

### Placement of feeding tubes in infants

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#### Abstract

**Background:** Correct placement of feeding tubes in small infants is an important and difficult process. Many different methods have been suggested and clinical staff were unsure which was the most accurate method.

**Clinical Question:** In infants being fed by nasogastric or orogastric tube, which method of tube placement results in the most accurate placement of tube into the infant's stomach?

**Methods:** We included all trials in infants published in English. Studies in children over 12 months old and adult patients, or in mixed paediatric populations were excluded.

We searched The Cochrane Library, including The Cochrane Database of Systematic Reviews, DARE, CENTRAL and HTA in May 2006. We also searched Medline and CINAHL and several key guideline websites.

Studies were selected and appraised by one reviewer in consultation with colleagues, using inclusion, exclusion and appraisal criteria established a priori.

**Results:** Three relevant studies were identified, however these studies were of very low methodological quality. The studies suggest that using minimal insertion lengths or measuring from the corner of the nose or mouth, to the ear lobe and then to the midpoint between the end of the xyphoid process and the umbilicus may be more accurate than measuring from the corner of the nose or mouth, to the ear lobe and then to the end of the xyphoid process. Further research is required to determine the most effective protocols for placement of nasogastric and orogastric tubes in infants.

**Conclusions:** In infants being fed by nasogastric or orogastric tube, there is only low quality evidence to evaluate which method of tube placement is most accurate.

**Implications for Practice:** Protocols for the placement of nasogastric or orogastric feeding tubes in infants should make recommendations as to how these tubes should be placed on the consensus opinion of a multidisciplinary group. Evidence from existing low quality studies may be useful in informing this decision.

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## Background

Correct placement of feeding tubes in small infants is an important and difficult process. Many different methods have been suggested. The protocol for feeding tube placement in infants in Newborn Services at Monash Medical Centre, Clayton is being reviewed and clinicians would like protocols to be in line with the best available evidence.

## Clinical Question

In infants being fed by nasogastric or orogastric tube, which method of tube placement results in the most accurate placement of tube into the infant's stomach?

## Methods

### Study Selection Criteria

|                     |   |                         |     |                 |         |
|---------------------|---|-------------------------|-----|-----------------|---------|
| <b>Patient</b>      | Infants being fed by nasogastric or orogastric tube |                         |     |                 |         |
| <b>Intervention</b> | Tube placement methods                              |                         |     |                 |         |
| <b>Comparison</b>   | Any   |                         |     |                 |         |
| <b>Outcomes</b>     | Accuracy of placement within the stomach            |                         |     |                 |         |
| <b>Study Type</b>   | Any   | <b>Publication Date</b> | Any | <b>Language</b> | English |

### Search Strategy

|                        |                          |
|------------------------|--------------------------|
| <b>Evidence Source</b> | <b>Date of Search</b>    |
| All EBM (Ovid) *       | 3 <sup>rd</sup> May 2006 |
| Medline (Ovid)         | 3 <sup>rd</sup> May 2006 |
| CINAHL (Ovid)          | 3 <sup>rd</sup> May 2006 |

\*(including The Cochrane Database of Systematic Reviews, DARE, CENTRAL and ACP Journal Club)

### Search Terms in Medline

|                     |   |
|---------------------|---|
| <b>Patient</b>      | (exp Infant, Newborn/ or exp NEONATOLOGY/ or exp Neonatal Nursing/ or (neonat\$ or newborn\$ or infant\$ or infancy or baby or babies).mp.) and (exp Intubation, Gastrointestinal/ or (nasogastric or naso-gastric or oro-gastric or orogastric).mp. or feeding tube\$.mp.) |
| <b>Intervention</b> | exp Intubation, Gastrointestinal/nu, sn, is, mt [Nursing, Statistics & Numerical Data, Instrumentation, Methods] or (placement or insertion).mp.  |
| <b>Comparison</b>   | -   |
| <b>Outcomes</b>     | -   |

### Data Collection & Analysis

Studies were selected and appraised by one reviewer in consultation with colleagues, using inclusion, exclusion and appraisal criteria established a priori.

