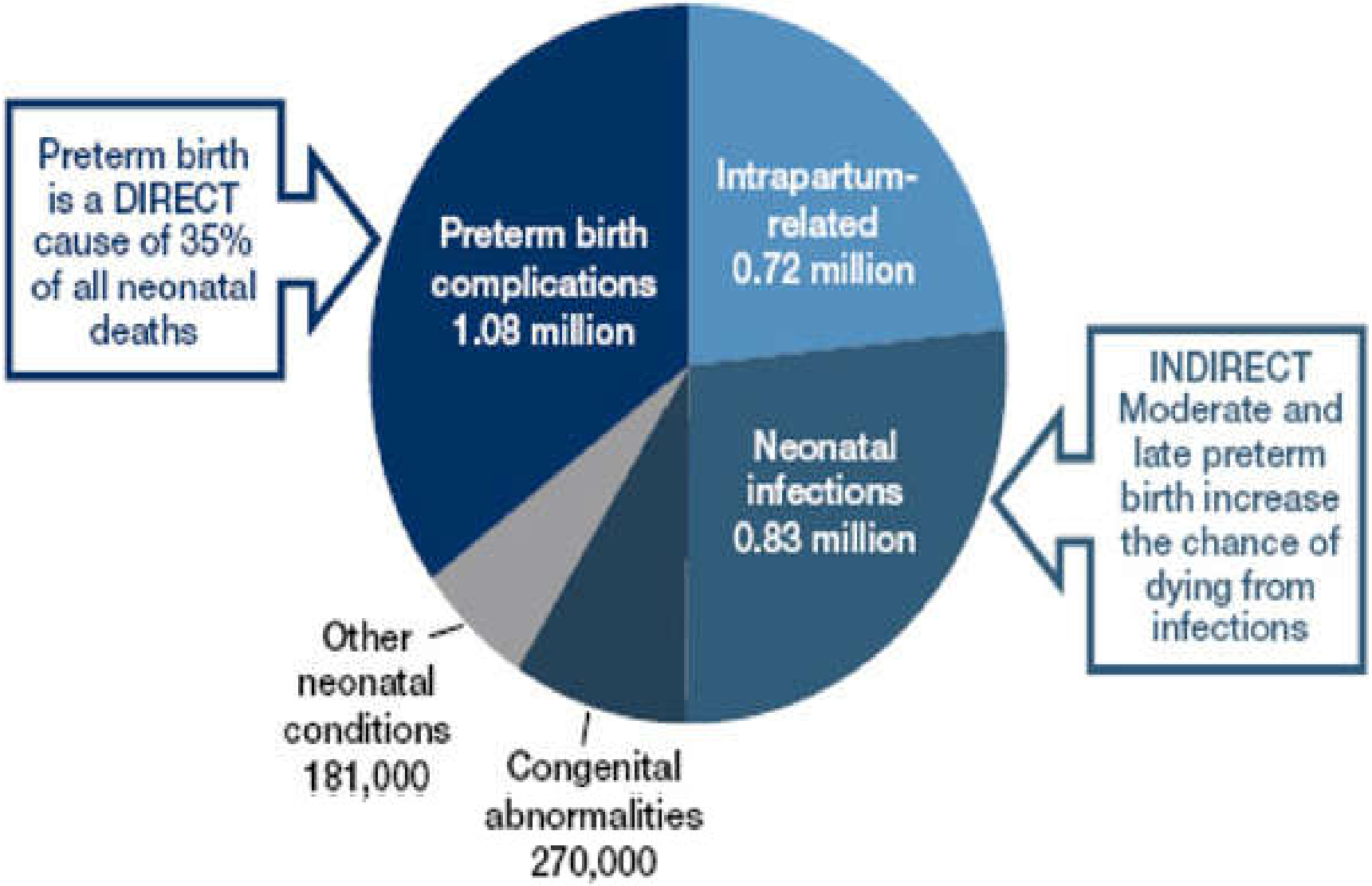
ENTERAL NUTRION IN PRETERM NEONATES



Preterm birth is a risk factor for neonatal and postneonatal deaths

At least 50% of all neonatal deaths are preterm

LONG OUTCOME IN PRETERM

Hospital re-admission

Brain development

Chronic diseases

Behavioural and psychomotor problems

Respiratory function

GOALS OF NUTRITION

Introdution

Proper nutrition is essential for
Normal growth
Immunity to infection
Optimal neurologic and cognitive development
Providing adequate nutrition to preterm infants is challenging because of several problems
Immaturity of bowel function
Inability to suck and swallow
High risk of necrotizing enterocolitis (NEC)
Illnesses that may interfere with adequate enteral feeding (e.g. RDS, PDA..)

