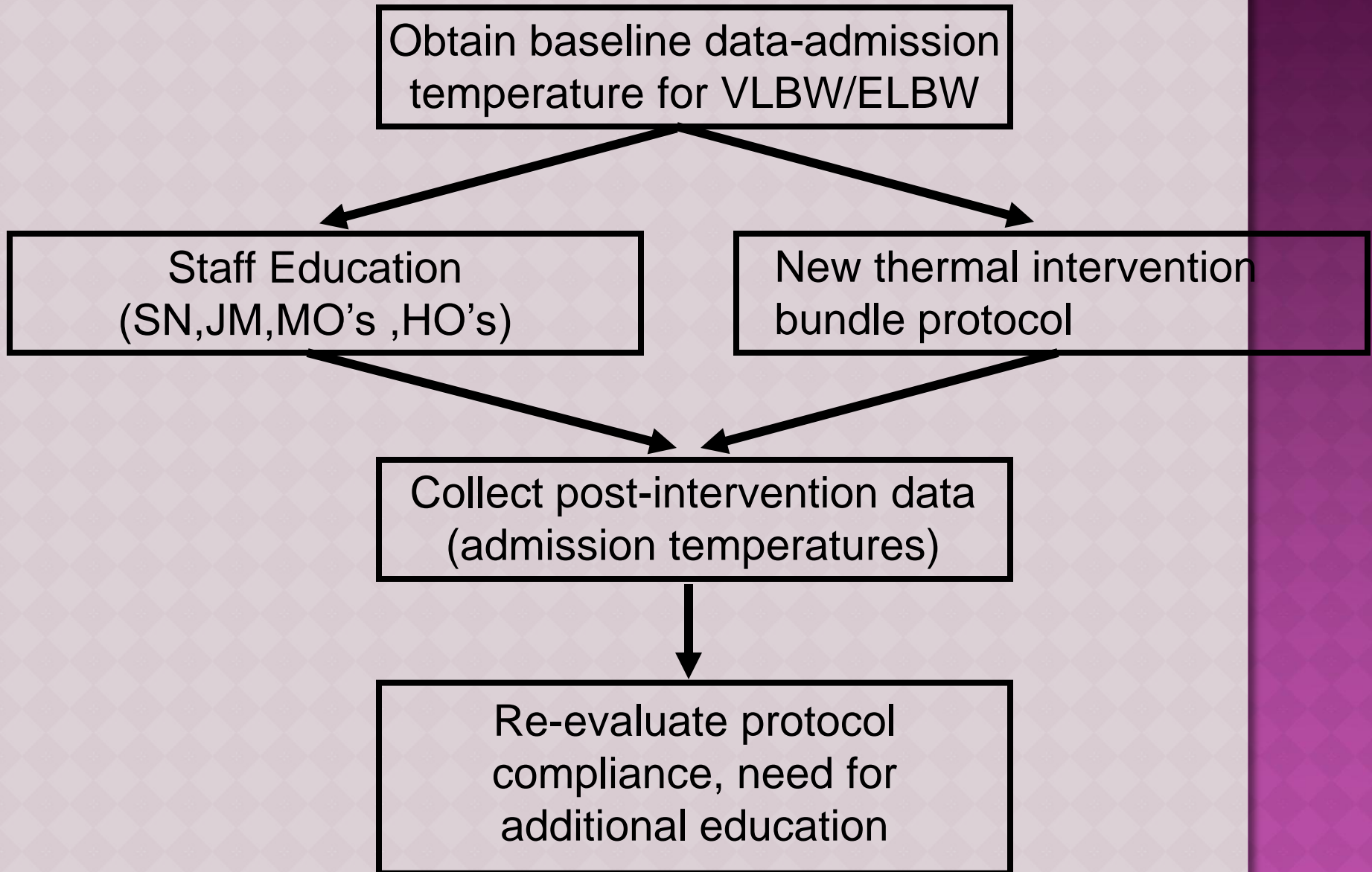
WHO Definition of Hypothermia

- Skin temperature $<36^{\circ}\text{C}$
- Core/rectal temperature $<36.5^{\circ}\text{C}$

Data from MNNR 2009

- ⦿ No. babies admitted $<1500\text{g} = 60$
- ⦿ No. babies hypothermic (skin $< 36^{\circ}\text{C}$) on admission = **52 (87.5%)**

