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INDISA - NEORED
Un Nuevo Concepto en Medicina Perinatal



Tracheostomy in Very Low Birth Weight Infants: A Prospective Multicenter Study

- Evaluar incidencia, outcomes y factores asociados a TQT en prematuros.
- Revisión prospectiva 2006-16, VLBW (401-1500 g o 22-29s), 796 centros VON USA (85%).
- **Mortalidad**, tiempo hospitalización, Cx asociadas, comorbilidades.
- 458.624 VLBW en 11 años, 3.442 (0.75%) requirieron traqueostomía durante hospitalización inicial.

TABLE 1 Demographic and Obstetric Characteristics of Infants of VLBW With and Without Tracheostomy Placement in the 796 Participating US Centers Between 2006 and 2016

	Tracheostomy, <i>n</i> = 3442	No Tracheostomy, <i>n</i> = 455 182
Male sex, %	57.8	50.5
Birth wt, g, median (IQR)	740 (605–960)	1100 (830–1330)
401–500, %	6.6	1.8
501–750, %	44.4	16.1
751–1000, %	25.8	22.4
1001–1250, %	12.0	25.6
1251–1500, %	8.8	31.6
Small for gestational age, %	20.9	21.2
Maternal race, %		
White	44.9	45.9
African American	36.2	29.0
Hispanic	14.1	18.1
Other	4.9	6.9
Apgar score, min, median (IQR)		
1	4 (2–6)	6 (4–8)
5	7 (5–8)	8 (7–9)
Mode of delivery, %		
Vaginal	26.3	27.1
Cesarean	73.7	72.9
Outborn, %	25.8	15.4

TABLE 2 Associated Congenital Anomalies and Hospital Course for Infants of VLBW With and Without Tracheostomy

	Tracheostomy, <i>n</i> = 3442	No Tracheostomy, <i>n</i> = 455 182
	%	%
Congenital malformations (any of below)	15.8	3.2
Neurologic	1.9	0.5
Cardiac	4.9	1.0
Gastrointestinal	7.1	1.2
Chromosomal	5.3	0.9
CDH, CCAM, or other pulmonary abnormalities	2.1	0.1
Hospital course		
CLD	92.2	26.7
PDA	71.2	34.1
Intraventricular hemorrhage	37.9	25.1
Necrotizing enterocolitis	11.5	6.2
Late sepsis	44.3	13.9
Retinopathy of prematurity	73.5	34.9

TABLE 3 Outcomes Comparing Infants With and Without Tracheostomy

	Tracheostomy, <i>n</i> = 3442	No Tracheostomy, <i>n</i> = 455 182
Total LOS, d, median (IQR)	226 (168–304)	58 (39–86)
Oxygen at discharge from the hospital, %	82.2	14.6
Monitor at discharge from the hospital, %	87.5	25.2
Final disposition, %		
Home	66.6	91.6
Still hospitalized as of 1 y of age	14.6	0.2
Died	18.8	8.3