Main questions

- *When to initiate enteral feeding*
- *Progession from minimal enteral feeding to nutritive feedings*
- *Bolus versus continuous feeding*
- *Choice of enteral formulation*

- *When to initiate enteral feeding*
- *Progession from minimal enteral feeding to nutritive feedings*

Cochrane Database of Systematic Reviews

y trophic feeding versus enteral fasting for very pre ery low birth weight infants (Review)

Morgan J, Bombell S, McG

rophic feeding defined as dilute or full strength feedings providing <= 25ml/kg/d for >= 5d (5 0 days)

ropic feeding vs. no feeding (9 trials, N = 754): **NO SIGNIFICIANT DIFFERENCE**

- Days to full enteral feedings
- The incidence of NEC
- Mortality
- Days of regain birth weight
- Invasive infection
- Days of phototherapy
- Hospital stay

Tropic feeding vs. advancing feeding (one trial): infants given tropic feedings reqired more days of full enteral feeding and longer hospital stay. Tropic feeding were associated with a significiant reduction in NEC.

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yed introduction of progressive enteral feeds to pre
otising enterocolitis in very low birth weight infants
iew)

Morgan J, Young L, McGuire

The effect of delayed (more than 4 days after birth) versus earlie
ntroduction progressive enteral feeds (N = 1106): **NO**
SIGNIFICIANT DIFFERENCE

- The incidence of NEC
- Mortality
- No intolerance
- The incidence of infection
- Hospital stay

rly or Delayed Enteral Feeding for Preterm owth-Restricted Infants: A Randomized Tria

Alison Leaf et al

Early (1 - 2 days) versus delayed (5 - 6 days) enteral feeding

N = 404, 54 United Kingdom and Ireland hospitals)

- Shorter duration of parental nutrition and high-dependency care
- Lower incidence of cholestatic jaudice
- Improved SD score for weight at discharge

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v advancement of enteral feed volumes to preve rotising enterocolitis in very low birth weight inf view)

