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TABLE OF CONTENTS

HEADER	1
ABSTRACT	1
PLAIN LANGUAGE SUMMARY	2
BACKGROUND	3
OBJECTIVES	3
METHODS	3
RESULTS	5
DISCUSSION	6
Figure 1.	6
AUTHORS' CONCLUSIONS	7
ACKNOWLEDGEMENTS	7
REFERENCES	8
CHARACTERISTICS OF STUDIES	9
DATA AND ANALYSES	11
Analysis 1.1. Comparison 1 Nasal versus oral placement of enteral feeding tubes, Outcome 1 Time to achieve full enteral feeding (days after birth).	12
Analysis 1.2. Comparison 1 Nasal versus oral placement of enteral feeding tubes, Outcome 2 Time to re-gain birth weight (days after birth).	12
Analysis 1.3. Comparison 1 Nasal versus oral placement of enteral feeding tubes, Outcome 3 Need for oxygen supplementation (days after birth).	12
WHAT'S NEW	12
CONTRIBUTIONS OF AUTHORS	13
DECLARATIONS OF INTEREST	13
SOURCES OF SUPPORT	13
DIFFERENCES BETWEEN PROTOCOL AND REVIEW	13
INDEX TERMS	13

[Intervention Review]

Nasal versus oral route for placing feeding tubes in preterm or low birth weight infants

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ABSTRACT

Background

Enteral feeding tubes for preterm or low birth weight infants may be placed via either the nose or mouth. Nasal placement may compromise respiration. However, orally placed tubes may be more prone to displacement, local irritation, and vagal stimulation.

Objectives

To determine the effect of nasal versus oral placement of enteral feeding tubes on feed tolerance, growth and development, and the incidence of adverse events in preterm or low birth weight infants.

Search methods

We used the standard search strategy of the Cochrane Neonatal Review Group. This included searches of the Cochrane Central Register of Controlled Trials (*The Cochrane Library*, 2012, Issue 10), MEDLINE, EMBASE, and CINAHL (to September 2012), conference proceedings, and previous reviews.

Selection criteria

Randomised or quasi-randomised controlled trials that compared nasal versus oral placement of enteral feeding tubes in preterm or low birth weight infants.

Data collection and analysis

We extracted data using the standard methods of the Cochrane Neonatal Review Group with separate evaluation of trial quality and data extraction by two review authors. We synthesised data using a fixed-effect model and reported typical risk ratio (RR), risk difference (RD), and weighted mean difference (WMD).

Main results

Three studies fulfilled the review eligibility criteria. Two were parallel group trials ([van Someren 1984](#); [Dsilna 2005](#)) and one was a cross-over trial ([Bohnhorst 2010](#)). The two parallel group randomised controlled trials enrolled 88 preterm infants. Only one trial reported data on the pre-specified primary outcomes for this review. This trial found no evidence of effect on the time taken to establish enteral feeding or the time taken to regain birth weight. However, the trial was underpowered to exclude modest effect sizes. We identified one randomised cross-over trial in which 35 very preterm infants participated. This study did not find any statistically significant effects on the incidence of apnoea, desaturation, and bradycardia during the study period.

Authors' conclusions

There are insufficient data available to inform practice. A large randomised controlled trial would be required to determine if the use of naso- versus oro-enteric feeding tubes affects feeding, growth and development, and the incidence of adverse events in preterm or low birth weight infants.

PLAIN LANGUAGE SUMMARY**Nasal versus oral route for placing feeding tubes in preterm or low birth weight infants**

When preterm or low birth weight infants are too immature or unwell to suck feeds they can receive their milk through a feeding tube passed via either the nose or the mouth. Although tubes placed via the nose may be more stable and less prone to displace than tubes passed via the mouth, there is concern that nasal tubes will partially obstruct breathing. Only three small trials were found that compared these two options and these did not find convincing evidence to support routine use of one route rather than the other.

BACKGROUND

Description of the condition

The establishment of safe oral feeding in preterm or low birth weight infants may be delayed because of poor co-ordination of sucking and swallowing, neurological immaturity and respiratory distress.

Description of the intervention

Enteral feeds may be delivered through a catheter (feeding tube) passed via the nose or via the mouth into the stomach or upper small intestine. There are potential advantages and disadvantages to both the nasal and oral routes for enteral feeding tube placement. Policy and practice varies between and within neonatal care units (Shiao 1996; Birnbaum 2009; Gregory 2012).