Mortalidad con y sin TQT según peso de nacimiento

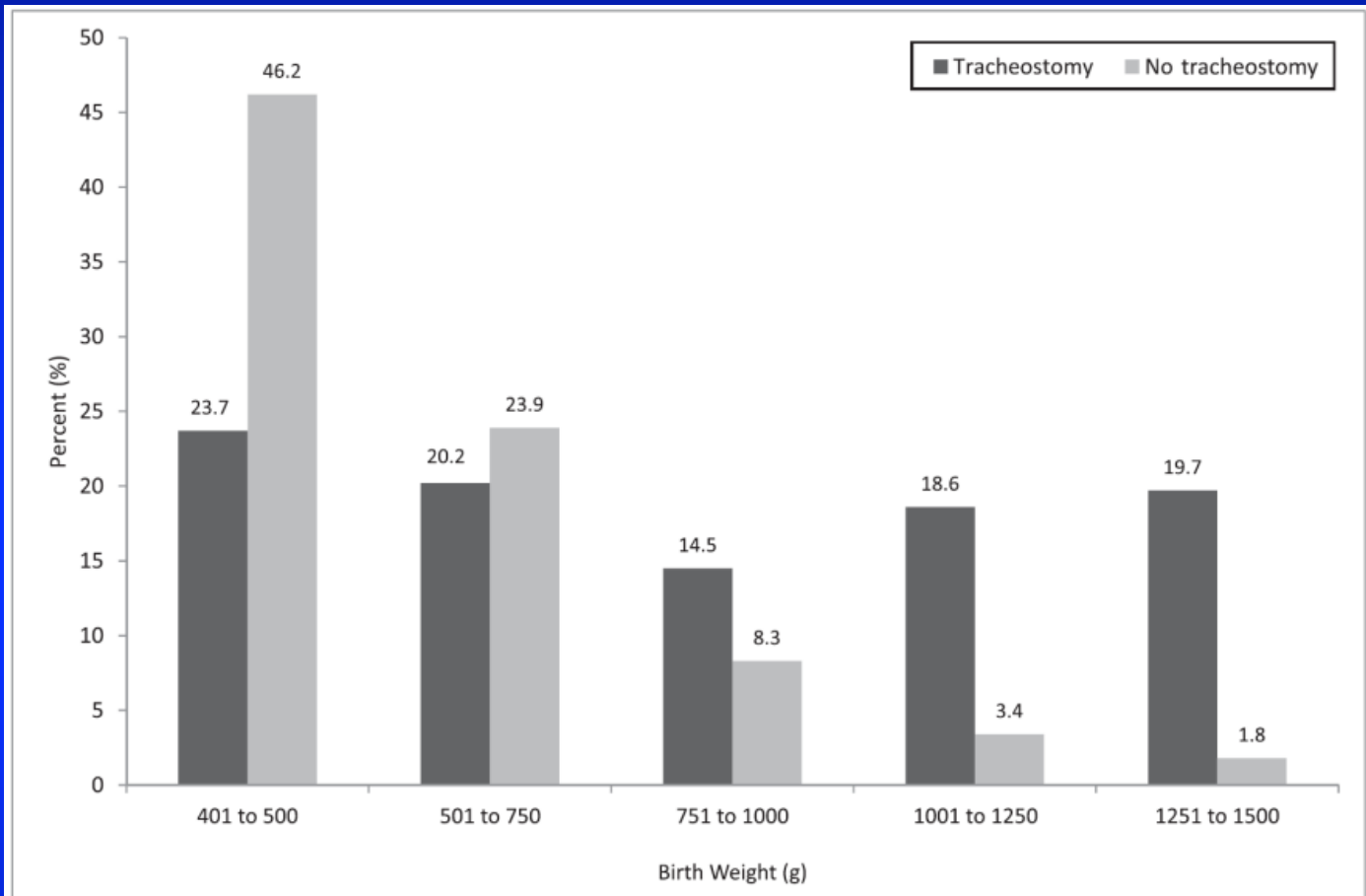


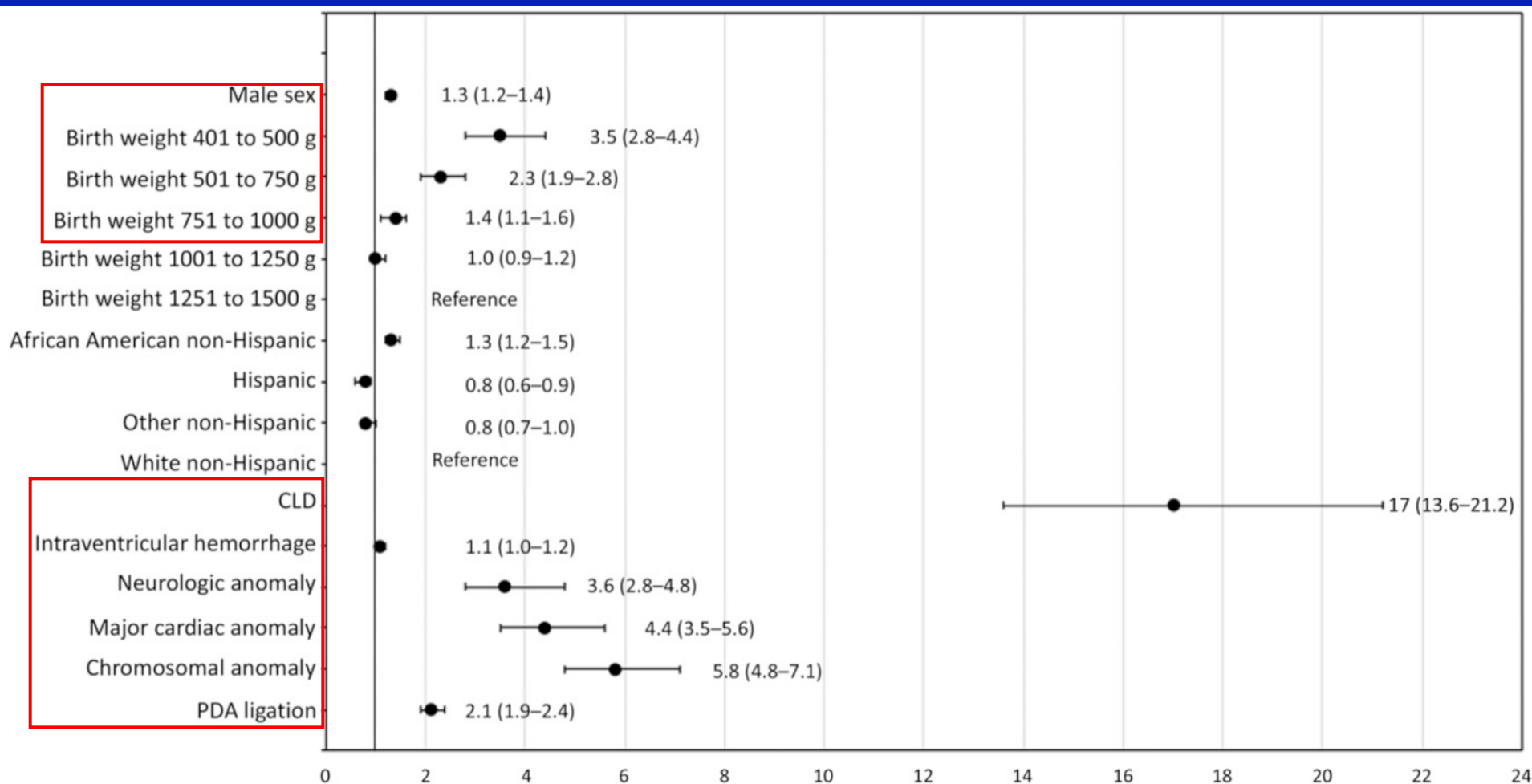
FIGURE 2

Mortality percentage of infants of VLBW with and without tracheostomy placement by birth weight categories.

