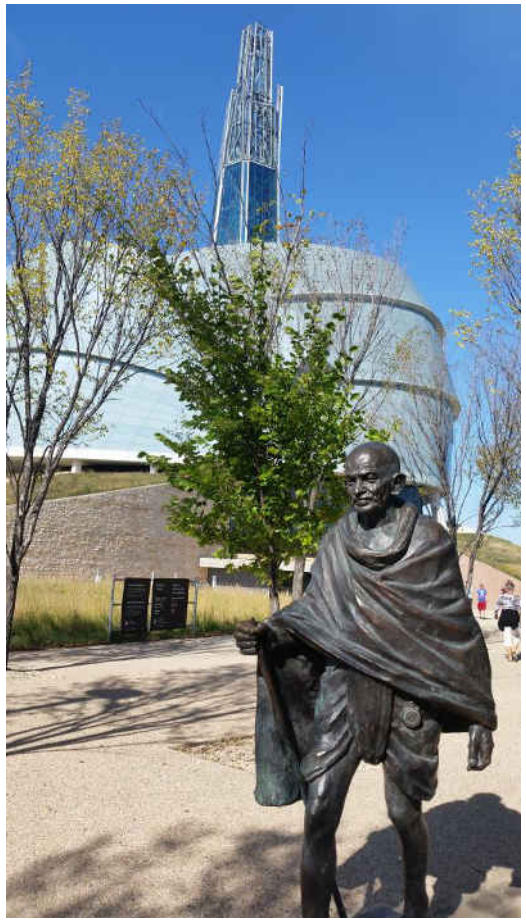
How Research has changed my practice in the Past five years

Ganesh Srinivasan MD DM FAAP

Director, Neonatal- Perinatal Medicine Residency Program

University of Manitoba



No Conflicts to Disclose: “ Truth is God”- M.K Gandhi

- Edge of Viability
- Delayed cord clamping
- Oxygen- Resuscitation
- Oxygen during NICU stay – low or high
- CPAP vs Intubation and surfactant
- Caffeine
- Antibiotic use and abuse
- Retinopathy of Prematurity
- PDA ligation (Not!)
- Hypothermia for HIE
- Neuromonitoring

Less is More

Edge of Viability

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

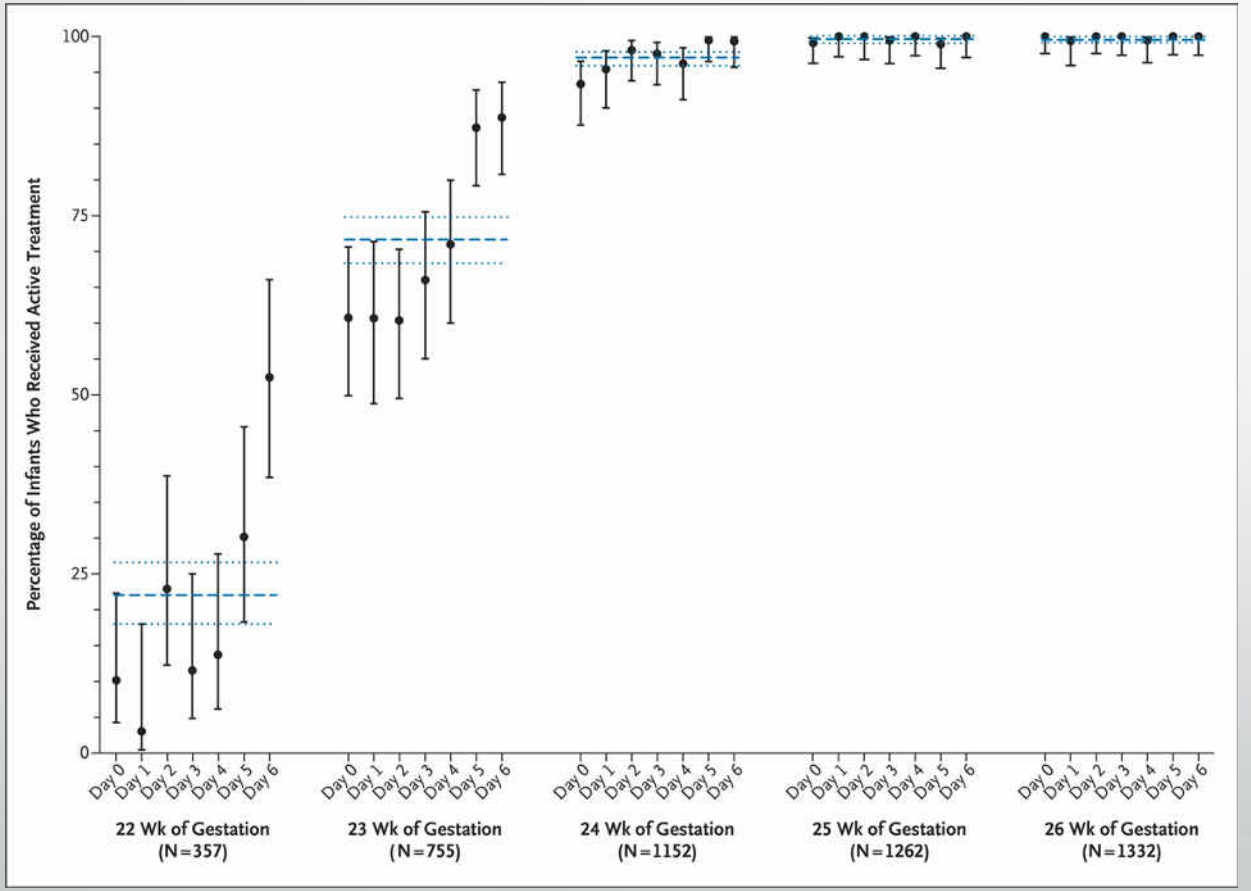
Between-Hospital Variation in Treatment and Outcomes in Extremely Preterm Infants

Matthew A. Rysavy, B.S., Lei Li, Ph.D., Edward F. Bell, M.D., Abhik Das, Ph.D., Susan R. Hintz, M.D., Barbara J. Stoll, M.D., Betty R. Vohr, M.D., Waldemar A. Carlo, M.D., Seetha Shankaran, M.D., Michele C. Walsh, M.D., Jon E. Tyson, M.D., M.P.H., C. Michael Cotten, M.D., M.H.S., P. Brian Smith, M.D., M.P.H., M.H.S., Jeffrey C. Murray, M.D., Tarah T. Colaizy, M.D., M.P.H., Jane E. Brumbaugh, M.D., and Rosemary D. Higgins, M.D., for the Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network

N Engl J Med
Volume 372(19):1801-1811
May 7, 2015

The NEW ENGLAND JOURNAL of MEDICINE

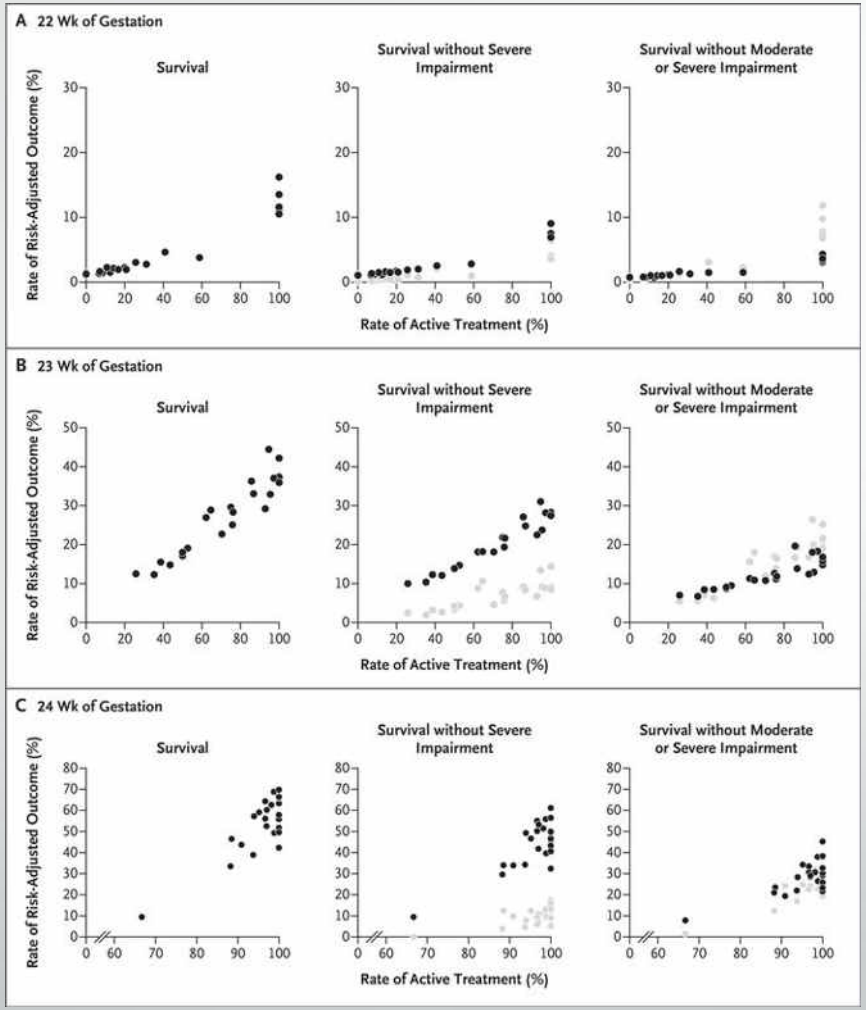
Rates of Active Treatment by Gestational Age at Birth



Rysavy MA et al. N Engl J Med 2015;372:1801-1811

The NEW ENGLAND JOURNAL of MEDICINE

Hospital Rates of Risk- Adusted Outcomes and Active Treatment by Gestational Age at Birth



Rysavy MA et al. N Engl J Med 2015;372:1801-1811

The NEW ENGLAND JOURNAL of MEDICINE

Edge of Viability

- Differences in hospital practices regarding the initiation of active treatment in infants born at 22, 23, or 24 weeks of gestation explain some of the between-hospital variation in survival and survival without impairment among such patients.

2013 Canadian Neonatal Network

Gestational age specific mortality or significant morbidity (six morbidities)

GA	Number of neonates	Number survived (%)	Number of neonates discharged home directly from network sites	Number (%) without any of the six morbidities	Number (%) with any one morbidity prior to discharge	Number (%) with any two morbidities prior to discharge	Number (%) with any three morbidities prior to discharge	Number (%) with any four morbidities prior to discharge	Number (%) with any five morbidities prior to discharge	Number (%) with all six morbidities prior to discharge
<24	92	43 (47)	16	1 (6)	4 (25)	4 (25)	3 (19)	2 (13)	2 (13)	0
24	197	133 (68)	56	7 (13)	19 (34)	17 (30)	10 (18)	3 (5)	0	0
25	247	195 (79)	76	15 (20)	26 (34)	18 (24)	13 (17)	4 (5)	0	0
26	267	228 (85)	92	29 (32)	37 (40)	17 (18)	9 (10)	0	0	0

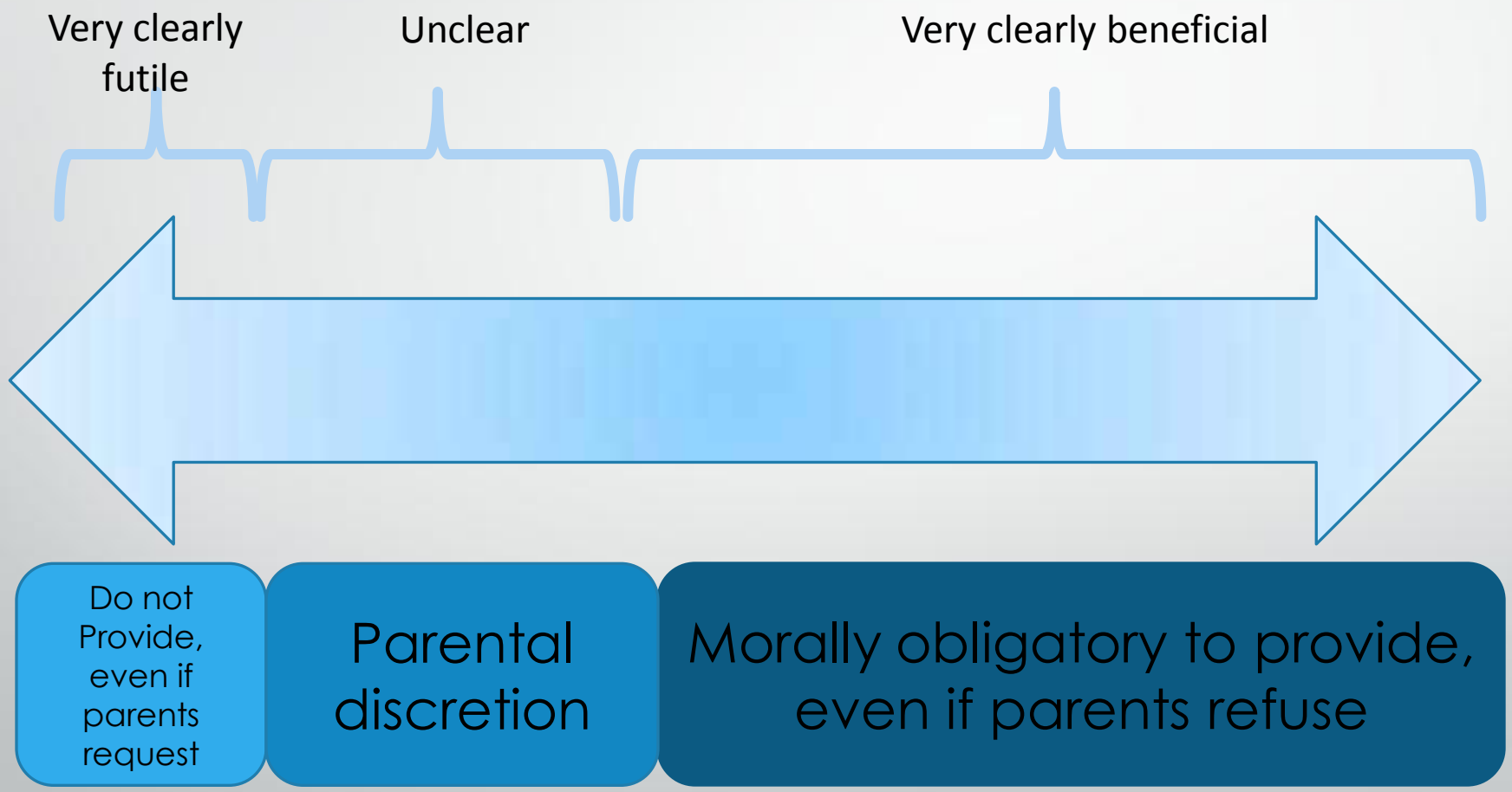
Morbidities were counted as score of one for each of the following

i. IVH grade 3 or 4 or PVL
ii. Stage 3 or higher ROP
iii. Oxygen use at 36 weeks or at discharge if earlier
iv. Culture proven early onset or late onset sepsis
v. Stage 2 or 3 NEC
vi. PDA requiring surgical ligation

