

Methods to determine the internal length of nasogastric feeding tubes: An integrative review

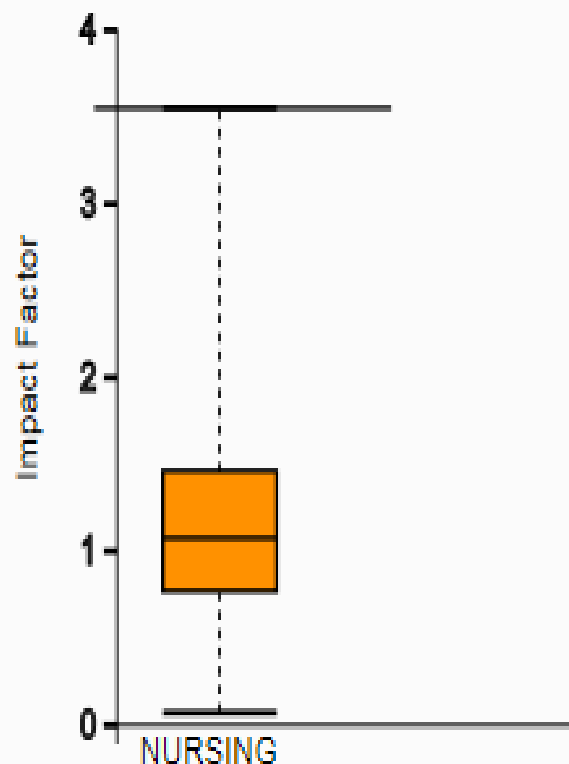
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Category Box Plot

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Category Box Plot

The category box plot depicts the distribution of Impact Factors for all journals in the category. The horizontal line that forms the top of the box is the 75th percentile (Q_3). The horizontal line that forms the bottom is the 25th percentile (Q_1). The horizontal line that intersects the box is the median Impact Factor for the category.

Horizontal lines above and below the box, called *whiskers*, represent maximum and minimum values.

The top whisker is the smaller of the following two values:

the maximum Impact Factor (IF)

$$Q_3 \text{ IF} + 3.5(Q_3 \text{ IF} - Q_1 \text{ IF})$$

The bottom whisker is the larger of the following two values:

the minimum Impact Factor (IF)

$$Q_1 \text{ IF} - 3.5(Q_3 \text{ IF} - Q_1 \text{ IF})$$

Box Plots are provided for the current JCR year for each of the categories in which the journal is indexed.

Introduction

- Gastric feeding is the most preferred route of tube feeding .
- ✓ Feeding patients via NGT involves introducing a thin tube through the nostril, down the esophagus, and into the stomach.
- ✓ Gastric access for feeding is appropriate in most cases. It allows normal absorption of nutrients, more versatility in the diet
- Despite the benefits and widespread use of tube feeding, some patients may experience complications either due to the enteral access itself or to the enteral feeding
 - If the tube migrates from the stomach into the esophagus or lung, there can be serious consequences, such as **esophageal perforation** , **esophageal stenosis** , **pneumothorax** , **aspiration pneumonia** and **bronchopulmonary complications** . In rare cases incorrect insertion of NGT may result in **perforation of the brain**
- Inserting the tip of the tube in the correct location is a prerequisite to confirming its position safely in the stomach; tubes with short or excess length can have serious consequences for the patient.
- ✓ Excess length can cause kinking and blockage.
- ✓ If the tube is short, it may be positioned in the esophagus and feedings may empty into the lung

Introduction

- Moreover, insufficient insertion length requires further advancement of the tube, exposes the patient to unnecessary risk and discomfort, subjects the patient to higher X-ray doses, and causes financial losses to the health institution with increased X- ray cost and the nurse's time
- The NEX method remains the method most widely taught in nursing programs and used by practicing nurses for tube insertion in adults, but it may not be the safest approach.
- Prevention of complications is the major goal. The adherence to well-designed protocols by a multidisciplinary team is the best way for avoiding complications