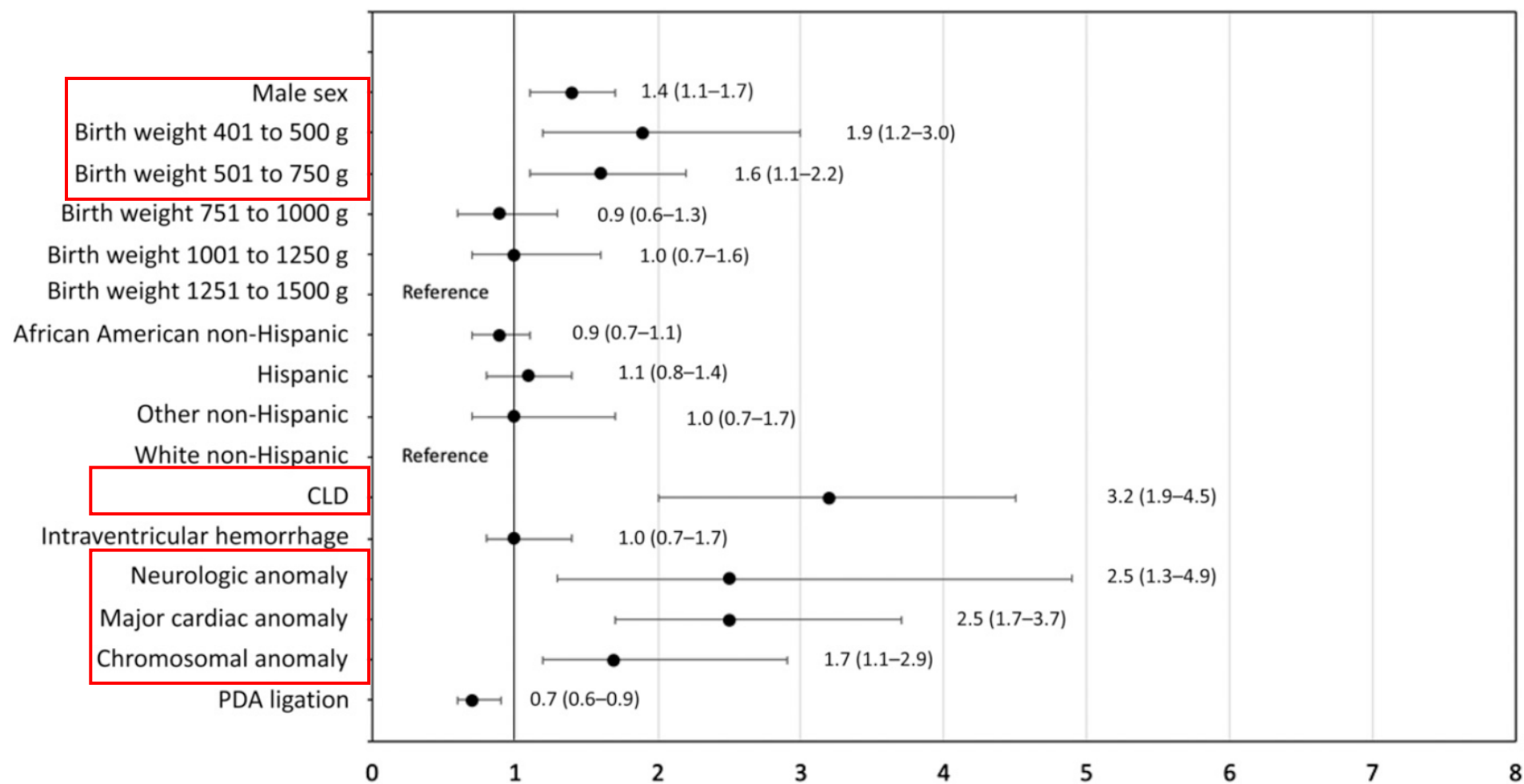
TABLE 4 Percentage of Infants of VLBW With and Without Tracheostomy at Their Initial Hospitalization Who Require Other Surgical Procedures

	Tracheostomy, <i>n</i> = 3442		No Tracheostomy, <i>n</i> = 455 182	
	Cases	%	Cases	%
Gastrostomy or jejunostomy tube placement	2355	68.4	9967	2.2
PDA ligation	1206	35.0	32 525	7.1
Fundoplication	815	23.7	3289	0.7
Other abdominal surgery	544	15.8	18 914	4.2
VP shunt placement	147	4.3	4699	1.0
Other open heart surgery	105	3.1	1309	0.3

Análisis multivariado aORs asociado con necesidad de TQT en VLBW



Análisis multivariado aORs mortalidad a 1 año en VLBW que recibieron TQT



Conclusiones

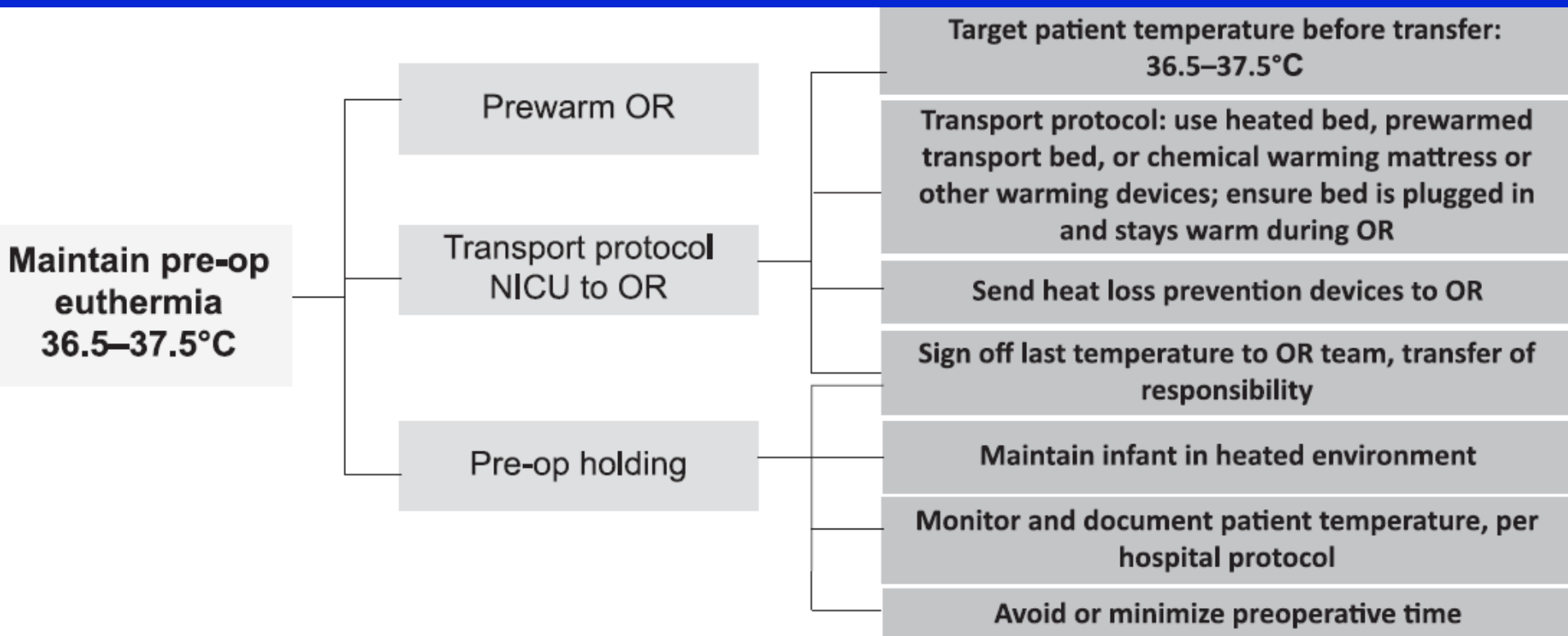
- 0.75% de los < 1500 g se realizó TQT.
- 77% de los que recibieron TQT son <1001 g.
- Tiempo de hospitalización mediana 226 d (IQR 168 – 304).
- Gastrostomía en 68.4% de los que recibieron TQT.