In Winnipeg

Site	FY11-12	FY12-13	FY13-14	FY14-15	FY15-16
HSC					
23 weeks	1/10 (10%)	0/4	0/8	0/7	-
24 weeks	1/5 (20%)	2/5 (40%)	2/6(33%)	1/3 (33%)	3/4 (75%)
St. B					
23 weeks	2/2	1/2 (50%)	0	1/1	3/5 (60%)
24 weeks	0	1/2 (50%)	1/3 (66%)	2/4 (50%)	3/5 (60%)

Deciding to Forgo LST



Warady and Lantos 2013

Probably, first 23-week-old baby to have survived: Docs

Worldwide, the survival of a preterm infant born at 23 weeks is considered an achievement of sorts. "Even developed countries would not revive babies premature than this, since the chances of survival and normal development are bleak," said his colleague, Dr Neelkanth Kabra.

Around 22-24 weeks of pregnancy is considered the earliest that a foetus can survive outside the mother's womb. But given the battle between pro-life and anti-abortion factions, many countries do not allow abortions beyond 14 weeks of pregnancy.

Dr Ruchi Nanavati, who heads the neonatology department of KEM Hospital, said, "I cannot say if this is indeed the first 23-weeker to survive in India, but it is admirable that a 480gm baby survived."

Dr Jayshree Mondkar, who heads the neonatology department at Sion Hospital, said, "She is likely to be among the few born under 25 weeks to look forward to a discharge from the NICU."

For the 37-year-old parents, their child's survival is the testimony of "our faith, our doctors' skills and God's blessings". Said Santosh, "We call her Sakshi as she is the testimony of God's will."

The couple was married for 12 years and Trupti suffered five miscarriages. "Left my job two years back as I underwent IVF treatment," said Trupti. Yet on the day of her their 12th wedding anniversary on May 1, she suffered bleeding.

Her gynecologist conducted tests that indicated that the baby could be born any moment. "We were advised to go to Surya Hospital as it has a maternity ward as well as an NICU" said Santosh.

Baby Sakshi was born on the night of May 5. "The concept of Golden Hour in cardiac care is reduced to Golden 10 minutes in neonatal care," said Dr Hari. The newborn was given special medicine to clear her lungs in the delivery room, transferred to the NICU and hooked to a ventilator within 10 minutes.

In the following months, she survived immature lungs, infection, bleeding in the brain, poor growth, drops in haemoglobin and fragile bones.

"We could not touch her as her skin would tear instantly," said Dr Hari.

"It has taken over 85,000 person hours of hard work to see Sakshi get to 1.6kg and take feeds orally without oxygen," said Dr Kabra.

Baby Sakshi, who was born 23 weeks premature, was discharged hale and hearty on Friday

Meet Mac

One of the youngest babies ever born at St. Boniface Hospital

Mac Gross, nine weeks old, cuddles with his mom, Tiffany Gross.

BY HOLLI MONCRIEFF
Winnipeg Health Region
Wave, May / June 2015

Tiffany Gross lies back on her anti-gravity chair and gently wraps her arms around the tiny infant lying on her chest.

READ MORE

- Miracle babies
- About kangaroo care

Her son, Mac, was prematurely born on February 9 at 22 weeks and six days gestation - about four months before term. Weighing in at just 630 grams (21 ounces), Mac is the youngest surviving premature baby born at St. Boniface Hospital.

Premature birth
The Observer

'Nathan was born at 23 weeks. If I'd known then what I do now, I'd have wanted him to die in my arms'

Alexia Pearce adores her 'gorgeous' three-year-old son, yet she is aware that his life – a life blighted by cerebral palsy and chronic lung disease – is unlikely to last long into his teens. In this moving account, she asks: are we always right to save premature babies?

NATIONAL POST

HEALTH

TRENDING Alan Kurdi | Recession | Election | Blue Jays | Donald Trump | CitizenSparks

Canadian pediatricians recommend letting 22-week-old preemies die. Should doctors try to save the tiny newborns?

Tom Blackwell | May 29, 2015 1:57 PM ET
More from Tom Blackwell | @tomblackwellNP

Delayed Cord Clamping or Milking In ELBW

REVIEW

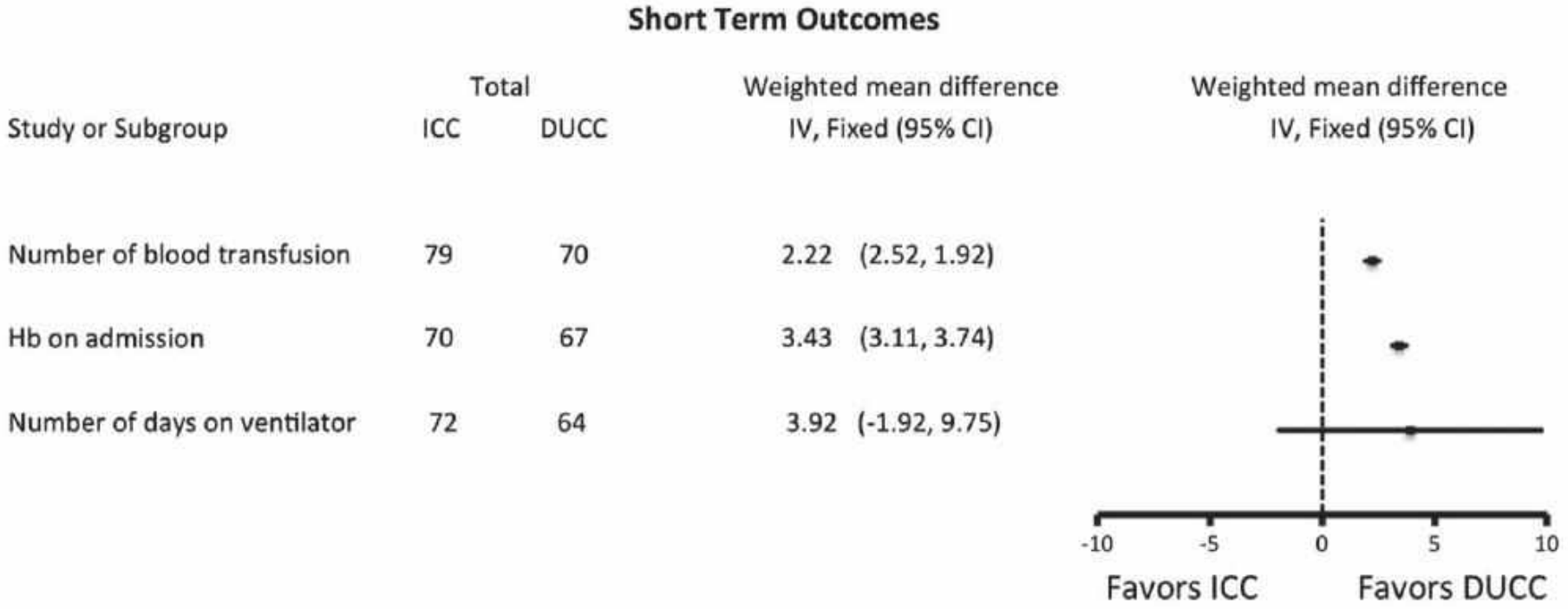
Effects of placental transfusion in extremely low birthweight infants: meta-analysis of long- and short-term outcomes

Sarvin Ghavam,[1] Dushyant Batra,[2] Judith Mercer,[3,4] Amir Kugelman,[5] Shigeharu Hosono,[6] William Oh[4], Heike Rabe,[7] and Haresh Kirpalani[1,8]

1192 TRANSFUSION Volume 54, April 2014

TABLE 1. Short-term outcomes of umbilical transfusion strategies

Outcome	Number of infants	Mean difference	95% CI	p value for overall effect
Hb on admission	137	3.42	3.11 to 3.74	<0.001
RBC transfusion requirement	149	–2.22	–2.52 to –1.92	<0.001
Admission blood pressure	113	4.9	4.22 to 5.58	<0.001
Days of mechanical ventilation	136	–3.92	–9.75 to 1.92	0.15
		OR	95% CI	
IVH	196	0.56	0.29 to 1.29	0.08
Episodes of late onset sepsis	154	0.39	0.18 to 0.81	0.01

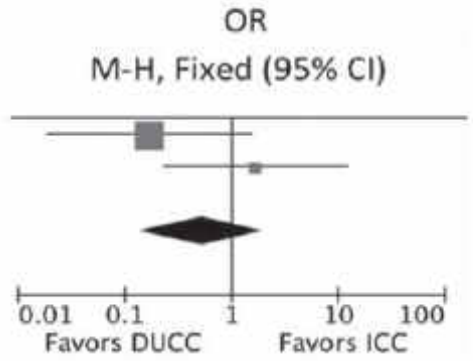


Neurodevelopmental Outcomes

Study or Subgroup	DUCC Events	DUCC Total	ICC Events	ICC Total	Weight (%)	OR M-H, Fixed (95% CI)
MDI<70						
Mercer 2010[22]	1	27	5	27	76.2	0.17 (0.02, 1.56)
Oh 2011[24]	4	8	3	8	23.8	1.67 (0.23,12.22)
Total (95% CI)		35		35	100	0.52 (0.14, 1.98)
Total Events	5		8			

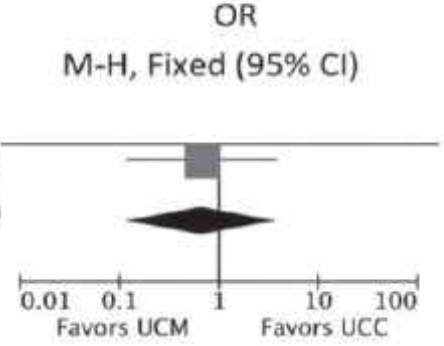
Heterogeneity: Chi^2=2.29 P=0.13 I^2=56%

Test for overall effect: Z=0.95 (p=0.34)



	UCM Events	UCM Total	UCC Events	UCC Total	Weight (%)	OR M-H, Fixed (95% CI)
Tumori-Inage						
Hosono 2008[7]	3	13	4	13	100	0.68 (0.12,3.87)
Total (95% CI)		13		13	100	0.68 (0.12,3.87)

Test for overall effect Z=0.44 (P=0.66)



3 trials

2012 WHO guidelines on basic newborn resuscitation

- In newly born term or preterm babies who do not require positive-pressure ventilation, the cord should not be clamped earlier than 1 min after birth (*strong recommendation*).
- When newly born term or preterm babies require positive-pressure ventilation, the cord should be clamped and cut to allow effective ventilation to be performed (c*onditional recommendation*).
- Newly born babies who do not breathe spontaneously after thorough drying should be stimulated by rubbing the back 2–3 times before clamping the cord and initiating positive-pressure ventilation (c*onditional recommendation*).