目前測量方式

N為nose (鼻部)，**E**為ear(耳朵)，**X**為xiphoid process(劍突)，**NEX**是指鼻→耳→劍突的位置，一般中等身材的成人，由鼻子通到胃所需的長度大約**45-55公分**。

成人：

(1)由鼻經耳垂至劍突處之長度(NEX)。

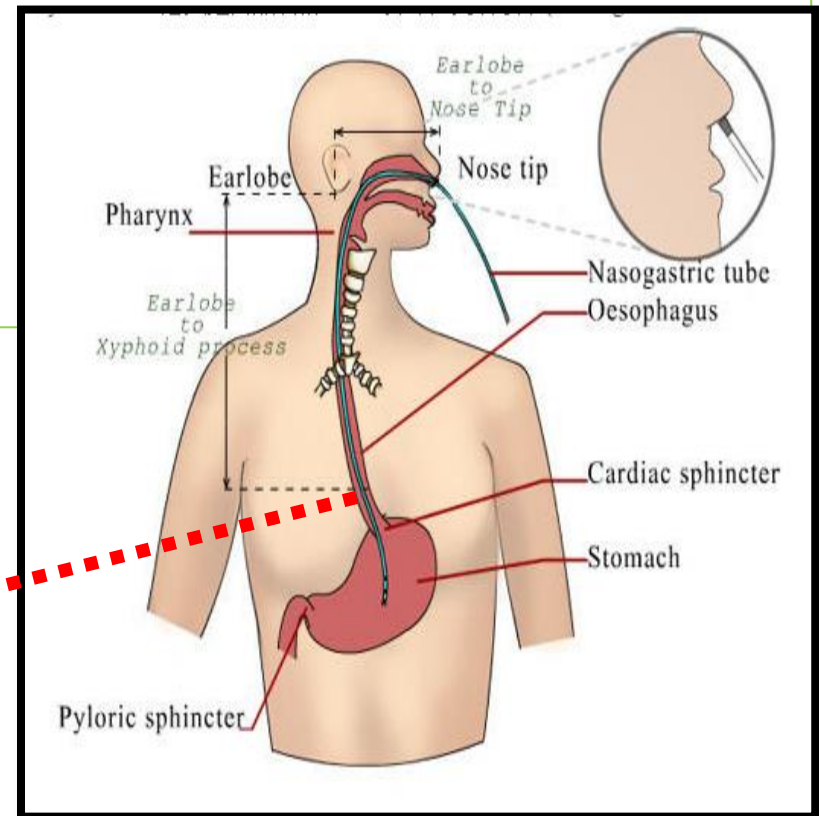
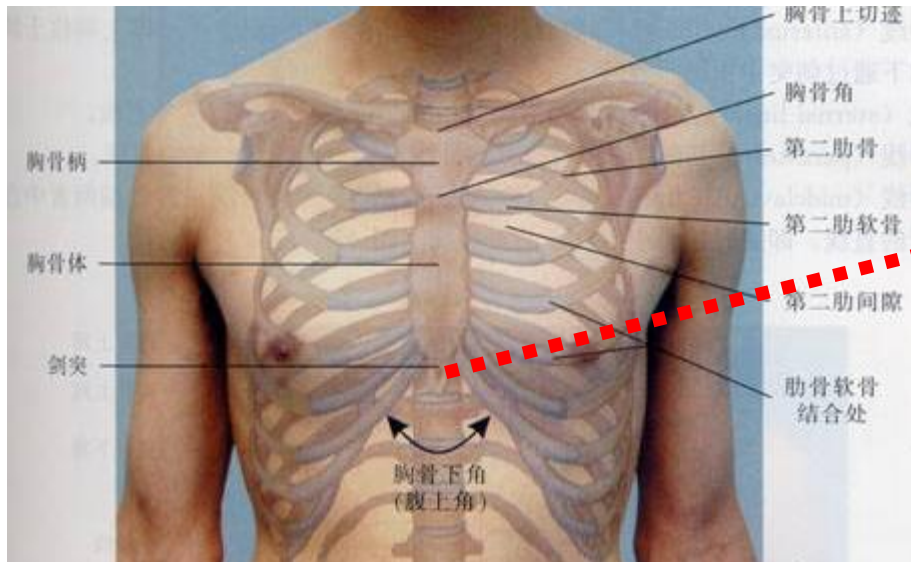
(2)是 $(NEX - 50 \text{公分}) / 2 + 50 \text{公分}$ 之長度。