Conclusiones

- Mortalidad 18.8% con TQT vs 8.3% sin TQT.
- Peso al nacer, DBP, anomalías congénitas son predictores de mortalidad post TQT.
- TQT en < 1500 g durante hospitalización inicial se asocia a gran morbimortalidad.
- No hay datos del timing de la TQT ni outcomes neurológicos a largo plazo.

STEPP IN: Working Together to Keep Infants Warm in the Perioperative Period

- QI para reducir hipotermia postoperatoria ($\leq 36^{\circ}\text{C}$ los primeros 30') 50% durante período de 12 meses en NICUs.
- Revisión sistemática de literatura, opinión de expertos y benchmarking.
- 19 NICUs Children's Hospital Neonatal Consortium, Nivel 4, 27 cirugías/mes.



Maintain intraoperative euthermia

Adjust ambient OR temperature

Monitor and document patient temperature at least every 15 min or per hospital protocol

Heat loss prevention

Hat and reflective blanket, as appropriate

Active warming during case

Prewarmed prep solutions

OR fluids

Bair Hugger, warming lights, circulating water garment, or chemical warming mattress

Avoid use of cold operative IV and/or irrigation fluids

Maintain post-op euthermia

Maintain temperature during recovery in NICU

Heat loss prevention and active warming, as needed

Monitor and document patient temperature, per hospital protocol

Avoid or minimize time in PACU

Sign off last temperature to PACU or NICU team, transfer of responsibility

Maintain temperature during transfer from OR to NICU

Heat loss prevention and active warming, as needed

Transport protocol: use heated bed, prewarmed transport bed, or chemical warming mattress; ensure bed is plugged in and stays warm during OR

TABLE 1 Guideline to Develop Local Site Process to Maintain Euthermia During Transport to and From the OR

Determine plan to prewarm patient to specific set temperature before leaving NICU

- If yes, what is the desired temperature?

Determine standard transport device

- Prewarmed transport isolette or warmer
- Battery-operated heated bed

Determine need for specific equipment

- Warm hat and/or warm blanket
- Chemical heating mattress
- Thermal blanket
- Plastic wrap

Determine plan to monitor patient temperature during transport

- If yes, define method for temperature measurement

TABLE 2 Guideline to Develop Local Site Process to Maintain Euthermia During Surgery

Determine plan to prewarm the OR

- If yes, what is the desired OR set temperature?

Determine routine strategies to maintain temperature in the OR

- Forced air device
- Warming lights
- Warmed intravenous fluids
- Warmed irrigation fluids

TABLE 3 Process Measures

Compliance with local center practice to prevent heat loss on transport to and from the OR

Compliance with local center practice for active intraoperative warming

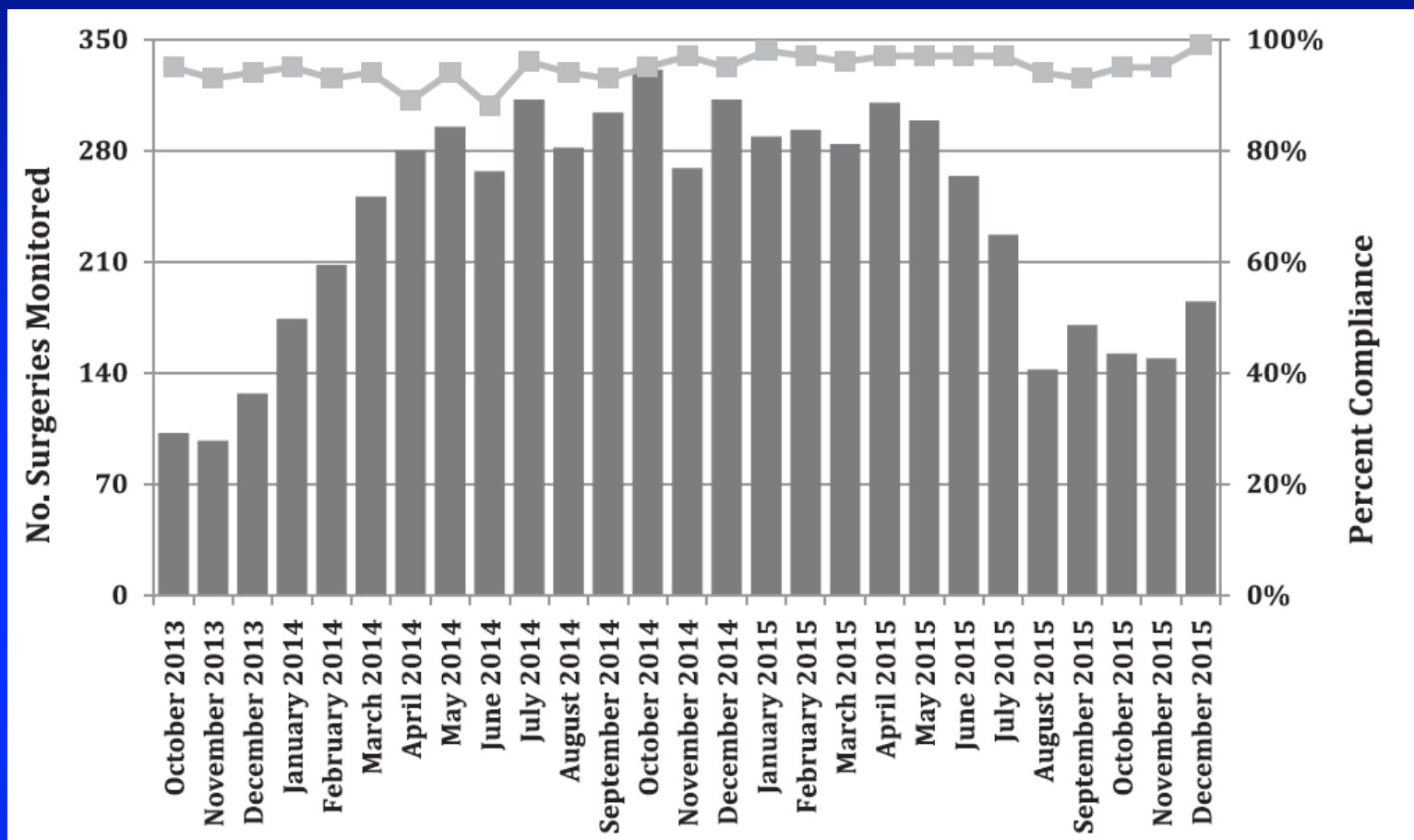
Compliance with local center, define practice for ambient set OR temperature (optional)