## Results

285 potentially relevant studies were identified, and full text was retrieved of 26 of these articles and 3 articles met inclusion criteria. Two of these articles are appraised below,<sup>1,3</sup> the third was not appraised as it was a case series with no comparison group and cannot be used to evaluate effectiveness.<sup>2</sup>

### Characteristics of included studies:

| Study                       | Study Type                           | N (total)  | Setting | Patients   | Intervention  | Comparison   | Outcomes   |
|-----------------------------|--------------------------------------|------------|---------|--|---|--|--|
| Gallaher et al <sup>1</sup> | Cohort with historical control       | 58 infants | NICU    | Consecutive, weight appropriate for GA, VLBW infants, having orogastric tubes placed and radiographs medically indicated   | Placement based on minimum insertion lengths of 13cm (<750g), 15cm (750-999g), 16cm (1000-1249), 17cm (1250-1499gm)   | Placement based on length measurement from the tip of the nose, to the ear lobe and then to the tip of the xyphoid   | % adequately positioned, % positioned high, % positioned low (all based on radiograph) |
| Tedeschi et al <sup>2</sup> | Case series ( <i>not appraised</i> ) | 38 infants | NICU    | All infants having feeding tubes inserted. GA 25-35 weeks, weight 650-2855g.   | Placement based on length measurement from the tip of the nose to the ear lobe and then to the midpoint between the xyphoid process and the umbilicus   | No comparison group  | Placement in the stomach, requirement for adjustment in the stomach.                   |
| Weibley et al <sup>3</sup>  | Crossover trial                      | 30 infants | NICU    | Infants who had GA at birth 28-36 weeks, requiring naso- or orogastric tubes for feeding, receiving xrays, no congenital malformations that might affect tube placement. | Placement based on length measurement from the right corner of the nose or mouth to the ear lobe of the right ear and then to the midpoint between the termination of the xyphoid process and the umbilicus | Placement based on length measurement from the right corner of the nose or mouth to the ear lobe of the right ear and then to the termination of the xyphoid process | % correct placement  |

### Quality of included studies:

| Study: Gallaher et al <sup>1</sup>                        | Comments |  |
|---|----------|--|
| <b>Specified inclusion/ exclusion criteria</b>            | Yes      | However these are very broad "consecutive, appropriately grown, VLBW infants admitted to the NICU" and not well defined  |
| <b>Patient groups comparable except for exposure</b>      | Unclear  | First 31 infants had birth weight 460-1426g and were 23-31 post conceptional age. No information was provided on the group of 27 infants who had tubes placed following the minimum insertion length guidelines. |
| <b>Outcomes assessed blindly with respect to exposure</b> | No       | Because control group was not contemporaneous, blinding to exposure was not possible.  |
| <b>Sufficient duration</b>                                | Unclear  | No details given as to length of time for either control or intervention phase.  |

|  |         |  |
|--|---------|--|
| <b>Proportion lost to follow-up</b>                    | Unclear | Details not provided   |
| <b>Outcomes assessed objectively and independently</b> | No      | Orogastric tube position was rated as high, low or adequate. Descriptions of each are given however reliability was not established.   |
| <b>All selected subjects included in analysis</b>      | Unclear | Of the 188 x-rays of the control infants 171 were adequate for review, of the 121 x-rays of the intervention group infants, 117 were interpretable. Orogastric tubes were changed at least once every 24 hours. It is not clear how many x-rays were contributed by each infant. |