Morgan J, Young L, McGuire W

9 trials, N = 949, slow **(15 - 24 ml/kg/day)** versus rapid rate

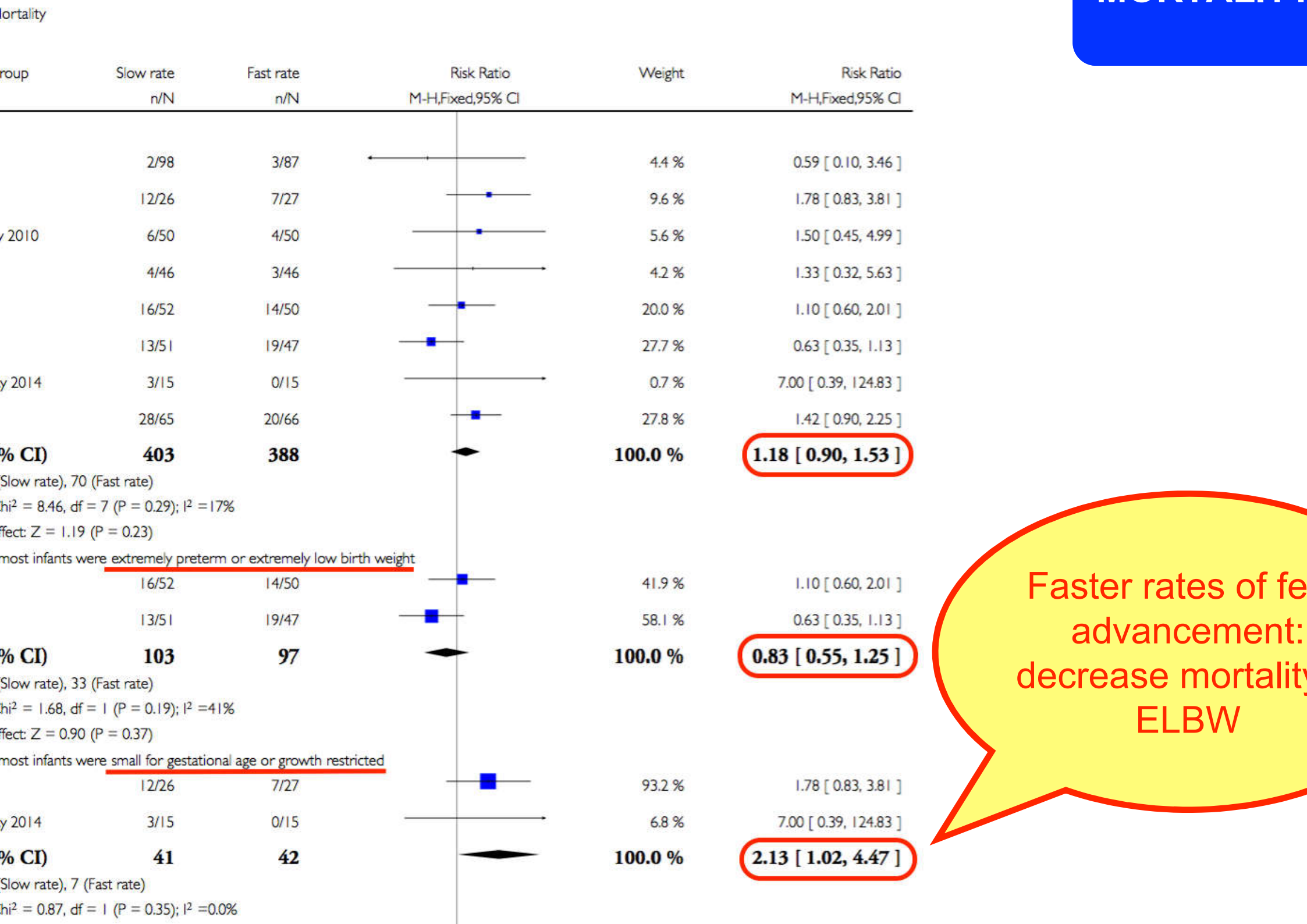
40 ml/kg/day) advancement of feedings:

- Incidence of NEC
- Mortality
- Feeds intolerance (causing interruption of enteral feeding)
- Incidence of invasive infection

idence of necrotising enterocolitis

oup	Slow rate n/N	Fast rate n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
	13/98	8/87		25.7 %	1.44 [0.63, 3.32]
	0/26	2/27		7.4 %	0.21 [0.01, 4.12]
	2/74	4/84		11.4 %	0.57 [0.11, 3.01]
2010	1/50	2/50		6.1 %	0.50 [0.05, 5.34]
	5/46	4/46		12.1 %	1.25 [0.36, 4.36]
	1/51	7/47		22.1 %	0.13 [0.02, 1.03]
2014	1/15	2/15		6.1 %	0.50 [0.05, 4.94]
	9/52	2/50		6.2 %	4.33 [0.98, 19.05]
	2/65	1/66		3.0 %	2.03 [0.19, 21.85]
% CI)	**477**	**472**		**100.0 %**	**1.02 [0.64, 1.62]**
low rate), 32 (Fast rate)					
i^2 = 10.83, df = 8 (P = 0.21); I^2 =26%					
ect: Z = 0.08 (P = 0.93)					
nost infants were extremely preterm or extremely low birth weight					
	9/52	2/50		21.9 %	4.33 [0.98, 19.05]
	1/51	7/47		78.1 %	0.13 [0.02, 1.03]
% CI)	**103**	**97**		**100.0 %**	**1.05 [0.44, 2.51]**
low rate), 9 (Fast rate)					
i^2 = 7.42, df = 1 (P = 0.01); I^2 =87%					
ect: Z = 0.11 (P = 0.91)					
nost infants were small for gestational age or growth restricted					
	0/26	2/27		55.1 %	0.21 [0.01, 4.12]
2014	1/15	2/15		44.9 %	0.50 [0.05, 4.94]
% CI)	**41**	**42**		**100.0 %**	**0.34 [0.06, 2.04]**
ow rate), 4 (Fast rate)					