NICU patient temperature within 30 min before transfer to OR or within 30 min of surgical start, if surgical procedure in NICU

First documented patient temperature in OR

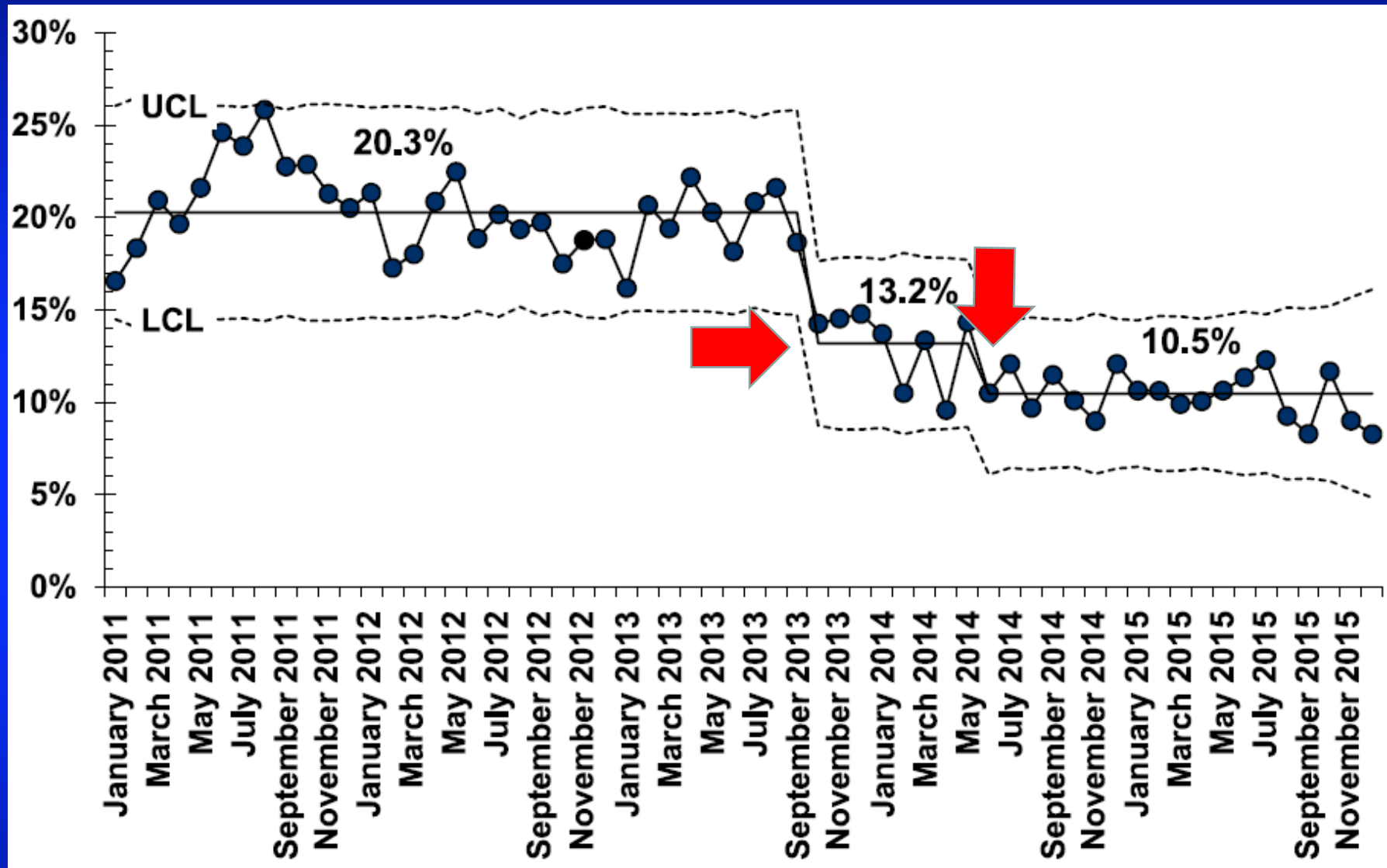
Last documented patient temperature before leaving OR or immediately after completion of surgery, if surgical procedure in NICU