How the intervention might work

Enteral feeding tubes passed via the nose are easier to secure to the face than orally placed tubes. However, since newborn infants are obligate nose breathers, feeding tubes placed via the nose can cause partial nasal obstruction, which increases airway resistance and work of breathing (Stocks 1980; Greenspan 1990). Airway resistance may differ between infants of similar weights due to differences in nasal size and structure. Naso-enteric intubation through the larger nostril may increase airway resistance as the infant is forced to breathe through an airway of smaller calibre. This increase in energy expenditure may potentially affect nutrient requirements and growth.

Orally placed enteral tubes are more frequently malpositioned compared to nasally placed tubes (Ellett 1998). Incorrect placement, or subsequent displacement, of feeding tubes into the lower oesophagus or into the lung can lead to aspiration, respiratory compromise, and increased energy expenditure. Furthermore, orally placed tubes may be easier to displace as they can loop inside the mouth. Repetitive movement of the orally placed tube may result in mucosal trauma and may increase the incidence of apnoea and bradycardia due to vagal stimulation. Similarly, orally placed duodenal and jejunal tubes may be easier to displace proximally, potentially increasing the risk of aspiration and respiratory compromise.

Why it is important to do this review

Given the potential for the route of enteral tube placement to affect important outcomes for preterm or low birth weight infants, we have attempted to detect, appraise and synthesise the available evidence from randomised controlled trials to inform practice and research.

OBJECTIVES

To determine the effect of nasal versus oral placement of enteral feeding tubes on feed tolerance, the incidence of adverse events, and growth and development, in preterm or low birth weight infants.

METHODS

Criteria for considering studies for this review

Types of studies

Controlled trials using either random or quasi-random patient allocation.

Types of participants

Preterm infants (< 37 weeks' gestation) or low birth weight infants (< 2500 g) receiving enteral tube feeding.

Types of interventions

Trials comparing nasal versus oral placement of enteral feeding tubes. Feeding tubes could have been in place either continuously (indwelling) or placed just for the duration of feeding and removed between feeds provided the same strategy was used for both the nasal and oral placement groups.

Types of outcome measures

Primary outcomes

1. Time to establish full enteral tube feeds independently of parenteral fluids or nutrition (days).

Secondary outcomes

1. Adverse events:
 - incidence of non-intentional removal or displacement of feeding tube;
 - apnoea defined as breathing pauses that last for > 20 seconds or for > 10 seconds if associated with bradycardia or oxygen desaturation (Finer 2006);
 - aspiration pneumonia/pneumonitis: clinical, radiological, or both, evidence of lower respiratory tract compromise that has been attributed to covert or evident aspiration of gastric contents.
2. Growth: time to re-gain birth weight and subsequent rates of weight gain, linear growth, head growth, or skinfold thickness growth.
3. Time to independence from supplemental oxygen (days).
4. Time to establish full oral feeds (at least 120 mL/kg/day) (days).

Search methods for identification of studies

We used the standard search strategy of the Cochrane Neonatal Review Group (<http://neonatal.cochrane.org/>).

Electronic searches

We searched the Cochrane Central Register of Controlled Trials (*The Cochrane Library*, Issue 10, 2012), MEDLINE (1966 to September 2012) and EMBASE (1980 to September 2012). The search strategy used the following text words and Medical Subject Headings: [Infant, Newborn OR Infant, Premature OR Infant, Low Birth Weight OR Infant, Very Low Birth Weight OR neonate\$ OR infan\$ OR preterm OR low birth weight OR LBW] AND [Enteral Nutrition/methods OR Intubation, Gastrointestinal OR nasogastric OR orogastric]. We used a search filter in MEDLINE and EMBASE to limit retrieval to clinical trials. We did not apply any language restrictions.

We searched [ClinicalTrials.gov](#), [Current Controlled Trials](#) and [WHO Clinical Trials Registry](#) for completed or ongoing trials.

Searching other resources

We examined the references in studies identified as potentially relevant. We also searched the abstracts from the annual meetings of the Pediatric Academic Societies (1993 to 2012), the European Academy of Paediatrics (1995 to 2012), the UK Royal College of Paediatrics and Child Health (2000 to 2012) and the Perinatal Society of Australia and New Zealand (2000 to 2012). We considered trials reported only as abstracts to be eligible if sufficient information was available from the report, or from contact with the authors to fulfil the inclusion criteria.