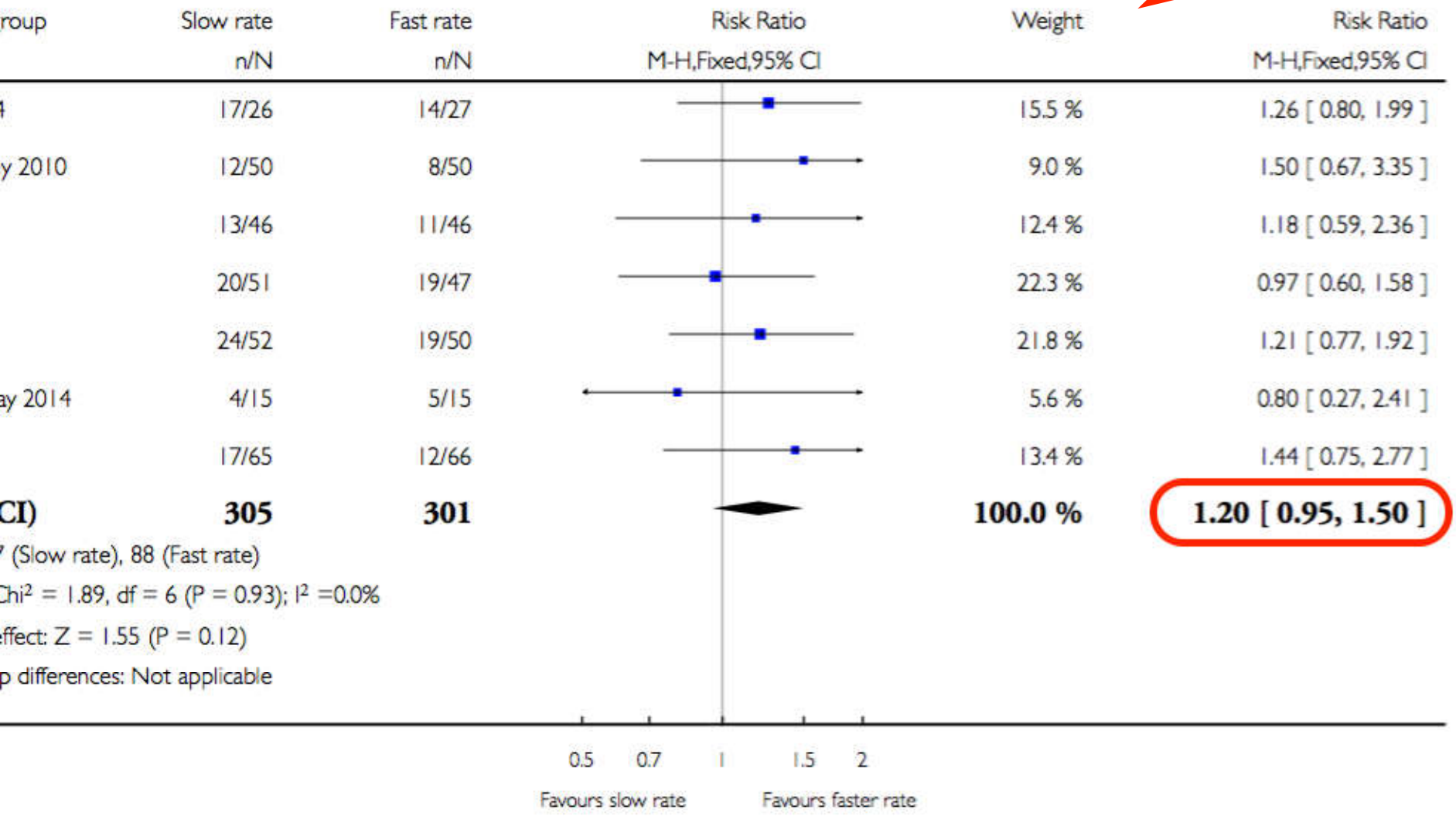
NO SIGNIFICIAN
DIFFERENCE


lortality
roup
Slow rate
n/N
Fast rate
n/N
Risk Ratio
M-H,Fixed,95% CI
Weight
Risk Ratio
M-H,Fixed,95% CI
2/98 3/87 4.4 % 0.59 [0.10, 3.46]
12/26 7/27 9.6 % 1.78 [0.83, 3.81]
y 2010 6/50 4/50 5.6 % 1.50 [0.45, 4.99]
4/46 3/46 4.2 % 1.33 [0.32, 5.63]
16/52 14/50 20.0 % 1.10 [0.60, 2.01]
13/51 19/47 27.7 % 0.63 [0.35, 1.13]
y 2014 3/15 0/15 0.7 % 7.00 [0.39, 124.83]
28/65 20/66 27.8 % 1.42 [0.90, 2.25]
% CI) 403 388 100.0 % 1.18 [0.90, 1.53]
Slow rate), 70 (Fast rate)
hi² = 8.46, df = 7 (P = 0.29); I² =17%
ffect: Z = 1.19 (P = 0.23)
most infants were extremely preterm or extremely low birth weight
16/52 14/50 41.9 % 1.10 [0.60, 2.01]
13/51 19/47 58.1 % 0.63 [0.35, 1.13]
% CI) 103 97 100.0 % 0.83 [0.55, 1.25]
Slow rate), 33 (Fast rate)
hi² = 1.68, df = 1 (P = 0.19); I² =41%
ffect: Z = 0.90 (P = 0.37)
most infants were small for gestational age or growth restricted
12/26 7/27 93.2 % 1.78 [0.83, 3.81]
y 2014 3/15 0/15 6.8 % 7.00 [0.39, 124.83]
% CI) 41 42 100.0 % 2.13 [1.02, 4.47]
Slow rate), 7 (Fast rate)
hi² = 0.87, df = 1 (P = 0.35); I² =0.0%
Faster rates of fe
advancement:
decrease mortality
ELBW

advancement of enteral feed volumes to prevent necrotising enterocolitis in very low birth weight infants

l Slow versus faster rates of feed advancement

eeds intolerance (causing interruption of enteral feeding)



NO SIGNIFICIANT DIFFERENCE

NO INTOLERANCE

advancement of enteral feed volumes to prevent necrotising enterocolitis in very low birth weight infants