Tº preoperatoria en relación a Cx monitorizadas

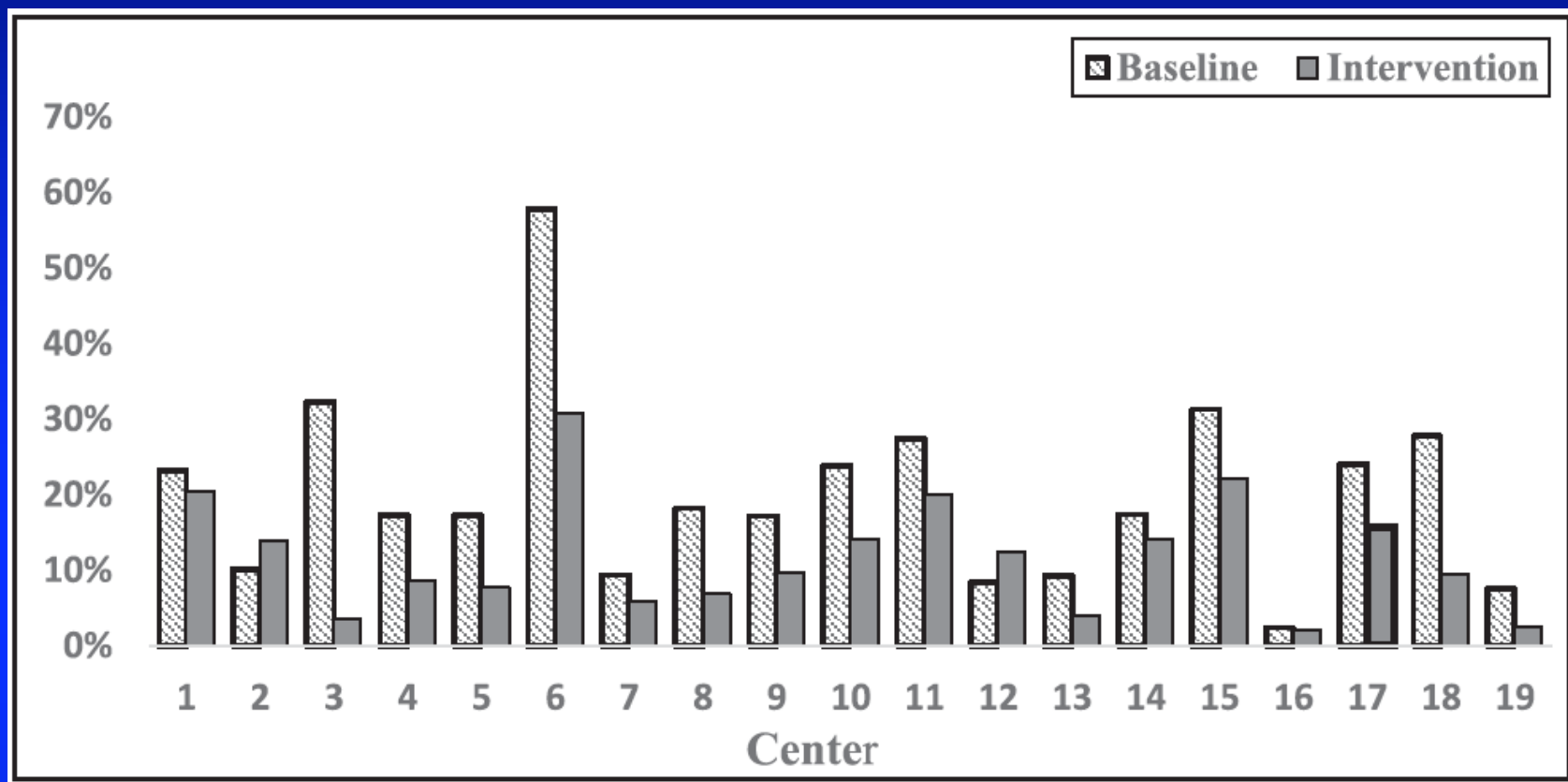


- 95% (88-99%) del tiempo en rango en NICU
- 83.5% (73-91%) del tiempo en rango al inicio y final en Pabellón

Disminución de hipotermia post operatoria



Promedios de hipotermia post operatoria por centros



- Disminución en promedio de 48% con gran variabilidad intercentros.

Regresión logística multivariada

TABLE 4 Outcome: Probability of Postoperative Hypothermia

Effect (Yes Versus No)	Odds Ratio (95% CI)	<i>P</i>
<u>Adopting the practice of prewarming the OR</u>	0.78 (0.62–1.00)	.05 ^a
>90% compliance with NICU temperature protocol before surgery	0.90 (0.69–1.17)	.43
>90% compliance with warming protocol to the OR	2.43 (1.90–3.09)	<.001 ^a
<u>>90% compliance euthermia at OR on arrival</u>	0.58 (0.43–0.79)	<.001 ^a
>90% compliance with intraoperative warming protocol	0.95 (0.75–1.21)	.67
<u>>90% euthermia at OR departure</u>	0.73 (0.56–0.95)	.02 ^a

Multivariable logistic regression demonstrating the effect of selected interventions that impact postoperative hypothermia. CI, confidence interval.

Conclusiones

- Es posible lograr disminuir frecuencia de hipotermia post operatoria en recién nacidos.
 - 50% en 2 años
 - Eliminación de daño >50 pctes por mes en la red
- Eutermia al llegar y salir de pabellón fueron predictores significativos.
- Considerar que hay períodos de hipotermia poco evitables relacionado a los anestésicos.

Conclusiones

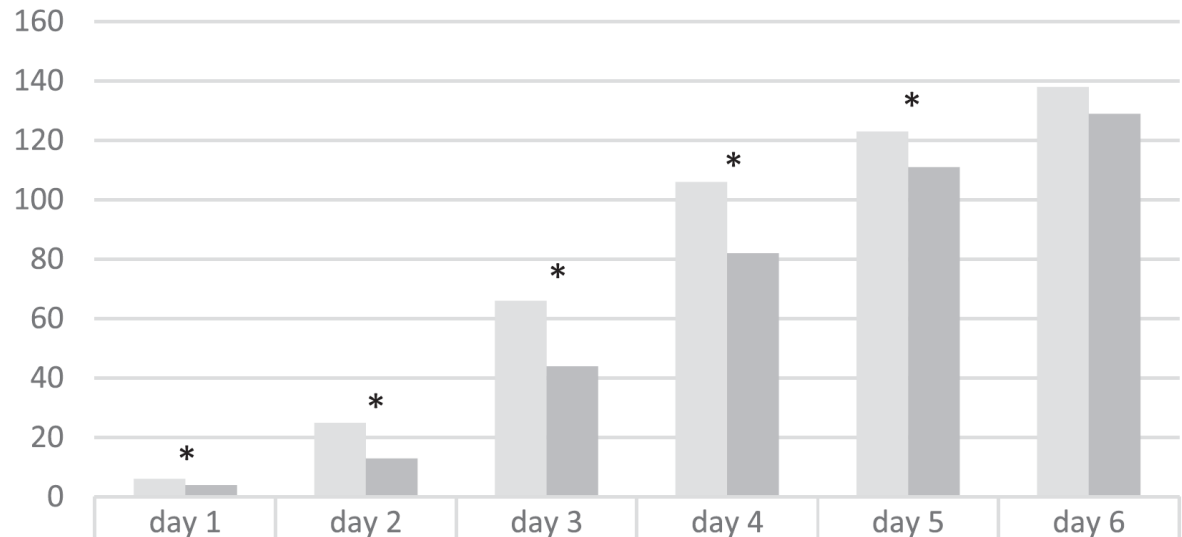
- Coordinación entre equipos y adherencia a procesos durante el perioperatorio y traslados.
- Claves de éxito individuales:
 - Métodos adicionales de calentamiento
 - Colaboración con equipo de pabellón
 - Feedback continuo (al menos mensual)
 - Checklist de las intervenciones