Data collection and analysis

We used the standard methods of the Cochrane Neonatal Review Group (neonatal.cochrane.org/) and The Cochrane Collaboration (Higgins 2011).

Selection of studies

Two review authors screened the title and abstract of all studies identified by the above search strategy. We assessed the full text of any potentially eligible reports and excluded those studies that did not meet all of the inclusion criteria. We discussed any disagreements until consensus was achieved.

Data extraction and management

We used a data collection form to aid extraction of relevant information from each included study. Two review authors extracted the data separately. We discussed any disagreements until consensus was achieved. We asked the investigators for further information if data from the trial reports were insufficient.

Assessment of risk of bias in included studies

We used the criteria and standard methods of the Cochrane Neonatal Review Group to assess the methodological quality of any included trials. Additional information from the trial authors was requested to clarify methodology and results as necessary. We evaluated and reported the following issues in the 'Risk of bias' tables:

1. Sequence generation: we categorised the method used to generate the allocation sequence as:
 - a. low risk: any random process, for example random number table; computer random number generator;
 - b. high risk: any non-random process, for example odd or even date of birth; patient case-record number;
 - c. unclear.
2. Allocation concealment: we categorised the method used to conceal the allocation sequence as:
 - a. low risk: for example telephone or central randomisation; consecutively numbered sealed opaque envelopes;
 - b. high risk: open random allocation; unsealed or non-opaque envelopes, alternation; date of birth;
 - c. unclear.

3. Blinding: we assessed blinding of participants, clinicians and caregivers, and outcome assessors separately for different outcomes and categorised the methods as:
 - a. low risk;
 - b. high risk;
 - c. unclear.
4. Incomplete outcome data: we described the completeness of data including attrition and exclusions from the analysis for each outcome and any reasons for attrition or exclusion where reported. We assessed whether missing data were balanced across groups or were related to outcomes. Where sufficient information was reported or supplied by the trial authors, re-included missing data in the analyses. We categorised completeness as:
 - a. low risk: < 20% missing data;
 - b. high risk: ≥ 20% missing data;
 - c. unclear.

Measures of treatment effect

We calculated risk ratio (RR) and risk difference (RD) for dichotomous data and weighted mean difference (WMD) for continuous data with respective 95% confidence intervals (CI). We determined the number needed to treat for an additional beneficial outcome (NNTB) or an additional harmful outcome (NNTH) for a statistically significant RD.

Unit of analysis issues

The unit of analysis is the participating infant in individually randomised trials and the neonatal unit for cluster randomised trials.

Dealing with missing data

We requested missing study data from the trial investigators.

Assessment of heterogeneity

If more than one trial was included in a meta-analysis, we examined the treatment effects of individual trials and heterogeneity between trial results by inspecting the forest plots. We calculated the I^2 statistic for each analysis to quantify inconsistency across studies and describe the percentage of variability in effect estimates that may be due to heterogeneity rather than sampling error. If substantial ($I^2 > 50\%$) heterogeneity was detected, we explored the possible causes (e.g., differences in study design, participants, interventions or completeness of outcome assessments) in sensitivity and subgroup analyses.

Data synthesis

We planned to use a fixed-effect model for meta-analyses.

Subgroup analysis and investigation of heterogeneity

Very low birth weight (< 1.5 kg) or very preterm (< 32 weeks' gestation at birth) infants.

RESULTS

Description of studies

Included studies

Three studies fulfilled the review eligibility criteria. Two were parallel group trials ([van Someren 1984](#); [Dsilna 2005](#)). One was a cross-over trial ([Bohnhorst 2010](#)).

[van Someren 1984](#) enrolled 42 preterm infants who required feeding via an enteral feeding tube. Gestational age at birth ranged from 30 to 34 weeks. Infants were randomised to receive either naso-enteric or oro-enteric feeding. Some of the infants in each group received transpyloric feeds, but the report of the trial does not state how many. The oral feeding tube was secured to the palate with a grooved orthodontic appliance ([Sullivan 1981](#)). Infants were recruited to the trial at a postnatal age of between one and 12 days and remained in the study until breast or bottle-feeding had been established. The primary outcome of the trial was the incidence of episodes of periodic breathing and central apnoea assessed by respiratory and polygraphic monitoring on the third and seventh days after randomisation. The investigators also assessed rate of weight gain during the first two weeks of participation, the incidence of local complications such as oral ulceration, and a composite 'sickness score' (mainly a score of the need for and duration of respiratory support).