CONCEPTUAL MODEL



PDSA CYCLE

May-November 2011

- P Establish baseline (prevalence of hypothermia from MNNR data)
- D Develop intervention bundle and checklist, staff education
- S Admission temperatures, staff compliance
- A Problems at multiple levels -adherence to protocol

RESULTS

- Total patients recruited (N)= 18
- Range of gestation: 28 to 35 weeks (mean =30.4 weeks)
- Birth Weight range: 840g to 1.5kg (mean= 1.22kg)
- Time from delivery to arrival in NICU ranged from 5 to 28 minutes (mean 17.4 minutes)

RESULTS

- Mode of delivery

SVD = 3/18 (16.7%)

Em LSCS = 12/18 (66.7%)

EI LSCS = 3/18 (16.7%)

WORK PROCESS RESULT

- Call received= 15/18 (83.3%)
- Transport incubator pre-warmed
36 °C= 18/18 (100%)
- Intensive care incubator pre-warmed
36 °C= 17/18 (94.4%)

WORK PROCESS

- Labour room/OT warmer pre-warmed at least 10 minutes = 16/18 (88.9%)
- 2 sets of linen pre-warmed = 16/18 (88.9%)
- Baby in Ziploc after Airway/Dry = 17/18 (94.4%)
- Baby in Ziploc within 10 min = 17/18 (94.4%)
- Baby in transport incubator = 18/18 (100%)
- Received baby in NICU in transport incubator = 18/18 (100%)

RESULTS: TEMPERATURE

- Temp measured within 15 min= 18/18 (100%)

Temp	Admission	1 hr	2 Hr	6 Hr
$\geq 37.5^{\circ}\text{C}$	0	0	1	1
36.5- 37.4°C	0	3	11	15
36- 36.4°C	0	6	6	2
35-35.9°C	2	4	0	0
34-34.9°C	10	1	0	0
33- 33.9°C	5	3	0	0
$< 33^{\circ}\text{C}$	1	1	0	0
Total	18	18	18	18

RESULTS

- Mean temperatures:
 - Admission - 34.2°C
 - 1 Hour - 35.6°C
 - 2 Hours - 36.6°C
 - 6Hours - 36.8°C

One baby had temp 31.2°C on admission, remained < 33°C at 1 hr.

One baby had temp 37.5°C at 2 and 6 hours

RESULTS: PROCEDURES

- Number of babies with procedures done = 16/18 (88.9%)
- In 1ST hour = 15/18 (83.3%)
- In 2nd hour = 3/18 (16.7%)

TYPES OF PROCEDURES

- Surfactant = 8/18 (44%)
In first hour = 7
In 2nd hour = 2 (included 2nd dose)
- IV lines = 10/18 (55.6%)
In first hour = 9,
In second hour = 1
- UAC/UVC = 2/18 (11.1%)
In 1½ hours = 1
In 4 hours = 1

CONCLUSIONS

- Good adherence to protocol- incubators, warmers all well prepared in advance.
- Communication better later on, cases informed > 30 min before arrival
- Ziploc bag can be applied soon after airway/drying ; and within 10 min (94.4%)

Cont...Conclusions

- Temperature on admission remained low, none above 36°C
- 50% of babies achieved temp of 36°C and above by 1 hour
- 100% babies achieved skin temp of 36°C and above by 2 hours , and maintained at 6 hours.
- Performing procedures with prolonged opening of the incubators may have affected the temperatures in the first hour.

Changes in practice after 1st cycle

- All procedures are to be done through the ports of the incubator (without opening up the entire side of the incubator.)
- Include setting of the IV lines, peripheral arterial lines, instillation of surfactant and suctioning of the baby.
- The exception is the insertion of UVC/UAC, in which strict aseptic technique is paramount.
- The initial IV line is to be set within 30 minutes. If a peripheral line is not obtained in this time, a UVC is to be inserted.

Cont...Changes in practice

- IV lines for babies below 1.5kg are to be set only by NICU staff or MOs/Specialists during the first week of life. House Officers are not allowed to set IV lines for this group of patients.
- Following IV access, the **heat shield** is to be placed over the torso and limbs of the baby for babies **< 1 kg birth weight**
- Non-urgent UAC and UVC insertion is to be delayed after 2 hours of life.

FUTURE CYCLES

- To improve admission temperatures
- To gather data on survival rates vs temperature



THANK YOU

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