Evidence-Based Updates on the First Week of Exclusive Breastfeeding Among Infants $\geq 35w$

- Evidencia de los últimos 10 años sobre lactancia materna exclusiva en RN ≥ 35 sanos :
 - Producción de leche
 - Evaluación peso del RN
 - Manejo de glicemia y bilirrubina
 - Sistema inmune y microbioma
 - Suplementación

Breast Milk Transfer Over First 6 Days

Mean Breast Milk Transfer
(mL/kg Body Weight)



■ Vaginal births (mL/kg body weight)

6

25

66

106

123

138

■ Cesarean deliveries (mL/kg body weight)

4

13

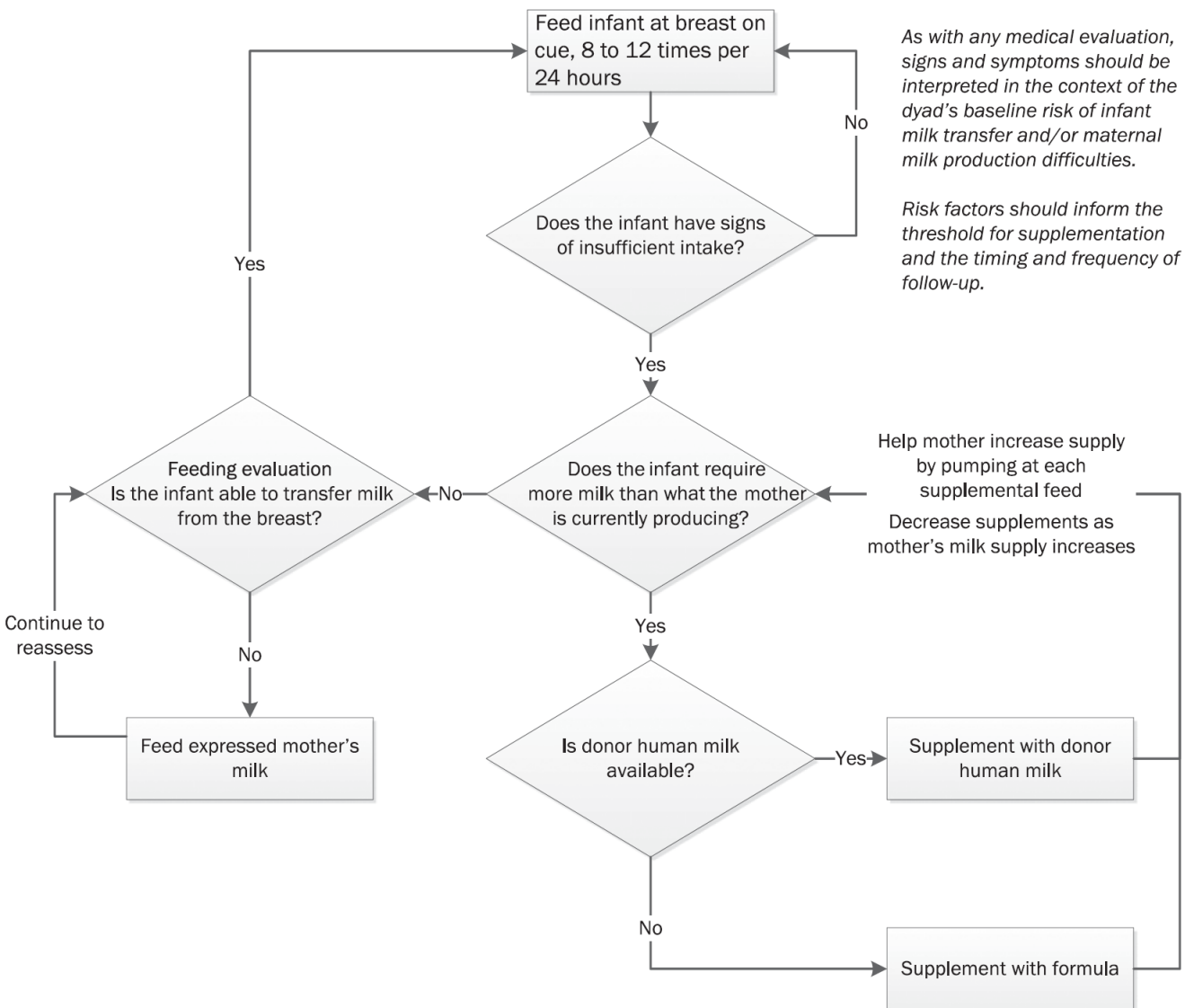
44

82

111

129

Adapted from Evans KC, Evans RG, Royal R, Esterman AJ, James SL. Effect of caesarean section on breast milk transfer to the normal term newborn over the first week of life. Arch Dis Child Fetal Neonatal Ed. 2003;88(5):F382.



Infant signs of insufficient milk intake and potential medical indications for supplementation

Persistent asymptomatic hypoglycemia despite skin-to-skin care and support for breastfeeding

Symptomatic hypoglycemia

Weight loss >10% with delayed lactogenesis II (>72 hours)

>75% weight loss by using NEWT curves

Decreased stooling (<4 stools after day 3) with delayed lactogenesis II

Clinical or biochemical signs of inadequate intake (such as decreased skin turgor, dry mucous membranes, high serum sodium levels, and no stool color change to yellow by day 5)

Hyperbilirubinemia approaching exchange transfusion levels, risk factors for neurotoxicity, or rising bilirubin levels despite lactation management

Infant risk factors for low milk transfer

Anomaly or other reason preventing direct breastfeeding and expressed milk insufficient for infant feeds

Anomalies suggestive of persistent hypoglycemia (eg, Beckwith-Wiedemann syndrome)

Maternal risk factors for low milk production

Glandular insufficiency with low milk production

Medical conditions associated with delay or lack of lactogenesis II (may occur with cesarean delivery, primiparity, obesity (BMI > 27), pregnancies conceived via infertility treatments, lack of perceived increased breast size during pregnancy, history of polycystic ovarian syndrome, or other hormonal condition affecting lactogenesis)