[Dsilna 2005](#) recruited 46 infants (gestational age < 30 weeks or birth weight < 1200 g) who required feeding via an enteral feeding tube. Infants were randomly allocated to either gavage feeding via a nasogastric or an orogastric tube until 32 weeks' postmenstrual age. Subsequently, all infants were fed via the orogastric route. The outcomes assessed were nutrient intake during the trial period, time to achieve full enteral feeding, time to regain birth weight, and the incidence of various neonatal morbidities (including necrotising enterocolitis).

[Bohnhorst 2010](#) undertook a randomised cross-over (sequential treatment) trial in which 35 spontaneously breathing, very preterm infants (< 32 weeks' gestational age) with evidence of apnoea or bradycardia of prematurity participated. Infants were randomly allocated to either 12 hours of nasogastric or 12 hours of orogastric feeding followed by 12 hours of the alternative feeding route. Thirty-two infants completed the study. The primary outcomes were the incidence of apnoea, desaturation and bradycardia during the study period.

Excluded studies

We excluded three studies ([Symington 1995](#); [Daga 1999](#); [Kublick 2011](#); see table 'Characteristics of excluded studies').

Risk of bias in included studies

Quality assessments are detailed in table 'Characteristics of included studies'.

[van Someren 1984](#): the method of randomisation used was not stated. Caregivers and assessors were not blinded to the intervention. The primary outcomes, respiratory monitoring data recorded either on the third or seventh day, were reported for 69% of the participating infants.

[Dsilna 2005](#): allocation concealment was achieved using sealed opaque envelopes. Caregivers and assessors were not blinded to the intervention. Follow-up was complete.

[Bohnhorst 2010](#): the random sequence was computer-generated but the allocation concealment method was not described. Caregivers were aware of the feeding tube placement route. Respiratory function recording were assessed blind to identity of the infant and the feeding route. Three infants did not complete the study because the frequency of apnoea or bradycardia necessitated respiratory support.

Effects of interventions

Nasal versus oral placement of enteral feeding tubes (Comparison 1)

Time to establish full enteral tube feeds (Outcome 1.1; Analysis 1.1)

[Dsilna 2005](#) did not find a statistically significant difference: MD -2.7 (95% CI -11.9 to 6.5) days after birth. The other trials did not report this outcome.

Adverse events: none of the trials reported the incidence of non-intentional removal or displacement of feeding tube or the incidence of aspiration pneumonia/pneumonitis.

[van Someren 1984](#) did not find any statistically significant differences in the frequency of episodes of apnoea between the groups on the third day post-randomisation. On the seventh day, the nasal placement group had statistically significantly more recorded episodes of apnoea. However, the definition of apnoea was cessation of breathing for 5 seconds or greater rather than the more commonly used definition (cessation of breathing for $\geq$ 20 seconds) that we pre-specified for this review.

[Bohnhorst 2010](#) did not find any statistically significant differences in the frequency of apnoea, desaturation or bradycardia:

- median (interquartile range) number of bradycardia/desaturation episodes per hour: 1.6 (95% CI 0.8 to 1.9) versus 1.0 (95% CI 0.9 to 1.6);
- median (interquartile range) number of apnoea episodes per hour: 0.8 (95% CI 0.7 to 1.2) versus 0.8 (95% CI 0.5 to 1.2).

[Dsilna 2005](#) did not report the incidence of frequency of apnoea, desaturation or bradycardia.

Growth (Outcome 1.2; Analysis 1.2)

[Dsilna 2005](#) did not find a statistically significant difference in the time taken to regain birth weight: MD 0.90 (95% CI -1.3 to 3.1) days. [van Someren 1984](#) reported weight gain in the 37 infants who remained in the trial until at least 14 days post randomisation. There was a statistically significantly lower rate of weight gain in the first week after randomisation in the infants fed via naso-enteric feeding tubes (0.6 vs 8.3 g/kg/day). In the second week after randomisation there was not a statistically significant difference (13.6 vs 12.3 g/kg/day).

Time to independence from supplemental oxygen (Outcome 1.3; Analysis 1.3)

Dsilna 2005 did not find a statistically significant difference: MD 7.6 (95% CI -15.2 to 30.4) days. The other trials did not report this outcome.