| <b>Study: Weibley et al<sup>3</sup></b>                          |         | <b>Comments</b>   |
|--|---------|---|
| <b>Specified inclusion/ exclusion criteria</b>                   | Yes     | GA 28 to 36 weeks at birth, requiring gavage tube for feeding, receiving frequent chest or abdominal x-rays for purposes other than the study, no congenital malformations that might influence tube placement.   |
| <b>Adequate method of randomisation</b>                          | No      | Randomisation was not undertaken. Methods were used “on different days”.  |
| <b>Groups similar at baseline except for exposure</b>            | Unclear | No comparison provided. No details given as to order of methods.  |
| <b>Concealment of allocation</b>                                 | No      | Randomisation was not undertaken.   |
| <b>Patients/investigators/assessors blind to treatment group</b> | Yes     | Outcome assessors were blind to placement method used   |
| <b>Adequate duration of follow-up</b>                            | Unclear | No details provided on time elapsed between tube placement and x-ray  |
| <b>Adequate duration of washout</b>                              | Unclear | No details provided.  |
| <b>Minimal proportion lost to follow up</b>                      | No      | Of 60 infants originally included, x-rays on tube placement of both methods were only available for 30 infants. Other 30 infants were discharged, died prior to second tube placement, or showed improvement meaning second x-ray was not clinically justified. It is not clear how these exclusions were distributed between groups. |
| <b>Objective &amp; independent assessment of outcomes</b>        | Yes     | Two reviewers scored each x-ray. They agreed on scores of 55/60 x-rays– other 5 x-rays were excluded from analysis  |

| <b>Results of included studies:</b> |   |
|-------------------------------------|---|
| Gallaher et al <sup>1</sup>         | Using minimal insertion lengths as compared to placement based on length measurement from the tip of the nose, to the ear lobe and then to the tip of the xyphoid: <ul style="list-style-type: none"> <li>the percentage of orogastric tubes that were adequately positioned increased from 62% to 86% (p&lt;0.0001).</li> <li>the percentage of orogastric tubes that were positioned high decreased from 33.3% to 12% (p&lt;0.0001).</li> <li>there was a non-significant decrease in the percentage of orogastric tubes that were positioned low 4.7% to 2% (p=0.22).</li> </ul> |
| Weibley et al <sup>3</sup>          | Placement based on length measurement from the right corner of the nose or mouth to the ear lobe of the right ear and then to the midpoint between the termination of the xyphoid process and the umbilicus was associated with a decrease from 55.6% to 39.3% of tubes placed incorrectly, however this difference was not statistically significant. All incorrect placements were high.  |

## Discussion

The research evidence available to determine which method of feeding tube placement results in the most accurate placement of tube into the stomach is of very low quality.

This evidence suggests that use of methods such as minimal insertion lengths or measuring from the corner of the nose or mouth, to the ear lobe and then to the midpoint between the end of the xyphoid process and the umbilicus may be more accurate than measuring from the corner of the nose or mouth, to the ear lobe and then to the end of the xyphoid process.

Further research is required to evaluate other placement methods and to conclusively determine the most effective protocols for placement of nasogastric and orogastric tubes in infants.

## Conclusions

In infants being fed by nasogastric or orogastric tube, there is only low quality evidence to evaluate which method of tube placement is most accurate.

## Implications for Practice

Protocols for the placement of nasogastric or orogastric feeding tubes in infants should make recommendations as to how these tubes should be placed on the consensus opinion of a multidisciplinary group. Evidence from existing low quality studies may be useful in informing this decision.

## References

1. Gallaher KJ, Cashwell S, Hall V, Lowe W, Ciszek T. Orogastric tube insertion length in very low birth weight infants. *Journal of Perinatology*. 1993 Mar-Apr;13(2):128-31.
2. Tedeschi L, Altimier L, Warner B. Improving the accuracy of indwelling gastric feeding tube placement in the neonatal population. *Neonatal Intensive Care*. 2004 Jan-Feb;17(1):16-8.
3. Weibley TT, Adamson M, Clinkscales N, Curran J, Bramson R. Gavage tube insertion in the premature infant. *MCN, American Journal of Maternal Child Nursing*. 1987 Jan-Feb;12(1):24-7.

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