小孩：

(1)眉間至劍突之距離。

(2)眉間至劍突與臍距離的中點之長度。

(3)鼻尖經耳垂至劍突與臍距離的中點之長度



其他測量方式介紹

XEN+10cm

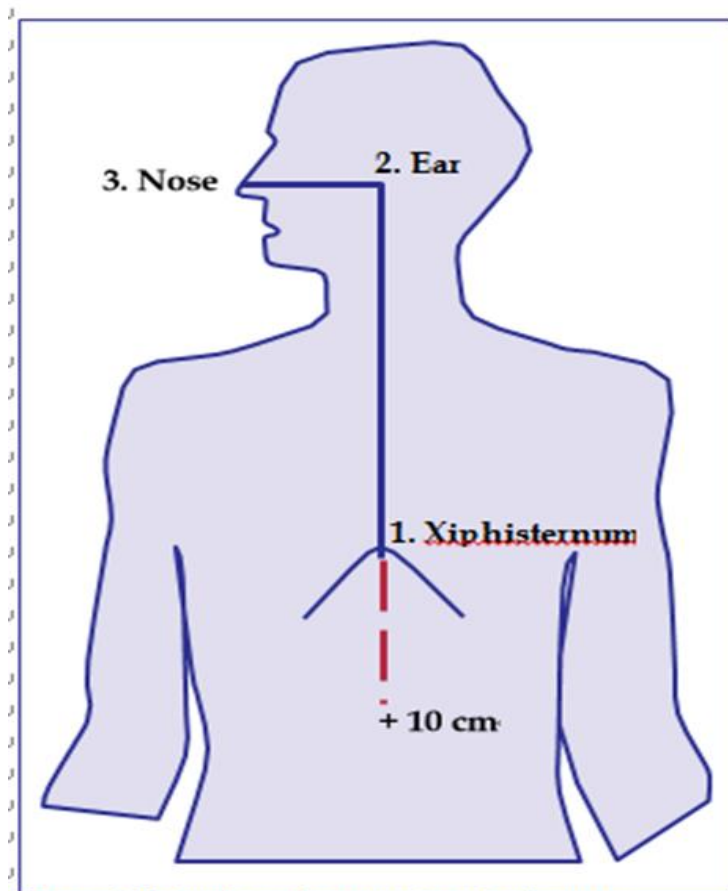
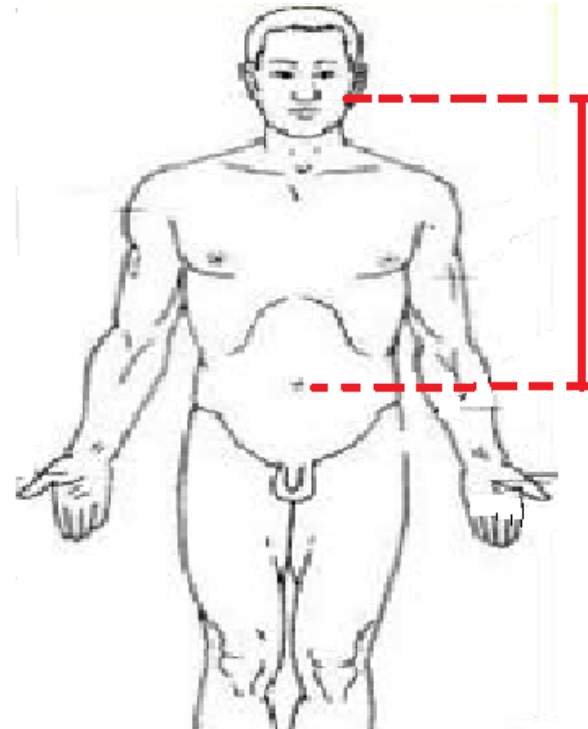


Figure 1. Estimation of nasogastric tube distance:
'XEN + 10' Source: Taylor, 2014³

GWNUF



Gender & weight
Nose to umbilicus
Head flat on the bed

Critical Appraisal

步驟 1：研究探討的問題為何？

the effect of art including ambient features such as music, interior design including visual art, and architectural features on health outcomes in surgical patients.