Time to establish full oral feeds: not reported by any trials.

Subgroup analyses

Subgroup data for very low birth weight or very preterm infants were not available for van Someren 1984.

Dsilna 2005 and Bohnhorst 2010 recruited very low birth weight or very preterm infants (see above for outcomes).

DISCUSSION

Summary of main results

There are only limited data available from two small parallel group randomised controlled trials and one cross-over trial on the effect of the nasal versus the oral route for placing feeding tubes in preterm or low birth weight infants. These trials had some methodological limitations including lack of blinding of caregivers and assessors and incomplete follow-up assessment. The trials did not find evidence that the route of placement of enteral feeding tubes affects important outcomes.

Overall completeness and applicability of evidence

The identified trials were small, contained methodological weaknesses, and did not report all important outcomes. None

of the trials reported the incidence of non-intentional removal or displacement of feeding tube, yet this is the most commonly expressed anxiety from parents attempting to perform this activity on the neonatal unit or when discharged home with an infant receiving enteral tube feeding (Howell 2011).

We excluded two trials that compared feeding with indwelling nasogastric tubes versus intermittently placed orogastric tubes (Symington 1995; Kublick 2011). This co-intervention (leaving the nasogastric tube in place versus replacing the orogastric tube at each feed) prevents independent assessment of the effects of nasal versus oral tube placement. However, it may be that this comparison is viewed as pragmatic by some clinicians, caregivers and parents and that a separate or subgroup review of trials of these two approaches is merited.

It may also be appropriate to consider whether the route of placement of feeding tubes affects other outcomes including infant distress during placement, and parental views. These might include parental perceptions of ease of placement and security, especially given that infants may be discharged home with a feeding tube in situ (Collins 2003).

Quality of the evidence

The included trials contained various methodological weaknesses (Figure 1).

Figure 1. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

In van Someren 1984, the method of randomisation was not stated so it is possible that allocation was not concealed and the assignment of infants to one or other feeding route could have been predicted. This may have allowed bias in allocation of infants that could have affected the outcomes independently of the intervention. The mean postnatal age of entry into the study was two days for the nasal group compared to six days for the oral group. This difference may have been a factor in the lower rate of weight gain in the nasal group during the first seven days of assessment. More infants in the oral group would have already transitioned through the normal postnatal weight loss that occurs during the first week of postnatal life, whereas many infants in

the nasal group were still in this postnatal weight loss phase. The difference in weight gain was not sustained during the second week of the study period. Furthermore, the finding of a difference in the frequency of apnoea identified on the seventh day after entry into the trial should also be interpreted cautiously. Follow-up assessment was incomplete and the definition of apnoea used in the trial was different from that of consensus agreements of the definition of clinically significant apnoea. Finally, oral placement of the feeding tube relied on the use of a palatal appliance to secure the tube thus limiting the applicability of the study findings to the more common practice of securing orally placed tubes at the lips.

The second parallel group trial was more methodologically rigorous but assessed only short-term outcomes ([Dsilna 2005](#)). The trial did not provide any evidence of effect on the time taken to establish enteral feeds, weight gain during the early neonatal period, or time taken to wean from oxygen supplementation. However, only 46 infants in total participated and the trial was underpowered to exclude modest but plausible effect sizes.

The cross-over trial used a computer-generated random sequence to determine the sequence in which infant received naso-enteric versus oro-enteric feeding ([Bohnhorst 2010](#)). The method of allocation concealment was not stated but this may be less important as a source of bias given that all infants received both interventions and acted as their own 'internal' controls. Caregivers were aware of the feeding route but the assessment of respiratory monitor recordings was undertaken blind to the identity of the infant and the feeding route. Although 32 of 35 infants completed the assessment, the three excluded infants all had episodes of apnoea and desaturation or bradycardia sufficient to require respiratory support. Inclusion of outcomes data for these infants may have altered the findings of the trial.

AUTHORS' CONCLUSIONS

Implications for practice

The data recovered in this review do not provide sufficient evidence to inform policy or practice regarding whether the nasal versus the oral route of enteral feeding tube placement is preferable for

preterm or low birth weight infants. The trials do not provide evidence that the route of feeding tube placement affects feed tolerance (time to achieve full enteral feeds) or the incidence or frequency of apnoea or desaturation or bradycardia. In current practice, the decision regarding the route of tube placement seems to be based on clinician preference and local or regional precedence ([Birnbbaum 2009](#)).