Breast pathology or previous breast surgery resulting in insufficient milk production

Factores de riesgo

Prenatal

Past medical history

Maternal obesity (BMI $\geq$ 30)

Significant medical problems (eg, thyroid disease, diabetes or insulin resistance, cystic fibrosis, polycystic ovarian syndrome)

Extremes of maternal age (eg, adolescent mother or older than 40 y)¹⁵

Any previous **breast surgery**, including cosmetic procedures (important to ask, not always obvious on examination)

Previous breast abscess

Lack of noticeable breast enlargement or tenderness during puberty or pregnancy

Past gynecology history

History of infertility

Conception by **assisted reproductive technology**

Past obstetrics history

Primiparity

History of **previous breastfeeding problems**, early breastfeeding cessation, or breastfed infant with slow wt gain

Postpartum plans

Intention to both breastfeed and bottle-feed or formula feed at <6 wk

Intention to use pacifiers or dummies and/or artificial nipples or teats at <6 wk

Early intention or necessity to return to school or work

Intended use of hormonal contraceptives before breastfeeding is well established (6 wk)

Medications

Inadequate counseling on maternal medication safety in lactation

Social history

Psychosocial problems (eg, depression, anxiety, lack of social support for breastfeeding)

Physical examination findings

Variation in breast appearance (marked **asymmetry**, hypoplastic, tubular)

Flat, inverted, or large **nipples**

Factores de riesgo

Intrapartum

Prolonged labor

Long induction or augmentation of labor

Use of medications during labor (benzodiazepines, morphine, or others) that can cause drowsiness in the newborn

Peripartum complications (eg, maternal hyperglycemia in labor, postpartum hemorrhage, hypertensive disorders of pregnancy, infection)

Infant initial assessment

Low birth wt, small for gestational age, or premature birth (<37 wk)

Early-term birth (37 + 0/7–38 + 6/7 wk)

Multiples

Oral anatomic abnormalities (eg, cleft lip or palate, macroglossia, micrognathia, tight frenulum or ankyloglossia)

Medical problems (eg, hypoglycemia, infection, jaundice, respiratory distress, birth trauma, birth asphyxia)

Neurologic problems (eg, genetic syndromes, hypertonia, hypotonia)

Factores de riesgo

Early postnatal care

Mother signs and symptoms

Perceived inadequate milk supply

Sore nipples or evidence of nipple compression with feedings

Failure of secretory activation or lactogenesis stage II (milk did not noticeably come in by 72 h post partum); this may be difficult to evaluate if the mother and infant are discharged from the hospital in the first 24–48 h post partum

Mother unable to hand express colostrum

Need for breastfeeding aids or appliances (such as nipple shields, breast pumps, or supplemental nursing systems) at the time of hospital discharge

Use of breast milk substitutes during hospital stay

Use of opiate pain medications

Health system

Mother-infant separation

Nonadherence to BFHI-based maternity practices

Hospital discharge before effective breastfeeding established

Discharge from the hospital at <48 h of age

Factores de riesgo

Infant signs and symptoms

- Persistently sleepy infant

- Difficulty in latching on to 1 or both breasts

- Ineffective or unsustained suckling

Excessive infant wt loss ($>7\%$ – 10% of birth wt in the first 48 h or >75 th percentile for age and mode of delivery on NEWT curves [<https://www.newbornweight.org/>])

Supplementation with breast milk substitutes

Early pacifier use

Signs of infant dehydration:

- Lack of bowel movements

- Urate crystals in diaper

- Dry mucous membranes

- Loss of skin turgor

- Sunken eyes

- Depressed anterior fontanelle

- Thready radial pulse

- Cold extremities

Factores de riesgo de hipoglicemia

Risk Factors

Large for gestational age

Small for gestational age

Infant of a mother with diabetes (including gestational diabetes)

Premature (<37 wk) or postmature delivery (>41 wk 6 d)

Symptoms of hypoglycemia (jitteriness, cyanosis, seizures, apneic episodes, tachypnea, weak or high-pitched cry, floppiness or lethargy, poor feeding, and eye-rolling)

Family history of congenital errors in metabolism that may be associated with hypoglycemia

Congenital syndromes (eg, Beckwith-Wiedemann syndrome), abnormal physical features (eg, midline facial malformations, microphallus) that may be associated with hypoglycemia

Perinatal stress (asphyxia)

Suplementación

- Introducción precoz de fórmula aumenta 2 veces riesgo del cese de la LM.
 - LME precoz aOR 2.3 (1.8 - 3.1)
- Si se indica fórmula, acompañar con extracción manual o mecánica de leche cada vez que RN se alimenta

Cochrane Neonatal Reviews

Marzo - Abril 2020



- **Clonidine for pain in non-ventilated infants**

<https://doi.org/10.1002/14651858.CD013104.pub2>

No hay RCT. No hay evidencia para apoyar o refutar uso de clonidina para manejo del dolor.

- **Diaphragm-triggered non-invasive respiratory support (NIV-NAVA) in preterm infants**

<https://doi.org/10.1002/14651858.CD012935.pub2>

1 RCT, 16 RN sin diferencias con NIPPV en efectividad y seguridad.

- Early versus late parenteral nutrition for critically ill term and late preterm infants <https://doi.org/10.1002/14651858.CD013141.pub2>

PEPaNIC trial 2016, análisis subgrupo 209 RNT: NPT iniciada >72h se asoció a menor mortalidad hospitalaria 28d (RR 0.29, 0.1-0.88; NNTB=11)

Sin asociación CLABSI, crecimiento o duración hospitalización.

Baja calidad de evidencia.

- **Postnatal corticosteroids for transient tachypnoea of the newborn**

<https://doi.org/10.1002/14651858.CD013222.pub2>

1 RCT Budesonida inhalado vs placebo. Sin diferencias en NPPV o VMI, ni tiempo de hospitalización. Baja calidad de evidencia.

- **Stopping enteral feeds for prevention of transfusion-associated NEC in preterm infants**

<https://doi.org/10.1002/14651858.CD012888.pub2>

1 RCT 22 PT, no ciegos. Ningún caso de NEC.