EDITORIAL

Delayed Cord Clamping and Umbilical Cord Milking at Birth

SIDDARTH RAMJI

From the Department of Neonatology, Maulana Azad Medical College, New Delhi, India. siddarthramji@gmail.com

Effect of Delayed Cord Clamping on Neurodevelopment at 4 Years of Age: A Randomized Clinical Trial

Ola Andersson, MD, PhD[1]; Barbro Lindquist, PhD[2]; Magnus Lindgren, PhD[3]; Karin Stjernqvist, PhD[3]; Magnus Domellöf, MD, PhD[4]; Lena Hellström-Westas, MD, PhD[1]

JAMA Pediatr. 2015;169(7):631-638. doi:10.1001/jamapediatrics.2015.0358

Oxygen in the Delivery room

"Oxygen is a dangerous drug"- Dr. S F Irani (1994 KEM, Mumbai, NICU rounds)

Resuscitation 95 (2015) 249–263

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

European Resuscitation Council Guidelines for Resuscitation 2015
Section 7. Resuscitation and support of transition of babies at birth

Jonathan Wyllie[a,*], Jos Bruinenberg[b], Charles Christoph Roehr[d,e], Mario Rüdiger[f], Daniele Trevisanuto[c], Berndt Urlesberger[g]

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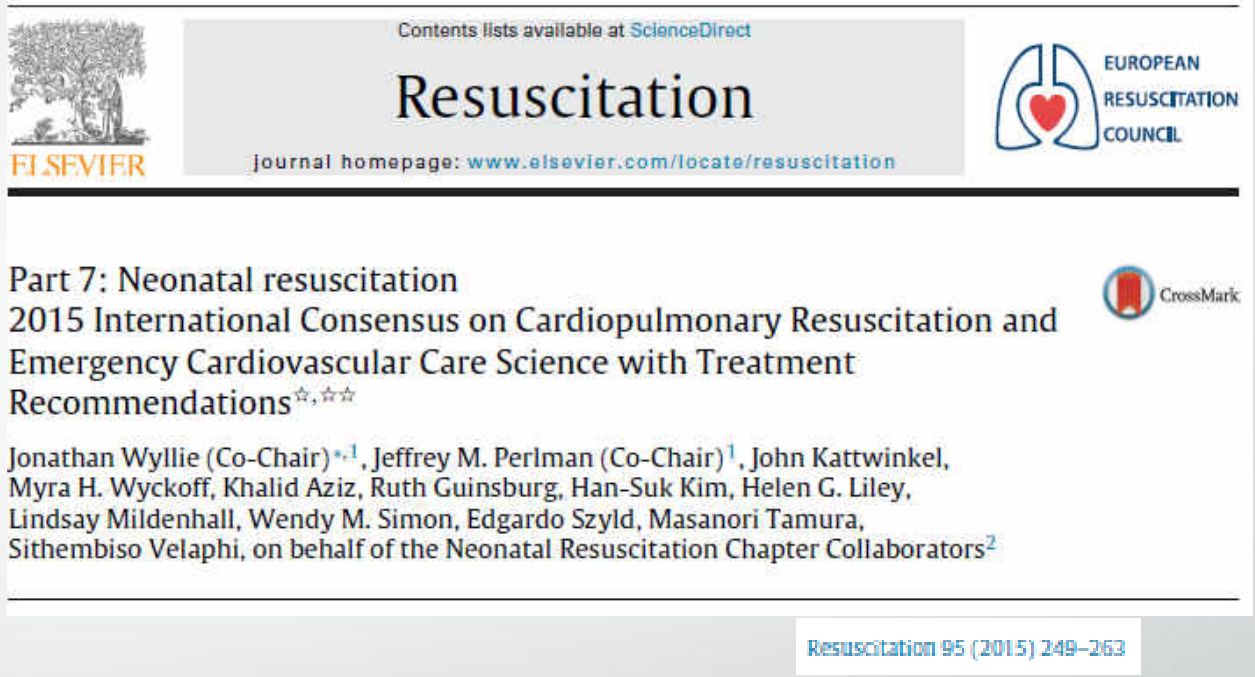
[c] Department of Women and Children's Health, Padua University, Azienda Ospedaliera di Padova, Padua, Italy
[d] Department of Neonatology, Charité Universitätsmedizin, Berlin, Berlin, Germany
[e] Newborn Services, John Radcliffe Hospital, Oxford University Hospitals, Oxford, UK
[f] Department of Neonatology, Medizinische Fakultät Carl Gustav Carus, TU Dresden, Germany
[g] Division of Neonatology, Medical University Graz, Graz, Austria



Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Part 7: Neonatal resuscitation
2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations☆,☆☆

Jonathan Wyllie (Co-Chair)*,[1], Jeffrey M. Perlman (Co-Chair)[1], John Kattwinkel, Myra H. Wyckoff, Khalid Aziz, Ruth Guinsburg, Han-Suk Kim, Helen G. Liley, Lindsay Mildenhall, Wendy M. Simon, Edgardo Szyld, Masanori Tamura, Sithembiso Velaphi, on behalf of the Neonatal Resuscitation Chapter Collaborators[2]

Resuscitation 95 (2015) 249–263

Resuscitate Full term neonates with Room air FiO2 0.21 and Preterm <35 wks 0.21 to 0.30

Neonatology

Systematic Review and Meta-Analysis

Neonatology 2014;105:55–63
DOI: 10.1159/000356561

Received: August 12, 2013
Accepted after revision: October 8, 2013
Published online: November 15, 2013

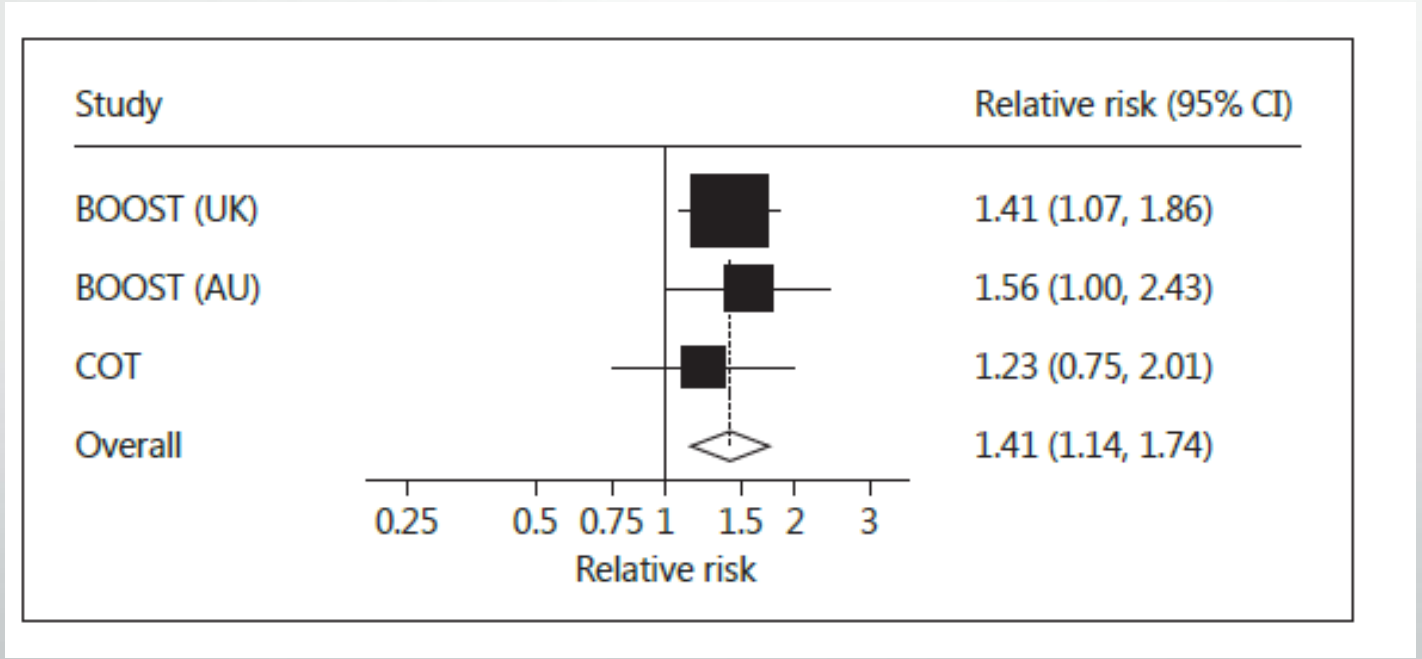
Optimal Oxygenation of Extremely Low Birth Weight Infants: A Meta-Analysis and Systematic Review of the Oxygen Saturation Target Studies

Ola Didrik Saugstad[a] Dagfinn Aune[b, c]

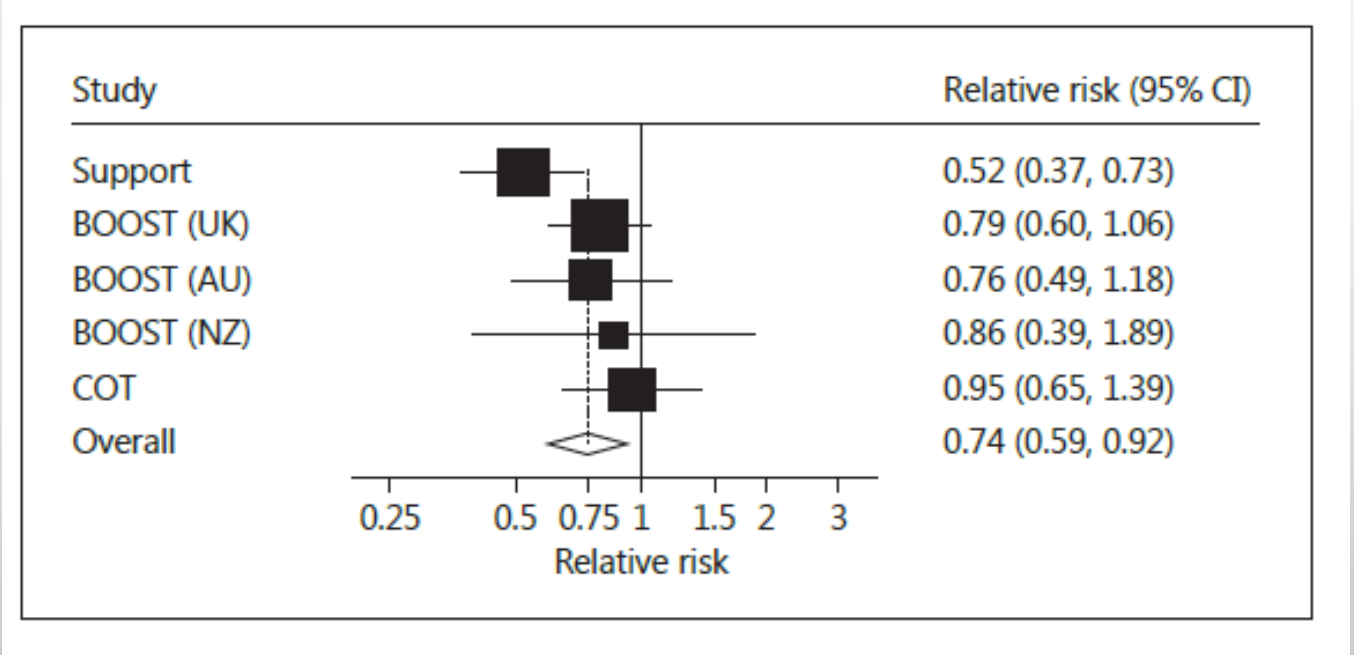
[a]Department of Pediatric Research, Oslo University Hospital, University of Oslo, Oslo, and [b]Department of Public Health and General Practice, Faculty of Medicine, Norwegian University of Science and Technology, Trondheim, Norway; [c]Department of Epidemiology and Biostatistics, School of Public Health, Imperial College, London, UK

Dr. Haresh Kirpalani kindly revised the manuscript.

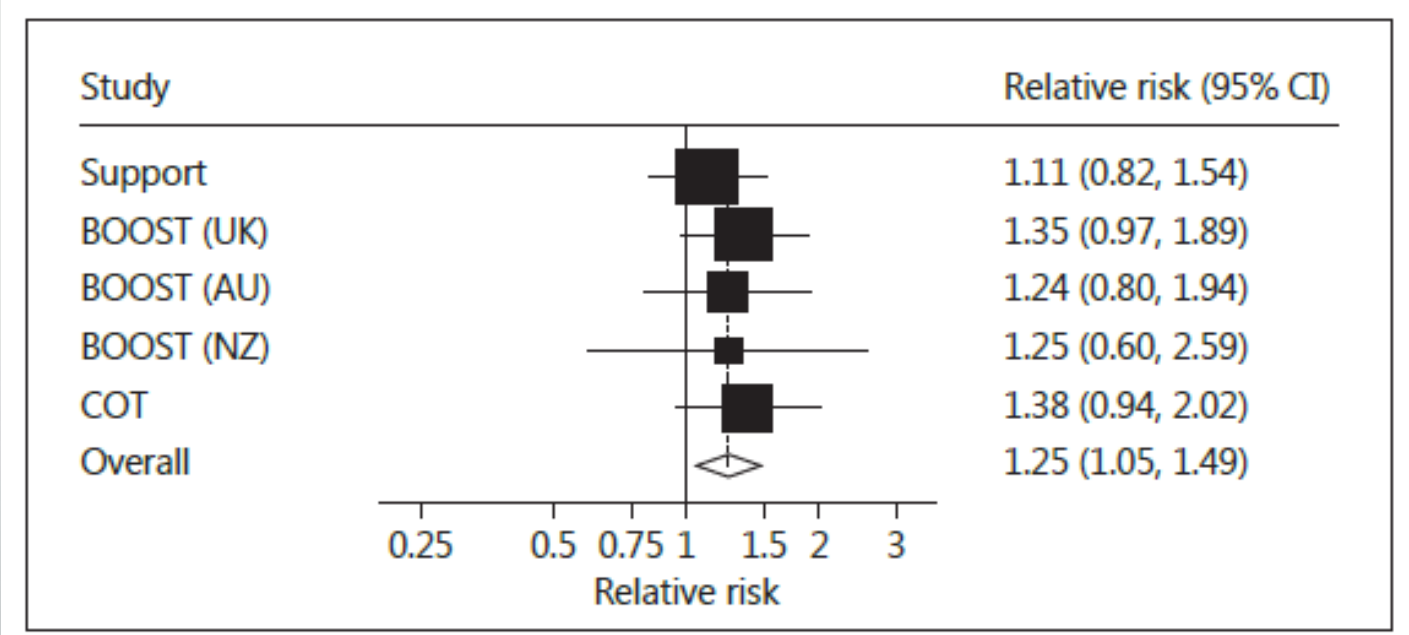
Mortality


Study
Relative risk (95% CI)
BOOST (UK)
1.41 (1.07, 1.86)
BOOST (AU)
1.56 (1.00, 2.43)
COT
1.23 (0.75, 2.01)
Overall
1.41 (1.14, 1.74)
0.25
0.5
0.75
1
1.5
2
3
Relative risk