Implications for research

A large randomised controlled trial would be needed to determine if the use of nasally compared with orally placed feeding tubes improves feeding and growth without increasing adverse consequences in preterm or low birth weight infants. Such trials should probably focus on very low birth weight or very preterm infants since this population is more likely to be affected by respiratory compromise and other adverse events associated with feeding tube placement. Engagement with parent and family advocates is needed to inform the development of these trials and ensure that the strategies for nutrition support are consistent with the ethos of family-centred care and that the outcomes assessed are those of most importance to infants and families ([POPPY Steering Group 2009](#); [Howell 2011](#)).

ACKNOWLEDGEMENTS

We thank Judith Hawes and Peter McEwan for contributing to the inception version of this review ([Hawes 2004](#)).

We thank Ann Dsilna for clarifying aspects of her study ([Dsilna 2005](#)).

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Dsilna 2005 {published data only}

Dsilna A, Christensson K, Alfredsson L, Lagercrantz H, Blennow M. Continuous feeding promotes gastrointestinal tolerance and growth in very low birth weight infants. *Journal of Pediatrics* 2005;**147**(1):43-9.

van Someren 1984 {published data only}

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Kublick 2011 {published data only}

Kublick JA. The Impact of Nasogastric Indwelling Versus Oral Intermittent Tube Feeding Methods on Premature Infants [Master of Nursing thesis]. Winnipeg, Canada: University of Manitoba, 2011.

Symington 1995 {published data only}

Symington A, Ballantyne M, Pinelli J, Stevens B. Indwelling versus intermittent feeding tubes in premature neonates. *Journal of Obstetric, Gynecologic, and Neonatal Nursing* 1995;**24**(4):321-6.

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Nadir 2007 {published data only}

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CHARACTERISTICS OF STUDIES

Characteristics of included studies [ordered by study ID]

Bohnhorst 2010

Methods	Randomised cross-over trial
Participants	35 infants of gestational age < 32 weeks with a history of apnoea and desaturation (> 3 episodes of oxygen saturation $\leq$ 80% in 6 hours) or bradycardia (> 3 episodes of heart rate $\leq$ 80 beats per minute in 6 hours) participated 32 out of 35 infants completed the study
Interventions	Nasal vs oral placement of enteral feeding tube (5 Fr gauge) for 2 sequential 12-hour periods
Outcomes	Oxygen saturation measured with pulse oximetry; episodes of apnoea and bradycardia
Notes	Setting: Department of Neonatology, Hannover Medical School, Germany (2008-2009)

Risk of bias

Bias	Authors' judgement	Support for judgement
Adequate sequence generation	Low risk	Computer-generated
Allocation concealment	Unclear risk	Method not stated
Blinding All outcomes	High risk	Caregivers not blinded, but respiratory monitoring assessed by investigator unaware of infant's identity or feeding tube route sequence
Incomplete outcome data addressed All outcomes	Low risk	Near-complete follow-up (32 out of 35 infants completed study)

Dsilna 2005

Methods	Randomised controlled trial
Participants	46 infants (gestational age < 30 weeks or birth weight < 1200 g) who required feeding via an enteral feeding tube Setting: Neonatal Research Unit, Karolinska Hospital, Stockholm (1998-2001)
Interventions	Intermittent gavage feeding via a nasogastric (n = 22) vs an orogastric tube (n = 24)
Outcomes	Nutrient intake, time to achieve full enteral feeding, time to re-gain birth weight, neonatal morbidities (including necrotising enterocolitis)
Notes	Infants allocated to feeding intervention until 32 weeks' postmenstrual age, then all fed via orogastric route

Risk of bias

Bias	Authors' judgement	Support for judgement
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Nasal versus oral route for placing feeding tubes in preterm or low birth weight infants (Review)

Dsilna 2005 *(Continued)*

Adequate sequence generation	Unclear risk	Random sequence generation method unclear
Allocation concealment	Low risk	Sealed opaque envelopes
Blinding All outcomes	High risk	Caregivers and assessors not blinded to the intervention
Incomplete outcome data addressed All outcomes	Low risk	Complete follow-up

van Someren 1984

Methods	Randomised controlled trial
Participants	42 preterm infants who required feeding via an enteral feeding tube (gestational age 30-34 weeks) Setting: Neonatal Research Unit, The London Hospital Medical College, London (early 1980s)
Interventions	22 infants allocated to feeding via an oro-enteric tube, 20 infants via a naso-enteric tube
Outcomes	Episodes of apnoea and periodic breathing assessed with respiratory and polygraphic monitoring on day 3 and day 7 after randomisation (data available for 29 infants)
Notes	The trial investigators excluded 2 infants who had been randomly allocated to the oro-enteric feeding group as parental consent was not obtained to allow the palatal device to be applied