Slow versus faster rates of feed advancement

ncidence of invasive infection

DECREASE INFECTION

roup	Slow rate n/N	Fast rate n/N	Risk Ratio M-H,Fixed,95% CI	Weight	Risk Ratio M-H,Fixed,95% CI
	10/46	6/46		14.2 %	1.67 [0.66, 4.21]
y 2010	5/50	4/50		9.5 %	1.25 [0.36, 4.38]
	24/65	17/66		39.9 %	1.43 [0.85, 2.41]
y 2014	4/15	2/15		4.7 %	2.00 [0.43, 9.32]
	9/51	9/47		22.1 %	0.92 [0.40, 2.12]
	10/52	4/50		9.6 %	2.40 [0.81, 7.17]
CI)	**279**	**274**		**100.0 %**	**1.46 [1.03, 2.06]**

(Slow rate), 42 (Fast rate)

Chi^2 = 2.27, df = 5 (P = 0.81); I^2 =0.0%

ffect: Z = 2.12 (P = 0.034)

o differences: Not applicable

0.1 0.2 0.5 1 2 5 10

Favours slow rate Favours fast rate

INVASIVE INFECTION

Bolus or continuous tube feeding

ntermittent bolus milk for premature infant less han 1500gram, 2008 Cochrane collaboration

7 trials, N= 511, found no differences in time to achieve full enteral.
No significiant difference in somatic growth and incidence of NEC

Authors' conclusions:

Small sample sizes, methodologic limitations, inconsistencies in controlling variables that may affect outcomes, and conflicting results of the studies to date make it difficult to make universal recommendations regarding the best tube feeding method for premature infants less than 1500 grams. The clinical benefits and risks of continuous versus intermittent nasogastric tubemilk feeding cannot be reliably discerned from the limited information available from randomised trials to date.