Retinopathy of Prematurity



NEC


Study
Relative risk (95% CI)
Support
1.11 (0.82, 1.54)
BOOST (UK)
1.35 (0.97, 1.89)
BOOST (AU)
1.24 (0.80, 1.94)
BOOST (NZ)
1.25 (0.60, 2.59)
COT
1.38 (0.94, 2.02)
Overall
1.25 (1.05, 1.49)
0.25
0.5
0.75
1
1.5
2
3
Relative risk

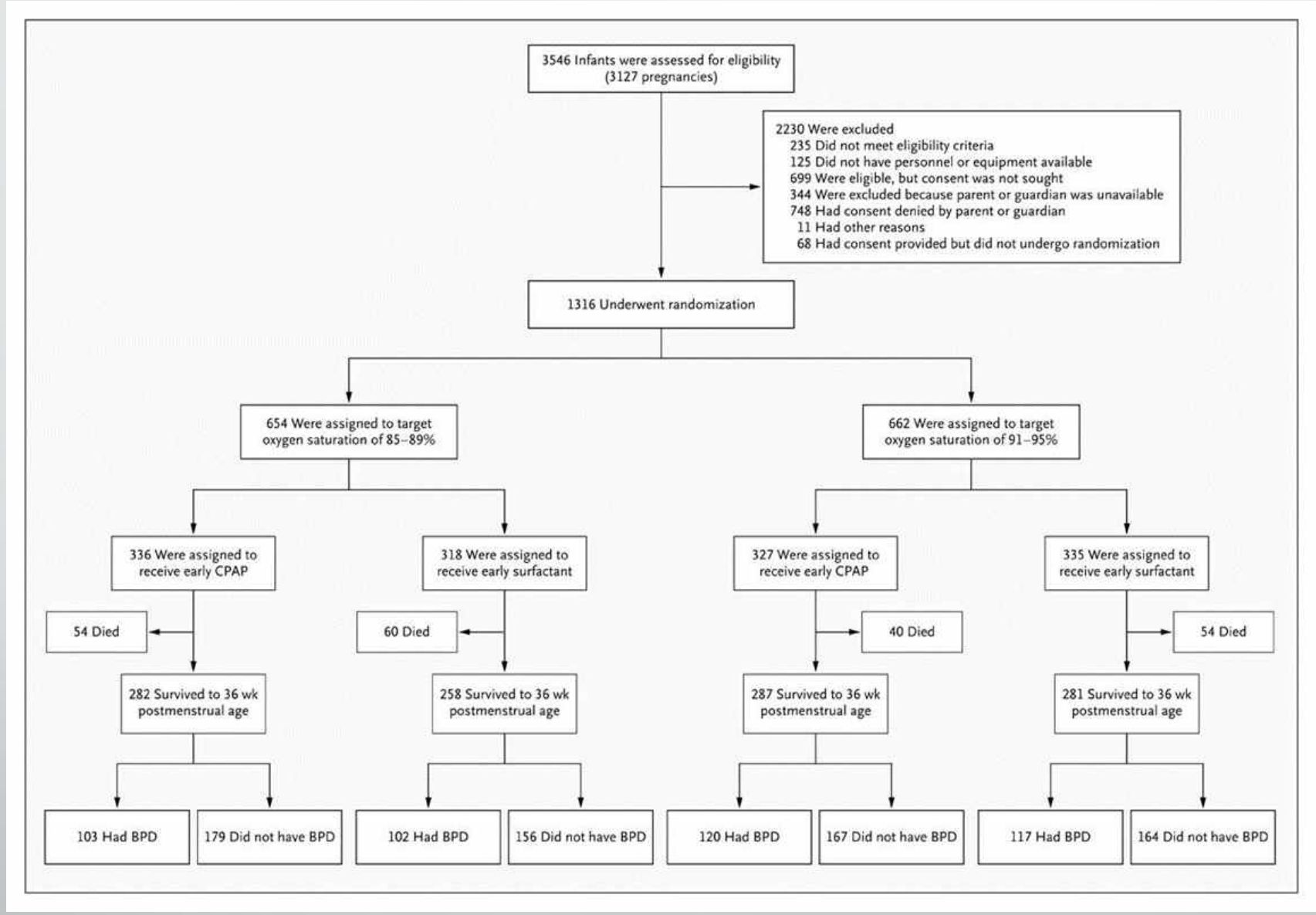
Use of NCPAP in delivery room and Non Invasive Ventilation

SUPPORT Study Group of the Eunice Kennedy Shriver NICHD Neonatal Research Network. N Engl J Med 2010;362:1970-1979

The NEW ENGLAND JOURNAL of MEDICINE

Study overview

- In this part of a randomized, 2-by-2 factorial trial involving extremely preterm infants, use of intubation and surfactant treatment (within 1 hour after birth) was compared with initiation of continuous positive airway pressure (CPAP) in the delivery room and subsequent use of a protocol-driven limited ventilation strategy
- The rate of death or bronchopulmonary dysplasia (the primary outcome) did not differ significantly between the groups; the CPAP group required intubation less frequently and for fewer days than did the surfactant group
- These results support consideration of CPAP as an alternative to intubation and surfactant in preterm infants



SUPPORT Study Group of the Eunice Kennedy Shriver NICHD Neonatal Research Network. N Engl J Med 2010;362:1970-1979

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Table 3. Selected Prespecified Outcomes.*

Outcome	CPAP (N=663)	Surfactant (N=653)	Relative Risk with CPAP (95% CI)	Difference in Means (95% CI)	Adjusted P Value
BPD or death by 36 wk of postmenstrual age — no. (%)					
Physiological definition of BPD†	317 (47.8)	333 (51.0)	0.95 (0.85 to 1.05)		0.30
BPD defined by need for supplemental oxygen	323 (48.7)	353 (54.1)	0.91 (0.83 to 1.01)		0.07
BPD by 36 wk of postmenstrual age — no./total no. (%)					
Physiological definition of BPD†	223/569 (39.2)	219/539 (40.6)	0.99 (0.87 to 1.14)		0.92
BPD defined by need for supplemental oxygen	229/569 (40.2)	239/539 (44.3)	0.94 (0.82 to 1.06)		0.32
Death by 36 wk of postmenstrual age — no. (%)	94 (14.2)	114 (17.5)	0.81 (0.63 to 1.03)		0.09
Need for supplemental oxygen — no. of days‡					0.12
Adjusted mean	62.2±1.6	65.3±1.6		−3.1 (−7.1 to 0.8)	
Unadjusted median	52	56			
Interquartile range	20 to 86	27 to 91			
Need for mechanical ventilation — no. of days‡§					0.03
Adjusted mean	24.8±1.0	27.7±1.1		−3.0 (−5.6 to −0.3)	
Unadjusted median	10	13			
Interquartile range	2 to 32	2 to 36			
Survival without need for high-frequency or conventional ventilation at 7 days — no./total no. (%)	362/655 (55.3)	318/652 (48.8)	1.14 (1.03 to 1.25)		0.01
Any air leak in first 14 days — no. (%)	45 (6.8)	48 (7.4)	0.89 (0.6 to 1.32)		0.56
Necrotizing enterocolitis requiring medical or surgical treatment — no./total no. (%)	83/654 (12.7)	63/636 (9.9)	1.25 (0.92 to 1.71)		0.15
Intraventricular hemorrhage grade 3 or 4 — no./total no. (%)¶	92/642 (14.3)	72/628 (11.5)	1.26 (0.94 to 1.68)		0.12
Postnatal corticosteroid therapy for BPD — no./total no. (%)	47/649 (7.2)	83/631 (13.2)	0.57 (0.41 to 0.78)		<0.001
Severe retinopathy of prematurity among survivors — no./total no. (%)	67/511 (13.1)	65/473 (13.7)	0.94 (0.69 to 1.28)		0.71

* Plus–minus values are means ±SD. BPD denotes bronchopulmonary dysplasia, CI confidence interval, and CPAP continuous positive airway pressure.

† The physiological definition of BPD includes, as a criterion, the receipt of more than 30% supplemental oxygen at 36 weeks, the need for positive-pressure support, or in the case of infants requiring less than 30% oxygen, the need for any supplemental oxygen at 36 weeks after an attempt at withdrawal of supplemental oxygen.[16,17]

‡ Data are for 1098 infants who survived to discharge, transfer, or 120 days; the maximum follow-up was 120 days.

§ This variable includes high-frequency ventilation and conventional ventilation.

¶ There are four grades of intraventricular hemorrhage; higher grades indicate more severe bleeding.

The NEW ENGLAND JOURNAL of MEDICINE

Published in final edited form as:
J Pediatr. 2014 August ; 165(2): 240–249.e4. doi:10.1016/j.jpeds.2014.02.054.

Respiratory Outcomes of the Surfactant Positive Pressure and Oximetry Randomized Trial

Timothy P. Stevens, MD MPH[1], Neil N. Finer, MD[2], Waldemar A. Carlo, MD[3], Peter G. Szilagyi, MD[1], Dale L. Phelps, MD[1], Michele C. Walsh, MD MS[4], Marie G. Gantz, PhD[5], Abbot R. Laptook, MD[6], Bradley A. Yoder, MD[7], Roger G. Faix, MD[7], Jamie E. Newman, PhD, MPH[5], Abhik Das, PhD[8], Barbara T. Do, MSPH[5], Kurt Schibler, MD[9], Wade Rich, RRT[2], Nancy S. Newman, RN[4], Richard A. Ehrenkranz, MD[10], Myriam Peralta-Carcelen, MD MPH[3], Betty R. Vohr, MD[6], Deanne E. Wilson-Costello, MD[4], Kimberly Yolton, PhD[9], Roy J. Heyne, MD[11], Patricia W. Evans, MD[12], Yvonne E. Vaucher, MD MPH[2], Ira Adams-Chapman, MD[13], Elisabeth C. McGowan, MD[14], Anna Bodnar, MD[7], Athina Pappas, MD[15], Susan R. Hintz, MD MS Epi[16], Michael J. Acarregui, MD[17], Janell Fuller, MD[18], Ricki F. Goldstein, MD[19], Charles R. Bauer, MD[20], T. Michael O'Shea, MD MPH[21], Gary J. Myers, MD[1], and Rosemary D. Higgins, MD[22] on behalf of the SUPPORT Study Group of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development Neonatal Research Network*

Antibiotic Overuse in the NICU

ORIGINAL STUDIES

Antibiotic Use in Neonatal Intensive Care Units and Adherence With Centers for Disease Control and Prevention 12 Step Campaign to Prevent Antimicrobial Resistance

Sameer J. Patel, MD,† Adebayo Oshodi, MD,‡§ Priya Prasad, MPH,¶‖ Patricia Delamora, MD,** Elaine Larson, PhD,† †† Theoklis Zaoutis, MD, MSCE,¶‖ David A. Paul, MD,‡§ and Lisa Saiman, MD, MPH*†‡‡*

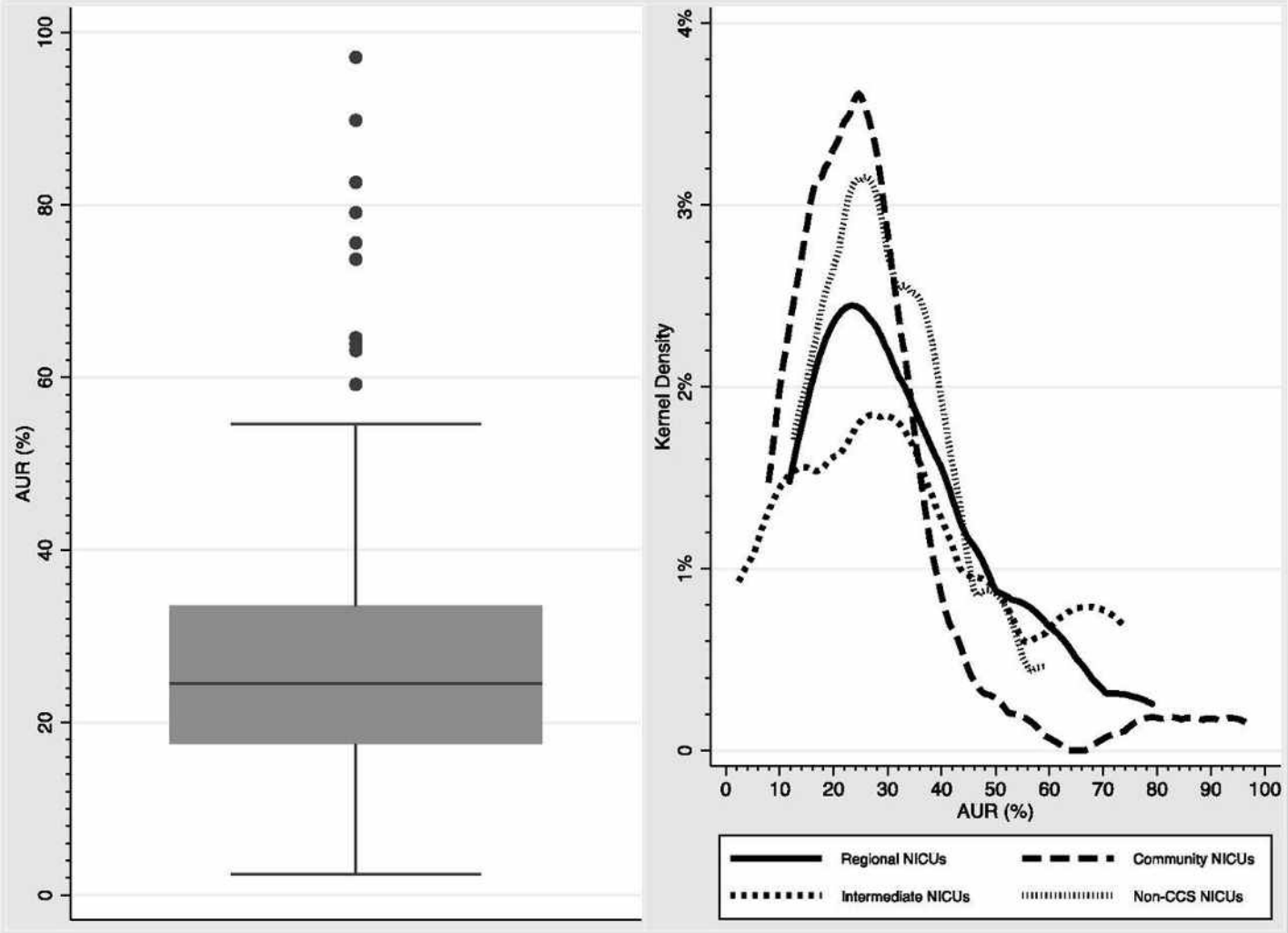
Neonatal Intensive Care Unit Antibiotic Use

Joseph Schulman, MD, MS[a], Robert J. Dimand, MD[a], Henry C. Lee, MD[b,c], Grace V. Duenas, MPH[b,c], Mihoko V. Bennett, PhD[b,c], Jeffrey B. Gould, MD, MPH[b,c]

www.pediatrics.org/cgi/doi/10.1542/peds.2014-3409

Forty- fold variation in NICU antibiotic prescribing practice across 127 NICUs with similar burdens of proven infection, NEC, surgical volume, and mortality!