Risk of bias

Bias	Authors' judgement	Support for judgement
Adequate sequence generation	Unclear risk	Method not stated
Allocation concealment	Unclear risk	Method not stated
Blinding All outcomes	High risk	Caregivers and assessors not blinded to the intervention
Incomplete outcome data addressed All outcomes	High risk	Respiratory monitoring (primary outcome) data reported for 69% of participants

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Daga 1999	Observational sequential treatment study; not a randomised or quasi-randomised trial
Kublick 2011	Co-intervention: indwelling nasogastric tubes versus intermittently placed orogastric tubes

Study	Reason for exclusion
Symington 1995	Co-intervention: indwelling nasogastric tubes versus intermittently placed orogastric tubes

Characteristics of ongoing studies *[ordered by study ID]*

[Nadir 2007](#)

Trial name or title	Nasogastric Tube vs. Orogastric Feeding Tube in Preterm Infants: Which is Best?
Methods	Randomised controlled trial (parallel group)
Participants	Preterm infants
Interventions	Nasogastric versus orogastric tube feeding
Outcomes	Time to reach full oral feeding
Starting date	2006
Contact information	Erez Nadir, MD Hillel Yaffe Medical Centre, Hadera, Israel Email: erezn@hy.health.gov.il
Notes	Primary investigator states that study completed and data being analysed and prepared for publication (October 2012)

DATA AND ANALYSES

Comparison 1. Nasal versus oral placement of enteral feeding tubes

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Time to achieve full enteral feeding (days after birth)	1	46	Mean Difference (IV, Fixed, 95% CI)	-2.70 [-11.94, 6.54]
2 Time to re-gain birth weight (days after birth)	1	46	Mean Difference (IV, Fixed, 95% CI)	0.90 [-1.27, 3.07]
3 Need for oxygen supplementation (days after birth)	1	46	Mean Difference (IV, Fixed, 95% CI)	7.60 [-15.17, 30.37]

Analysis 1.1. Comparison 1 Nasal versus oral placement of enteral feeding tubes, Outcome 1 Time to achieve full enteral feeding (days after birth).

Analysis 1.2. Comparison 1 Nasal versus oral placement of enteral feeding tubes, Outcome 2 Time to re-gain birth weight (days after birth).

Analysis 1.3. Comparison 1 Nasal versus oral placement of enteral feeding tubes, Outcome 3 Need for oxygen supplementation (days after birth).

WHAT'S NEW

Date	Event	Description
28 September 2012	New citation required but conclusions have not changed	<p>Search updated in September 2012.</p> <p>One new trial included (Bohnhorst 2010).</p> <p>We have revised the outcomes for this review. Adverse events outcomes now include the incidence of non-intentional removal or displacement of feeding tube.</p>

Date	Event	Description
28 September 2012	New search has been performed	This review updates the review "Nasal versus oral route for placing feeding tubes in preterm or low birth weight infants" published in the Cochrane Database of Systematic Reviews, Issue 3, 2004 (Hawes 2004).

CONTRIBUTIONS OF AUTHORS

William McGuire and Julie Watson revised the protocol for this review, undertook electronic searches and handsearches, screened the title and abstract of identified studies and the full text of potentially relevant studies. The authors independently assessed the methodological quality of the included trials, extracted the relevant information and completed this final review update.

DECLARATIONS OF INTEREST

None.

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DIFFERENCES BETWEEN PROTOCOL AND REVIEW

We have revised the outcomes for this review. Adverse events outcomes now include the incidence of non-intentional removal or displacement of feeding tube.

INDEX TERMS

Medical Subject Headings (MeSH)

*Infant, Low Birth Weight; *Infant, Premature; Enteral Nutrition [*instrumentation] [methods]; Intubation, Gastrointestinal [*methods]; Intubation, Intratracheal [*methods]; Randomized Controlled Trials as Topic

MeSH check words

Humans; Infant, Newborn