Cochrane Database of Systematic Reviews

biotics for prevention of necrotizing enterocolit erm infants (Review)

AlFaleh K, Anabrees J

Compare probiotics versus placebo: 24 trials

- Reduced the incidence of severe NEC(stage II - III): RR 0,43 (95% CI 0.33 - 0.56, 20 trials, N = 5529)
- Reduced mortality: RR 0.65 (95% CI 0.52 - 0.81, 17 trials, N = 5112)
- Nosocomial sepsis : no difference RR 0.91 (95% CI 0.80 - 1.03, 19 trials, N = 5338)
- Lactobacillus alone or in combination with Bifidobacterium: effective

ENTERAL FEEDING
UpToDate (2016)

The final goal: 160 ml/kg/days(PN stop when enteral feeds
00ml/kg/day)

≤1000g:

- Day 1 - 3: 15 ml/kg/day
- Day 4: increase 15 ml/kg/day

001 - 1500g:

- Day 1 - 2: 20 ml/kg/day
- Day 3: increase 20 ml/kg/day

501 - 1800g:

- Day 1: 25 ml/kg/day
- Increase 25 ml/kg/day

ENTERAL FEEDING
John Hunter Children's Hospital (2013)

BW	Initial feeding (ml/kg/day)	Increasing (ml/kg per 12 hours)
< 1000 g	10	10
1001 - 1250 g	10 - 20	10
1251 - 1500 g	20 - 30	10 - 15
1501 - 1800 g	30	15
1801 - 2500 g	30 - 40	15 - 20

...chnics for Feeding Very Low Birth Weight In...

...on of Neonatology, Department of Pediatrics, McMaster University Children's H...

...Time to full feeding (150 - 180 ml/kg/day)

- < 1kg: 2 weeks
- ≥1kg: 1 week

...nitial and increasing feeding

- < 1kg: 15 - 20 ml/kg and increase 15 - 20 ml/kg/day
- ≥ 1kg: 30 ml/kg and increase 30 ml/kg/day

...The frequency of feeding:

- < 1250g: every 2 hours
- ≥ 1250g: every 3 hours

ASSESSMENT OF FEED TOLERANCE

Nause, vomiting

Abdomen : distension, pain, visible bowel loops

Gastric residuals: GRV, green, yellow, brown

Stool: diarrhea, bloody

Symptoms : apnea, bradycardia, temperature instability

Formula milk versus maternal breast milk for feeding preterm or low birth weight infants 2008 Cochrane Collaboration

There are no data from randomised trials of formula milk versus maternal breast milk for feeding preterm or low birth weight infants.

Maternal breast milk remains choice of enteral nutrition because observational studies, and meta-analyses of trials comparing feeding with formula milk versus donor breast milk, suggest that feeding with breast milk has major non-nutrient advantages for preterm or low birth weight infants.

preterm infants: systematic review and meta-analysis. Cochrane collaboration 2006

7 trials, N 471

Lower risk of NEC in infants receiving donor breast milk (RR 0.1, 95% CI 0.06-0.76)

Donor breast milk: slower growth in the early postnatal period, but its long-term effect is unclear

Multi-nutrition fortification of breast milk for preterm infants, Cochrane 2016

14 trials, N 1071

Increase growth rates preterm infants during their initial hospital admission (low- quality evidence)

Breastfeeding

Human milk:

- Reduce rates of sepsis, NEC
- Fewer hospital readmissions
- Vitamins or minerals: vit A, vit D, Vit K, iron, zinc, calcium and phosphorus

HMF product

CONCLUSION

Early initiation of enteral nutrtion

Advancement of feeds depend on gestational age and birth weight

Use of approriate enteral products

Monitoring of growth and nutrition