Range of AUR values and distribution of AUR values by level of care.



Joseph Schulman et al. Pediatrics 2015;135:826-833

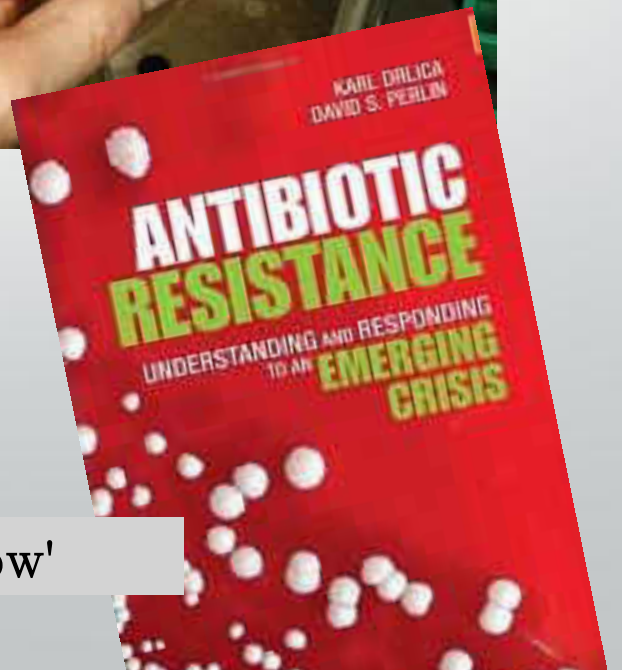
PEDIATRICS®

Antibiotic resistance now 'a public health problem of global proportions,' researcher warns

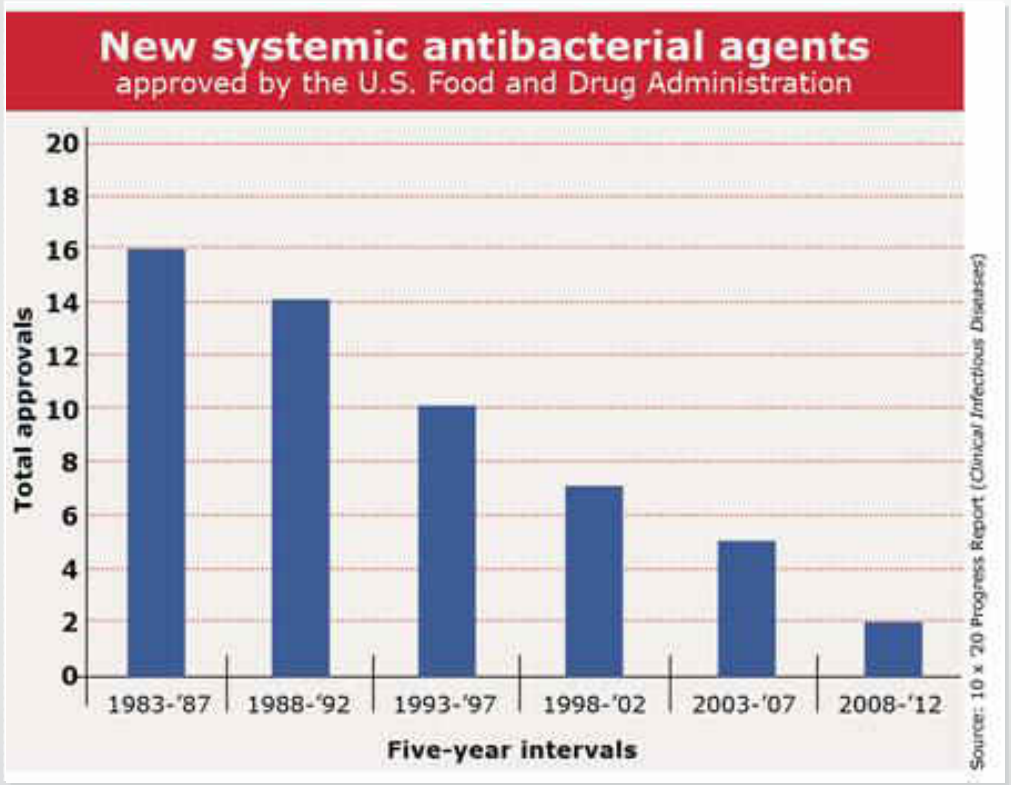
Superbug New Delhi–Metallo–1 spreading worldwide

London, Aug 11 (PTI)

Scientists have warned that a new superbug, called New Delhi-Metallo-1, which is resistant to antibiotics, has reached Britain and could spread worldwide as nothing is being developed to combat it.



Antibiotic progress on superbugs called 'alarmingly slow'

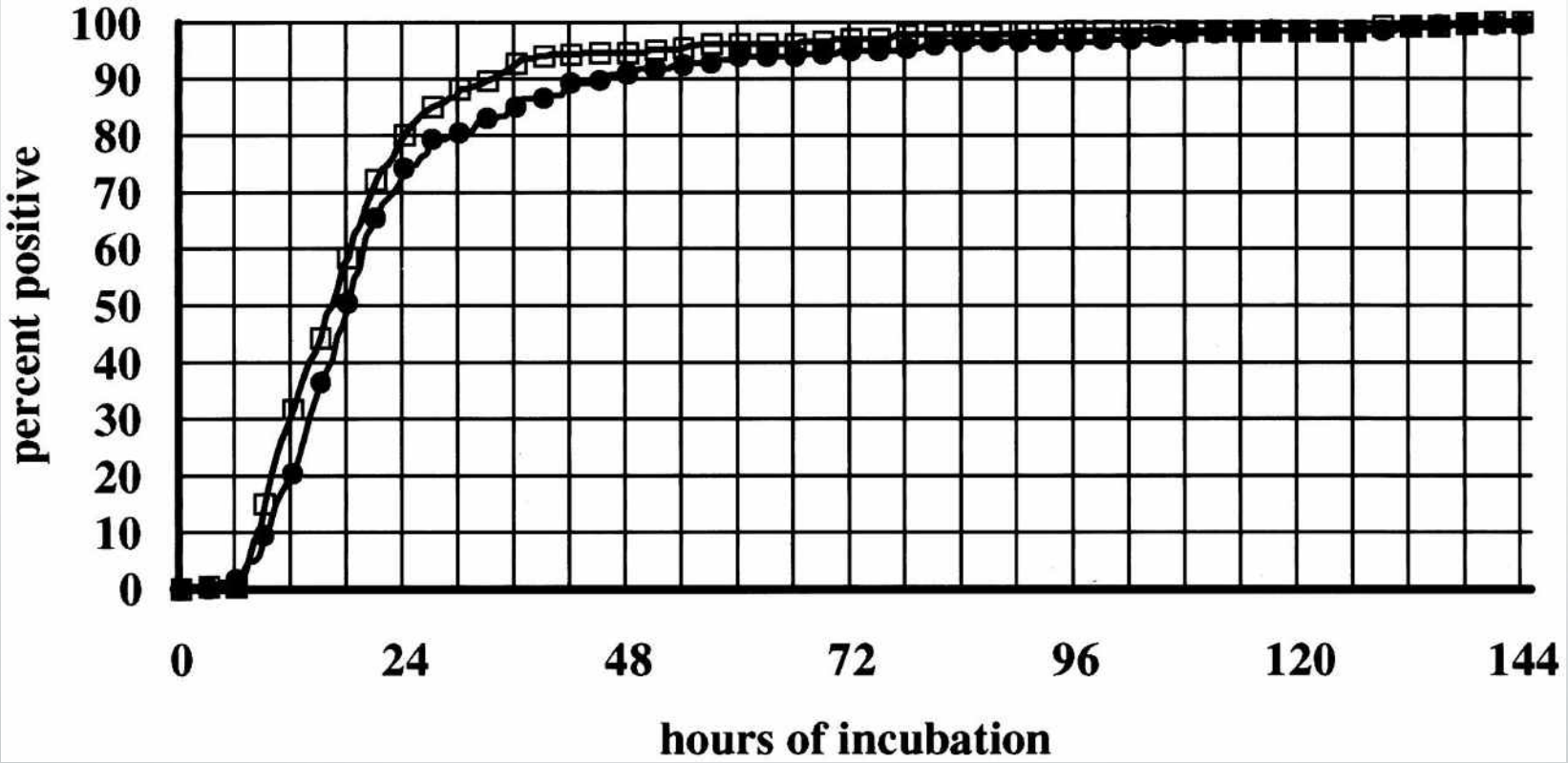

New systemic antibacterial agents
approved by the U.S. Food and Drug Administration
Total approvals
20
18
16
14
12
10
8
6
4
2
0
1983-'87
1988-'92
1993-'97
1998-'02
2003-'07
2008-'12
Five-year intervals
Source: 10 x '20 Progress Report (Clinical Infectious Diseases)

Prolongation of Empiric Antibiotic Course and later sepsis

Study (number of patients)	Group 1	Group 2	RR for LOS
Shah et al 2013 (216)	≥4 days	<4 days	2.1 (1.2-3.7)
Ghany et al 2012 (207)[a]	≥5 days	<5 days	1.27 (1.12-1.44)[b]
Kuppala et al 2011 (365)	≥5 days	<5 days	2.45 (1.28-4.67)
Cotton et al 2009 (4039)	≥4 days	<4 days	1.21 (1.03–1.42)

[a]received ampicillin and gentamicin
[b]risk per day of antibiotic

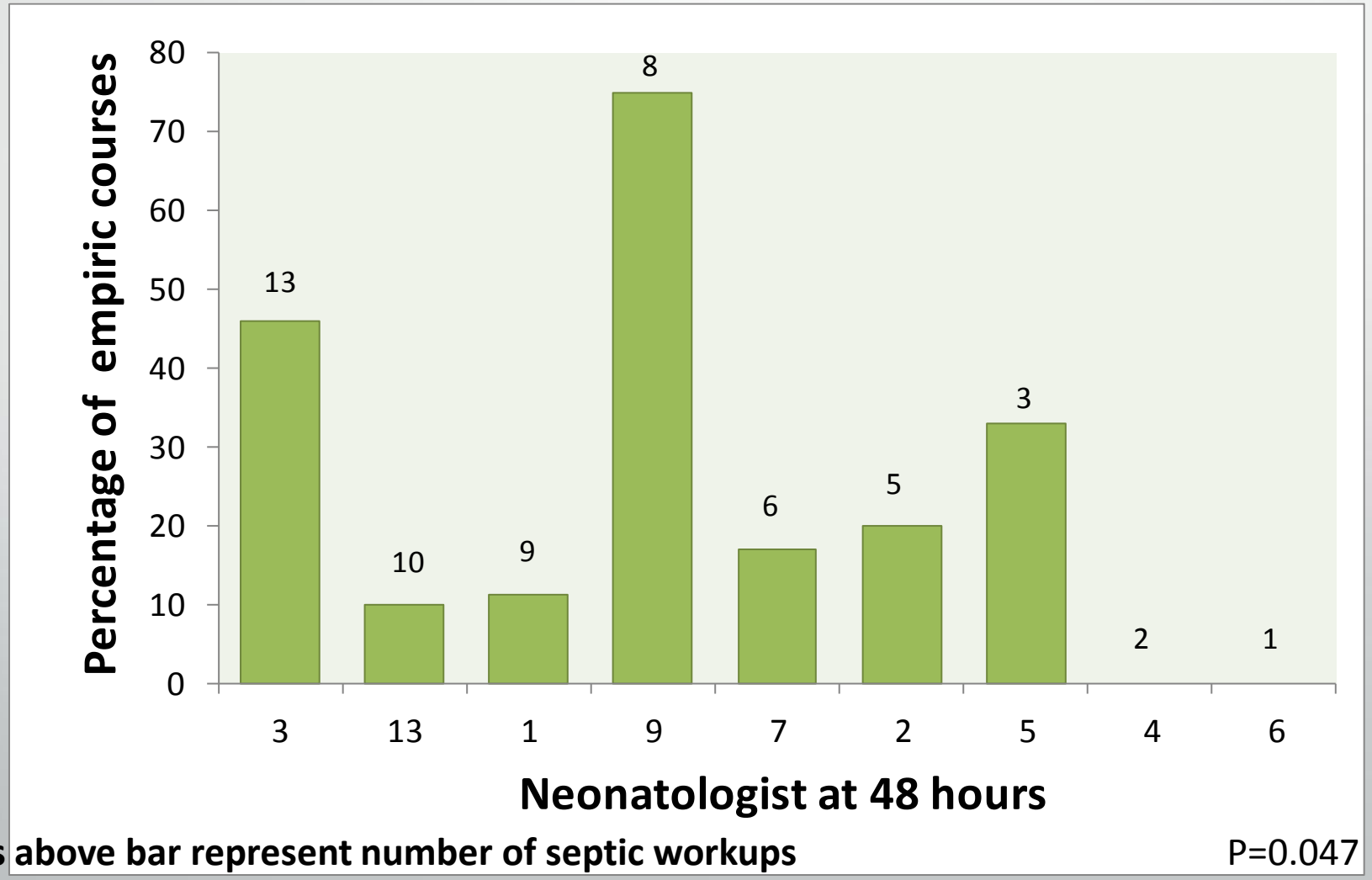
Comparison of time to detection of pretreatment (□) positive blood cultures and posttreatment (○) positive blood culture results.