研究族群 / 問題 (Problems)	In adults requiring enteral nutrition via NGT
介入措施 (Intervention)	which external landmark measurements used to determine ideal placement of the nasogastric feeding tube
比較 (Comparison)	(1) NEX (2) XEN+10cm (3)([NEX -50cm]/2)+50cm (4)GWNUF
結果 (Outcomes)	are most accurate

步驟 2：系統性文獻回顧的品質如何？(FAITH)

Find- 良好的文獻搜尋至少應包括二個主要的資料庫，並且加上文獻引用檢索(參考文獻中相關研究、Web of Science, Scopus 或 Google Scholar)、試驗登錄資料等。文獻搜尋應不只限於英文，並且應同時使用 MeSH 字串及一般檢索詞彙(text words)。

The databases searched were: **CINAHL**, **Cochrane Library**, Joanna Briggs Institute (**JB**I), **PubMed** (National Library of Medicine), **SCOPUS**, and **Web of Science**. Key words used for searching included “nasogastric tube”, “tube feeding”, “measures”, and “adults”. These descriptors were combined using Boolean conjunctions “AND” and “OR” in the following sequence: “nasogastric tube OR tube feeding AND measures AND adults” in all the surveyed databases.

3.1. Inclusion/exclusion criteria⁴¹

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Studies were included in this review if they met the Cochrane standards (Cochrane Community, 2015) for article inclusion. Articles that had clear objectives and defined criteria were identified. Original articles, literature reviews, guidelines and expert opinion that were published in English, Portuguese or Spanish from January 1979 to March 2015 were analyzed. We excluded studies of children or infants from review based on title, and those of methods checking the tube position in the stomach (e.g., auscultation of air insufflation, aspiration of fluid, visual inspection of aspirates, testing of aspirates for pH or concentrations of bilirubin, pepsin or trypsin, observing for bubbling when the tip of the tube is held under water) and

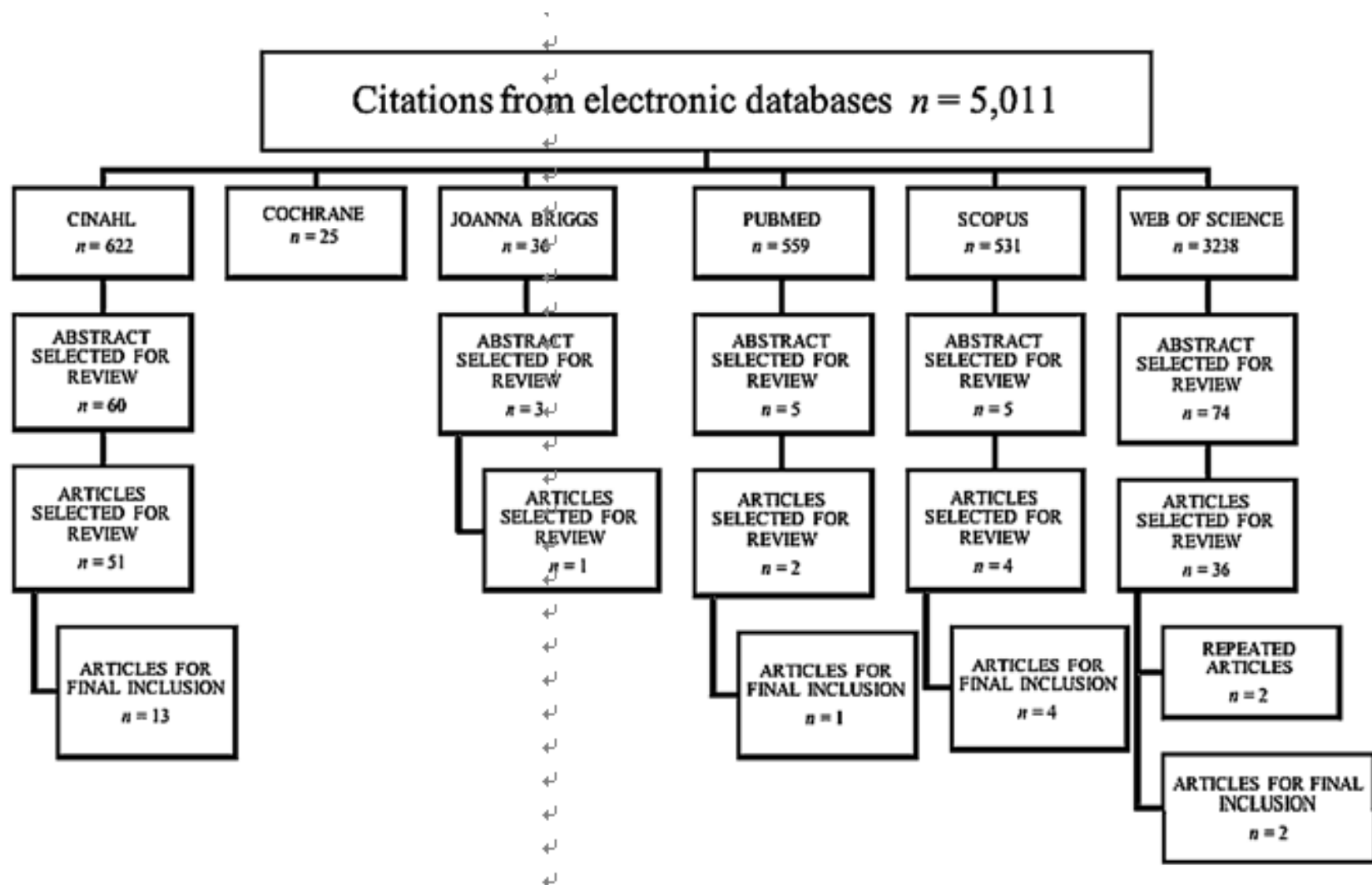
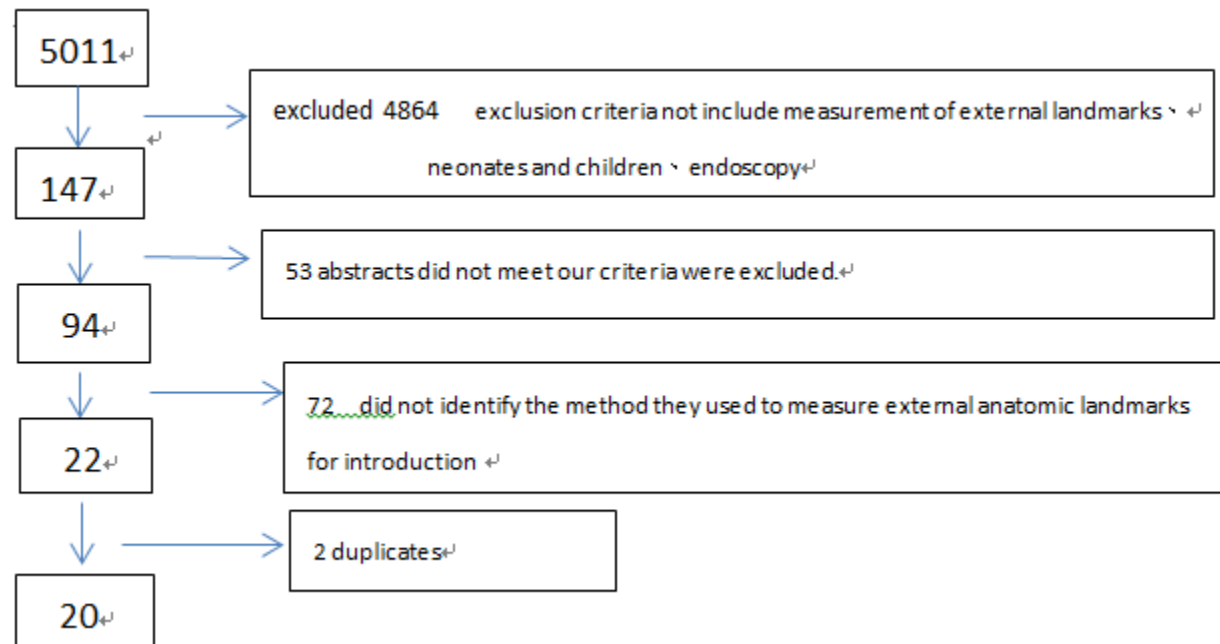