Garcia-Prats J A et al. Pediatrics 2000;105:523-527

PEDIATRICS®

Prolonged Empiric Antibiotics in Culture Negative Infants < 29 weeks (>48 hours)



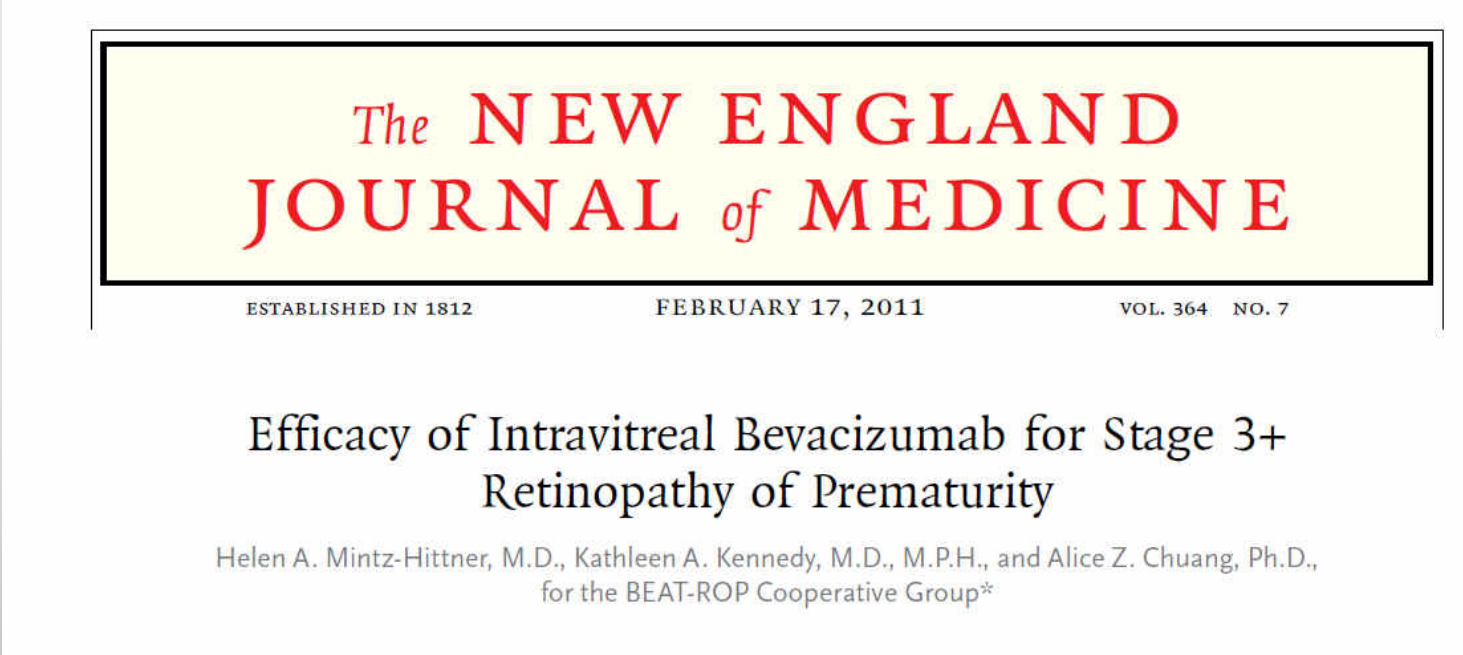
Numbers above bar represent number of septic workups

P=0.047

Retinopathy of Prematurity

- Screening : Identify the at-risk population
  - birth weight < 1500g
  - gestational age < 31/40

Retinopathy of Prematurity



The NEW ENGLAND JOURNAL of MEDICINE

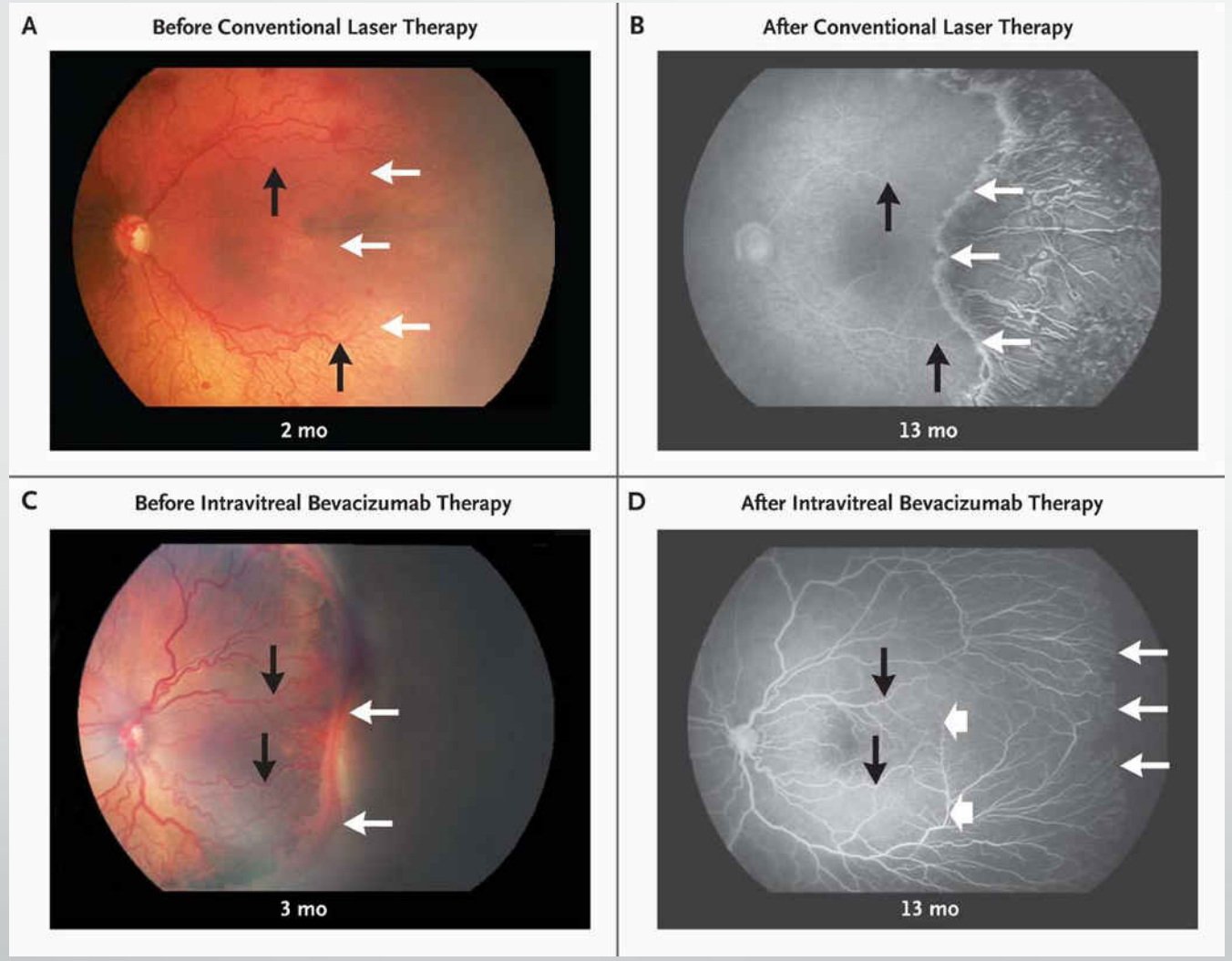
ESTABLISHED IN 1812 FEBRUARY 17, 2011 VOL. 364 NO. 7

Efficacy of Intravitreal Bevacizumab for Stage 3+ Retinopathy of Prematurity

Helen A. Mintz-Hittner, M.D., Kathleen A. Kennedy, M.D., M.P.H., and Alice Z. Chuang, Ph.D., for the BEAT-ROP Cooperative Group*

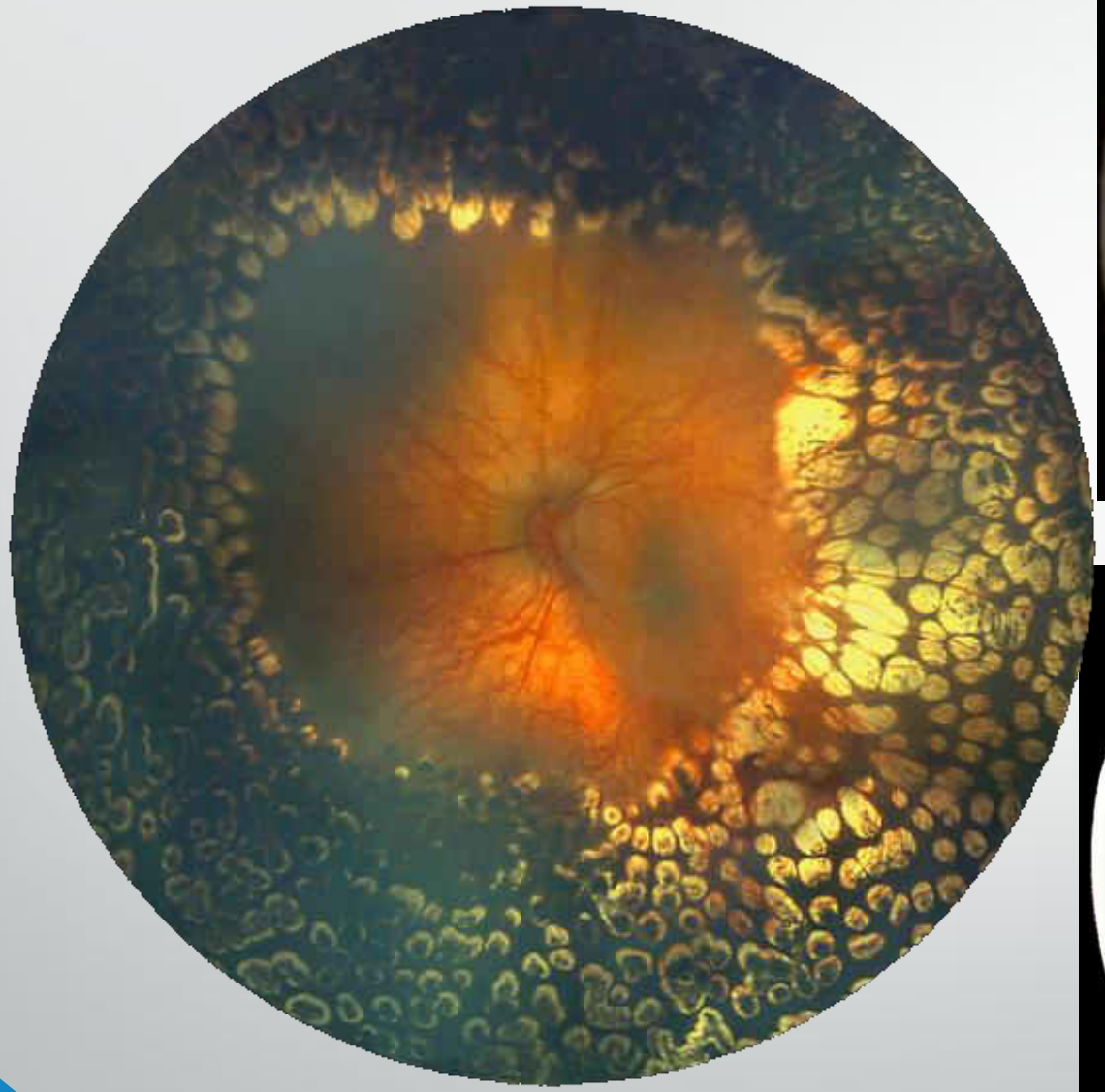
N ENGL J MED 364;7 NEJM.ORG FEBRUARY 17, 2011

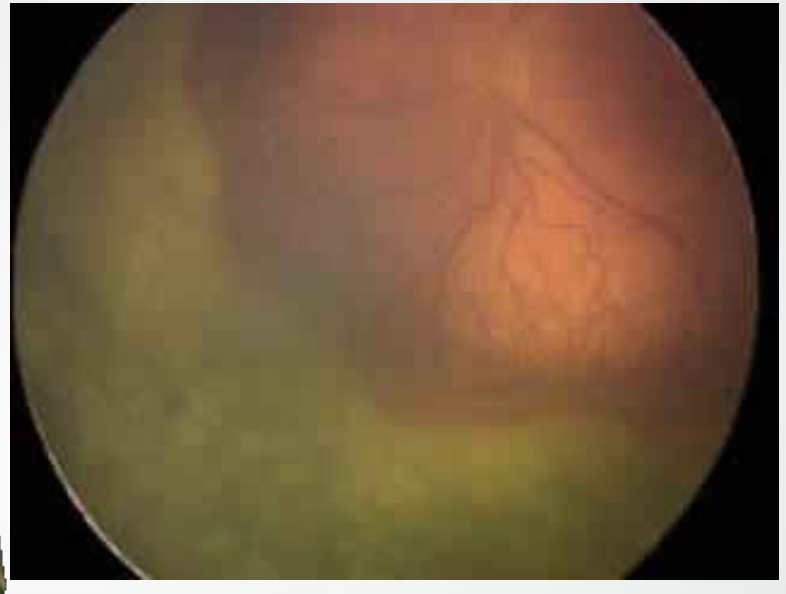
Fundus Photographs and Fluorescein Angiograms of Retinas in Study Infants with Stage 3+ Retinopathy of Prematurity in Zone I, before and after Treatment.

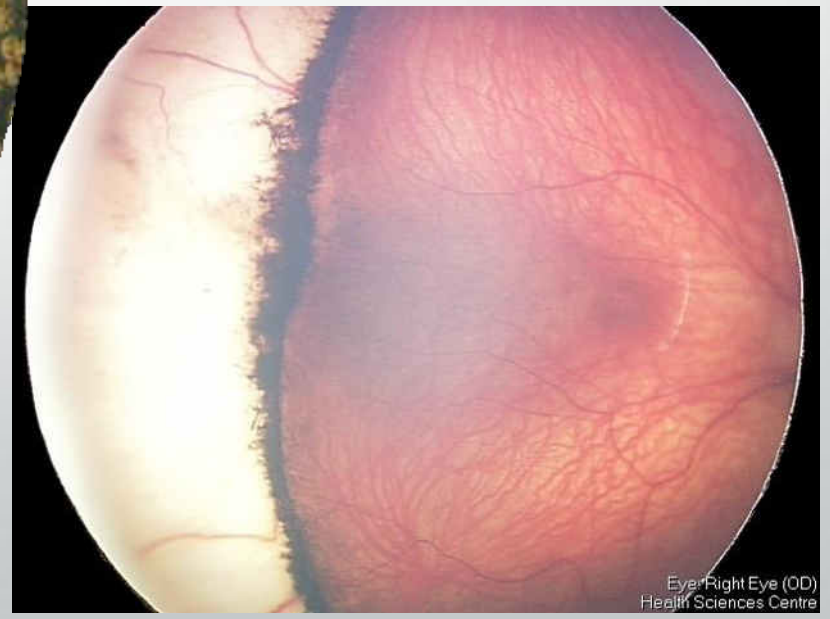


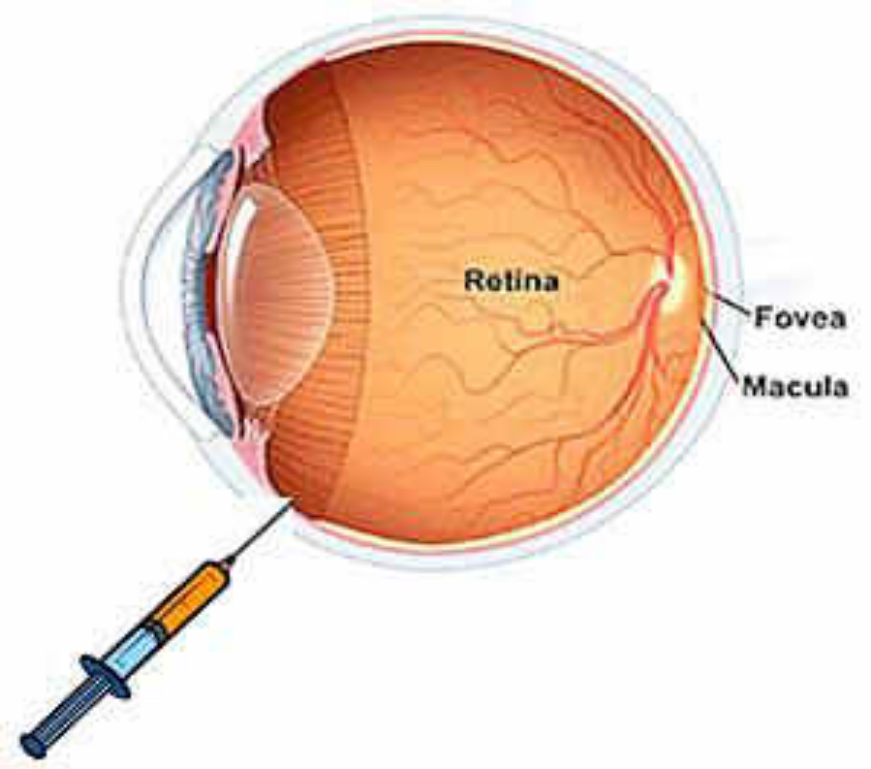
Mintz-Hittner HA et al. N Engl J Med 2011;364:603-615