Fig.1. Study selection...

- Our search strategy produced a total of 5011 articles as follows: CINAHL = 622, Cochrane Library = 25, JBI = 36, PubMed = 559, SCOPUS = 531, and Web of Science = 3238
- We excluded 4864 based on our inclusion and exclusion criteria.
- Studies were **included** if they described **measurement of external landmarks** to determine position of a NGT.
- Studies were **excluded** if they **did not include measurement of external landmarks**; were carried out in **neonates and children**; used other methods, such as **endoscopy**, to aid insertion of the tube; or addressed ways of **locating feeding tubes** in the post-pyloric position.



評讀結果：☐是 ☐否 ☐不清楚

A - 文獻是否經過嚴格評讀 (Appraisal) ?

應根據不同臨床問題的文章類型，選擇適合的評讀工具，並說明每篇研究的品質 (如針對治療型的臨床問題，選用隨機分配、盲法、及完整追蹤的研究類型)

Table 1.

Johns Hopkins strength of the evidence – rating scales.

Johns Hopkins strength of the evidence.	
Level I	Experimental study/randomized controlled trial or meta-analysis.
Level II	Quasi-experimental study.
Level III	Non-experimental study, qualitative study, or meta-synthesis.
Level IV	Opinion of nationally recognized experts based on research evidence or expert consensus panel (systematic review, clinical practice guidelines).
Level V	Opinion of individual expert based on non-research evidence (includes case studies; literature review; organizational experience e.g., quality improvement and financial data; clinical expertise, or personal experience).

Newhouse et al. (2005).

- ✓ A search of the literature was conducted in February and March 2015. The search included articles having all levels of evidence. The Johns Hopkins Strength of the Evidence method (Newhouse et al., 2005) was used to analyze the evidence
- ✓ Studies were included in this review if they met the Cochrane standards (Cochrane Community, 2015) for article inclusion.

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- ✓ **Author 1** conducted the initial review of the remaining 20 articles (15 in Table 2 and 5 in Table 3) **and Author 2** conducted a second review to establish reliability. All 20 articles were included in the final review.

評讀結果： ☐ 是 ☐ 否 ☐ 不清楚

I - 是否只納入 (included) 具良好效度的文章？

僅進行文獻判讀是不足夠，系統性文獻回顧只納入至少要有一項研究結果是極小偏誤的試驗。

See [Table 2](#)

P99-100

- ✓ We found two studies that were reports of original research 、three review articles 、one, guidelines and nine expert opinion
- ✓ Twelve articles were classified as evidence level 5 and one each as evidence level 4 evidence level 3 (Chen et al., 2011), and evidence level 1 (Illias et al., 2013). In spite of the higher level of evidence of Illias et al. (2013) and Chen et al. (2011), included in Table 2, these studies did not aim to determine an internal length of NGT for feeding in adults. This is why they were not included in Table 3, in spite of their higher level of evidence.

評讀結果：☐是 ☐否 ☐不清楚

I - 是否只納入 (included) 具良好效度的文章？

see [table 3](#)

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- We found five observational studies that were papers of original research, in which external anatomical land-marks were compared to internal measurements to determine tube placement .
- The countries where these studies were conducted include: USA (2), Brazil (1), England (1) and Taiwan (1), and used different populations and technologies.
- The publication period for these studies ranged from 1979 to 2014.
- All studies were rated at **evidence level 3**; **no randomized clinical trials** were found.
- ✓ Three studies compared the NEX method to others.
- ✓ Four studies examined patients and one study used cadavers and volunteers.
- ✓ Anatomical landmarks studied included:
 1. NEX,
 2. XEN + 10 cm
 3. $[\text{NEX} - 50 \text{ cm}]/2 + 50 \text{ cm}$
 4. GWNUF

評讀結果：☐是 ☐否 ☐不清楚

T - 作者是否以表格和圖表「總結」 (total up) 試驗結果？

應該用至少 1 個摘要表格呈現所納入的試驗結果。若結果相近，可針對結果進行統合分析(meta-analysis)，並以「森林圖」(forest plot)呈現研究結果，最好再加上異質性分析

僅以Table2.3呈現

Table 2:Studies not intended to determine the internal length of the nasogastric tube

Table 3:Studies intended to determine the internal length of the nasogastric tube

評讀結果： 是 ☐ 否 ☐ 不清楚

H - 試驗的結果是否相近 - 異質性 (Heterogeneity) ?

在理想情況下，各個試驗的結果應相近或具同質性，若具有異質性，作者應評估差異是否顯著(卡方檢定)。根據每篇個別研究中不同的PICO及研究方法，探討造成異質性的原因。

5、Limitations

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This review summarizes information on methods to determine the insertion internal length of NGT in adults. Several methodologies were described and there may have been recommendation bias. Several studies contained small samples sizes and groups that may not be directly comparable. For instance, the Hanson (1979) study was composed of cadavers. We considered that all studies were equally reliable. However, the methods **were heterogeneous**, which may have led to a biased conclusion.

評讀結果：☐ 是 ☒ 否 ☐ 不清楚

Results

- Ideal placement was described in two studies.
 - ✓ According to Hanson's (1979) results, the best placement of a NGT should be the body or fundus of the stomach, located between 1 cm and 10 cm beyond the lower esophageal sphincter
 - ✓ Ellett et al. (2005) determined best placement to be 3–10 cm beyond the lower esophageal sphincter.

Results

■ Four studies incorporated technology to aid in identifying internal measurement.

- ✓ Ellett et al. (2005) used [continuous transduced pressure](#) recordings during esophageal motility studies to identify the location of the lower esophageal sphincter.
- ✓ Malta et al. (2013) used an [endo- scope to mark](#) and compare internal anatomical points with external anatomical points to determine the internal length of NGT.
- ✓ Taylor et al. (2014) used an [electromagnetic signal](#) to follow the path of NGT during insertion and compared external landmarks to the internal measurement generated by the signal for XEN (NEX measured in reverse).
- ✓ Chen et al. (2014) used [positron emission tomography](#) to compare external anatomical landmarks to internal points for NEX, glabella to xiphoid (GX), and glabella to umbilicus (GU).

Results

■ Each study tested a different method of measuring NGT to the correct length

- ✓ Hanson (1979) discovered NEX resulted in placement beyond the ideal position in 26% of cases and determined the method $([NEX - 50 \text{ cm}]/2) + 50 \text{ cm}$ would be accurate.
- ✓ Ellett et al. (2005) entered gender, weight, and nose-to-umbilicus distance into a method, which they labeled GWNUF. When compared to NEX and Hanson's method, the GWNUF method was shown to be significantly more accurate in predicting distance.
- ✓ Malta et al. (2013) determined the earlobe to xiphoid (EX) method would position the tube at the gastroesophageal junction. they recommended adding the distance from the xiphisternum to the umbilicus (XU) to EX however, they did not test this method.
- ✓ Taylor et al. (2014) concluded XEN resulted in the tube falling short of the stomach and that $XEN + 10 \text{ cm}$ was a more accurate measure.

Conclusion

- The nose-to-ear-to-xiphisternum and Hanson method should no longer be taught in nursing programs or used in practice by the nurse.
- The [gender-weight and nose- umbilicus-flat] method has been shown to be safer.

Discussion

1臨床ON NG tube長度測量方法的是否要改成GWNUF?



綠(同意):0人

黃(需討論):8人

紅(不同意):16人