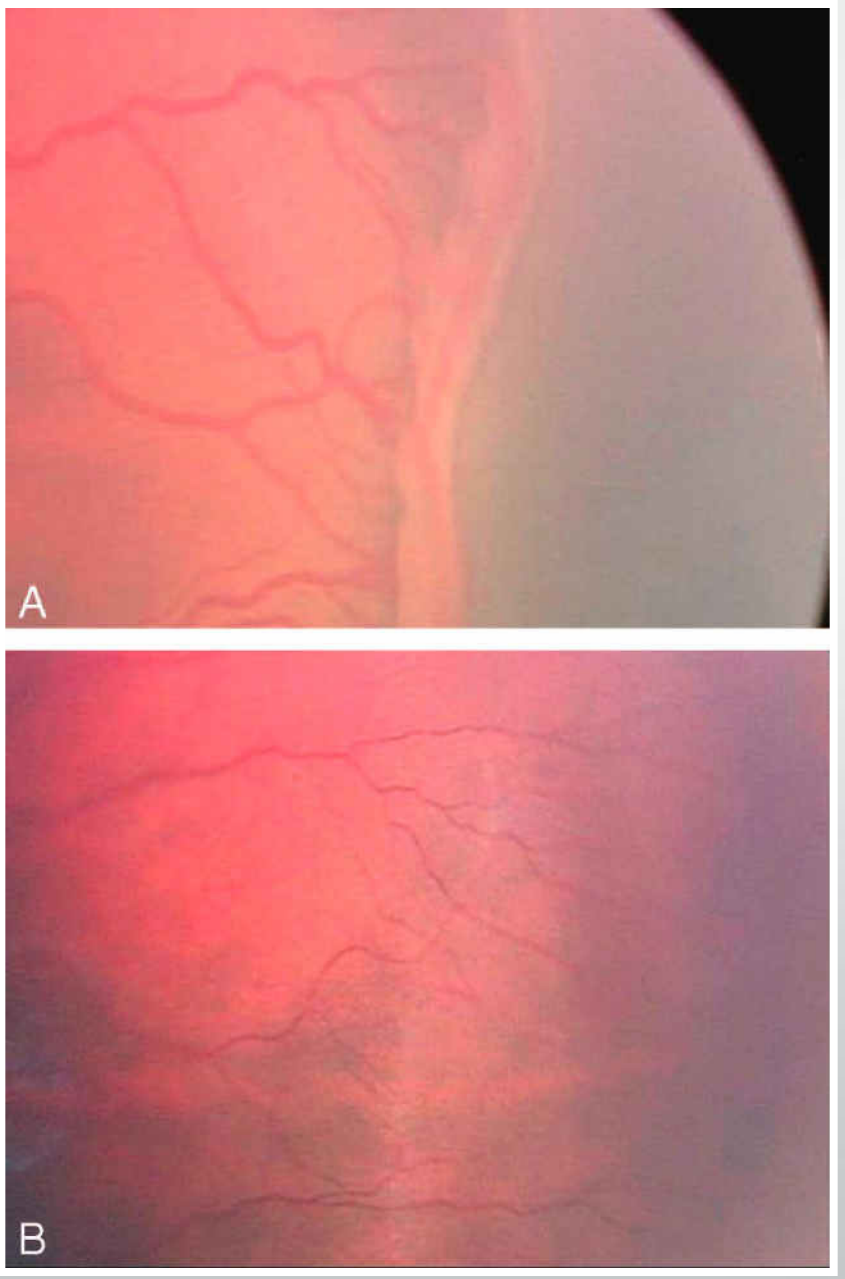
The NEW ENGLAND JOURNAL of MEDICINE

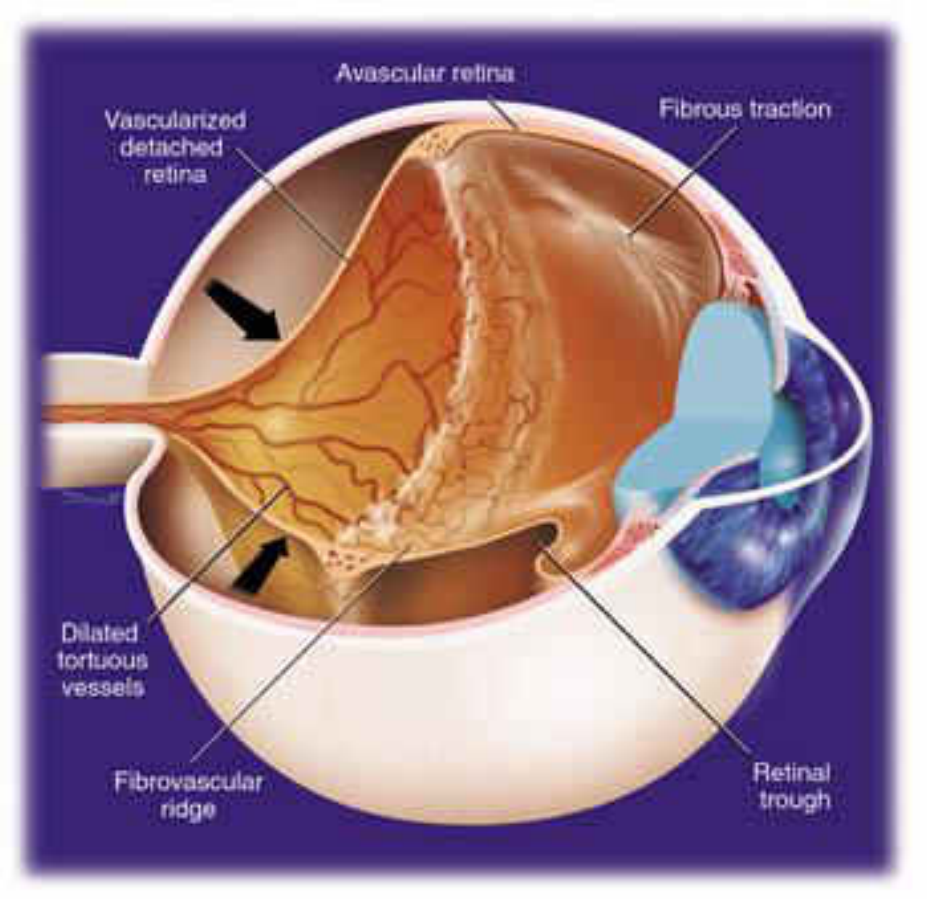


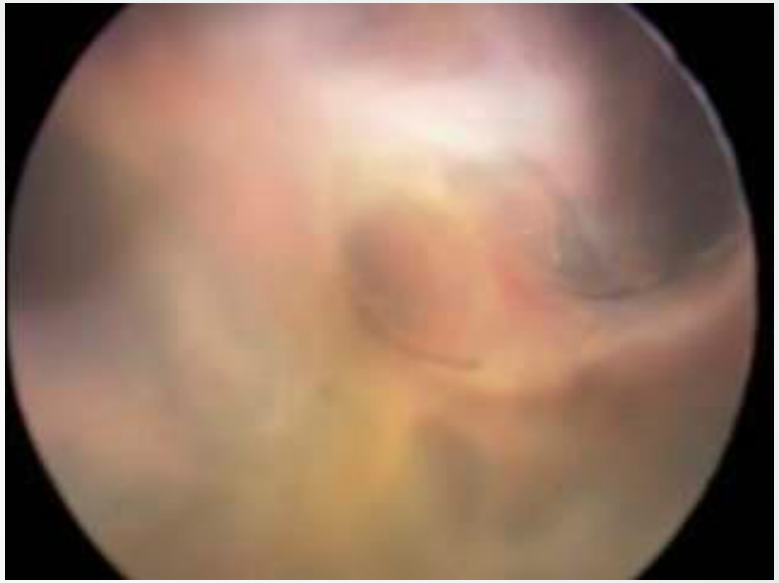


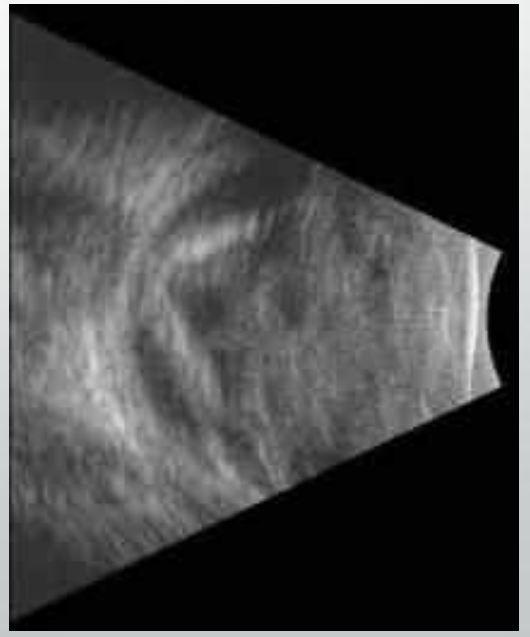

Eye: Right Eye (OD)
Health Sciences Centre


Retina
Fovea
Macula


A
B

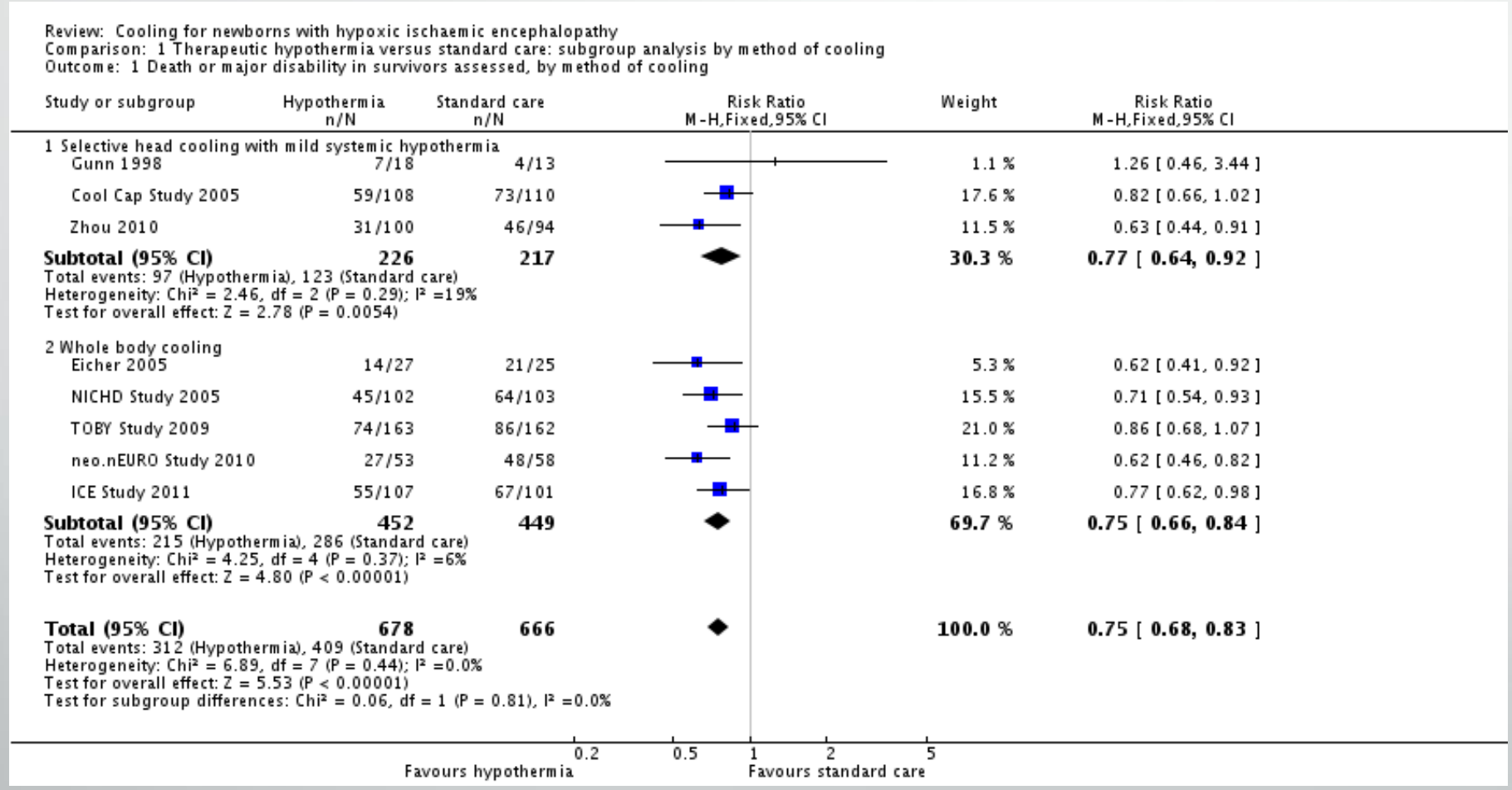

Avascular retina
Vascularized detached retina
Fibrous traction
Dilated tortuous vessels
Fibrovascular ridge
Retinal trough





Research translates to Practice ever so slowly

Therapeutic Hypothermia for HIE



Cooling for newborns with hypoxic ischaemic encephalopathy.
Jacobs SE1, Berg M, Hunt R, Tarnow-Mordi WO, Inder TE, Davis PG.

NIRS in HIE

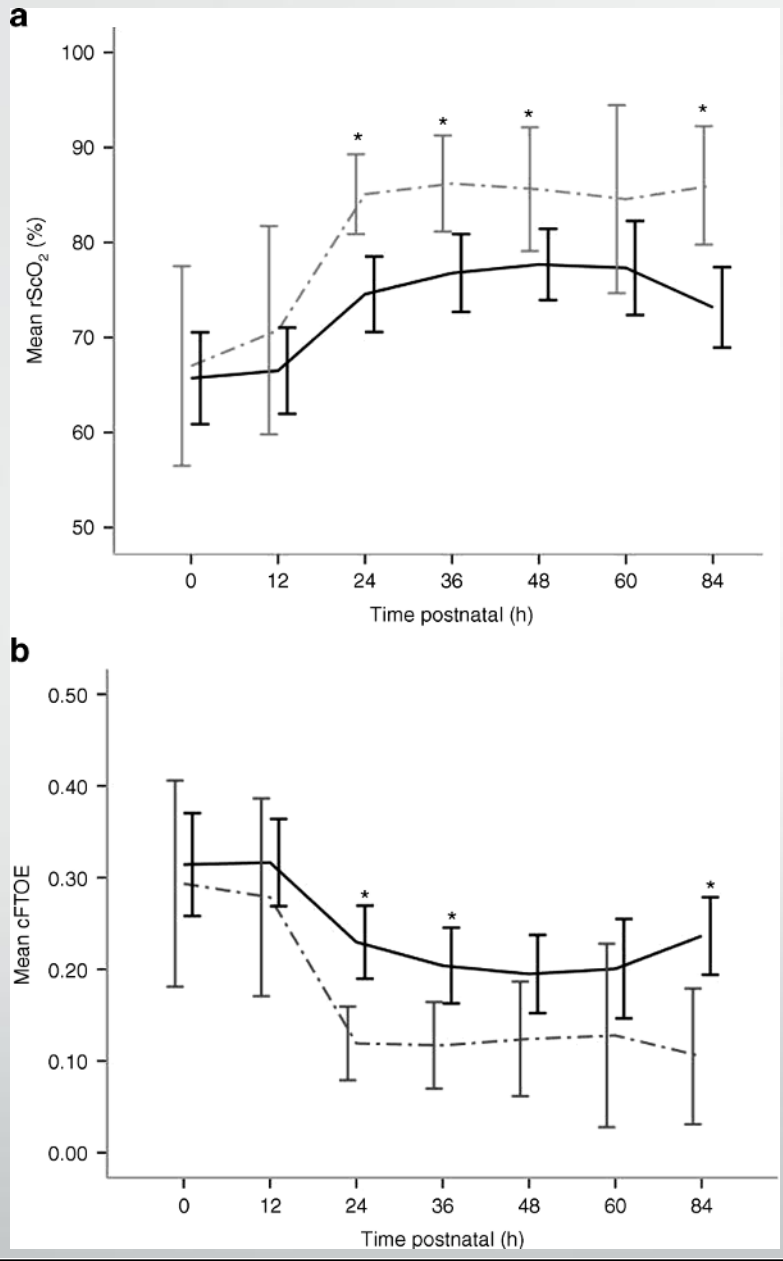


Figure 1

Pediatric RESEARCH

Petra M.A. Lemmers
(2013) **74**, 180-185. doi:10.1038/pr.2013.84

Is near-infrared spectroscopy clinically useful in the preterm infant?

Cristine Sortica da Costa,[1] Gorm Greisen,[2] Topun Austin[1]

Contents lists available at ScienceDirect

Seminars in Fetal & Neonatal Medicine

journal homepage: www.elsevier.com/locate/siny

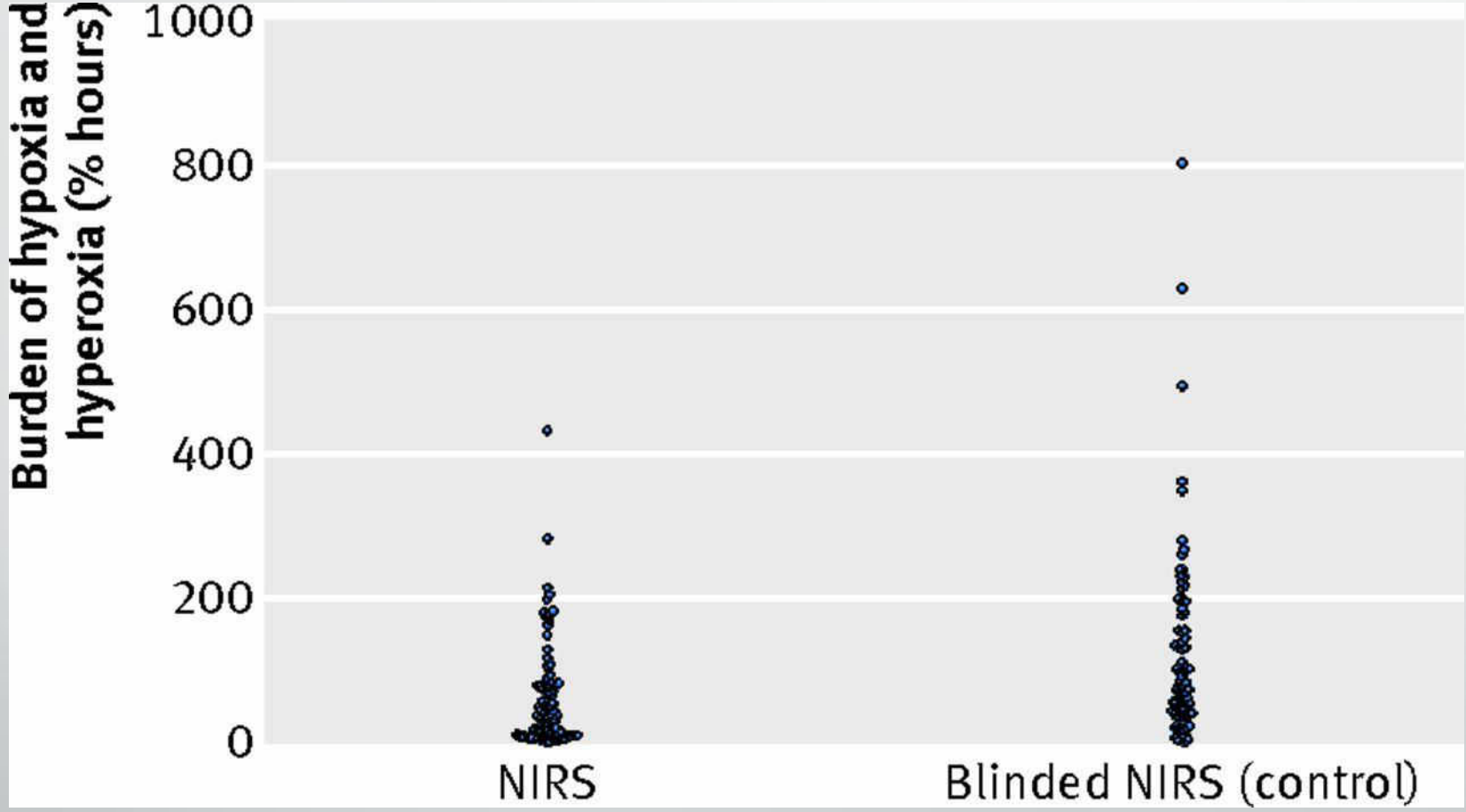
Review

Near-infrared spectroscopy: Applications in neonates

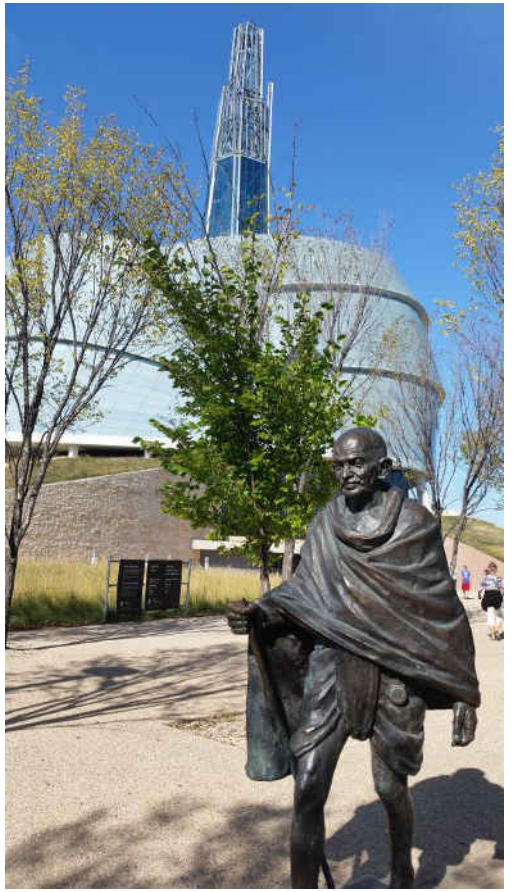
Beena G. Sood [a, b, *], Kathleen McLaughlin [b], Josef Cortez [c]

[a] Division of Neonatal–Perinatal Medicine, Department of Pediatrics, Wayne State University, Children's Hospital of Michigan, Detroit, MI, USA
[b] Hutzel Women's Hospital, Detroit, MI, USA
[c] Division of Neonatology, Department of Pediatrics, University of Florida Health Jacksonville, Jacksonville, FL, USA

Burden of hypoxia and hyperoxia by treatment group . SafeBoos



Simon Hyttel-Sorensen et al. BMJ 2015;350:bmj.g7635



How has research changed your practice?

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ganeshs1@hotmail.com