

# **Continuous vs. Intermittent NG Feeding for Patients on Mechanical Ventilation: Impacts on Gastric Emptying and Pulmonary Aspiration: A Comprehensive Systematic Review**

**Yi-Jen Huang**, RN, MSN, Head Nurse, Intensive Care Unit,  
Department of Nursing, ChungHua Christian Hospital, ChungHua County, Taiwan  
**Asphodel Yang**, RN, PhD, Associate Professor,  
College of Nursing, Central Taiwan University of Science and Technology, Taichung

# Significance of Mechanical Ventilation

- A commonly used mode of support in the intensive care unit
  - 8 to 28% of patients receiving mechanical ventilation (MV)
- Primary risk factor for nosocomial pneumonias
  - risk 6 to 21 times the rate for nonventilated patients
  - 86% of nosocomial pneumonias are associated with mechanical ventilation

# Ventilator-Associated Pneumonia

- pneumonia occurring more than 48 h after patients have been intubated and received mechanical ventilation

# Significance of VAP

- Account for 15% of all hospital associated infections
- Account for 27% of all MICU acquired infections
- Affects 10–20% of mechanically ventilated patients

# Significance of VAP

- Increased morbidity and mortality
  - ranges from 24 to 50% and can reach 76% in some specific settings
  - have a 2- to 10-fold higher risk of death compared with patients without pneumonia

# Significance of VAP

- Increases ventilatory support requirements and ICU stay by 4.3 days
- Increases hospital LOS by 4 to 9 days
- Increases cost - > \$11,000 per episode

# Role of Enteral Feeding

- Necessary nutritional support
- A well known risk factor for developing VAP (VAP)

# Step 1: Ask An Answerable Question

P

- Patient/Problem
- Patients on ventilator

I

- Intervention
- Intermittent NG Feeding

C

- Comparator
- Continuous NG Feeding

O

- Outcome
- Gastric Emptying
- Indicators of Pulmonary Aspiration



**Criteria for considering studies for this review**

**Step 2: Tracking down the best evidence with which to answer that question**

# Types Of Studies

- Randomized Controlled Trials (RCTs)
- Controlled Clinical Trials (CCTs)
- Non-randomized controlled trials and before and after studies will be considered in the absence of RCTs

# Types of Participants

- The quantitative component of this review will consider studies that include adult patients on mechanical ventilation and receiving NG feeding

# Types of Interventions

- Only trials comparing the effects of continuous or intermittent NG feeding were selected.

# Types of Outcome Measures

- Gastric emptying
- Pulmonary Aspiration

# Search strategy

- A three-step search strategy was utilized in each component of this review.
  - An initial limited search of MEDLINE and CINAHL was undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe article.
- A second search using all identified keywords and index terms will then be undertaken across all included databases.
- Thirdly, the reference list of all identified reports and articles will be searched for additional studies.

# Search Methods For Identification Of Studies

- Electronic searches
  - MEDLINE
  - CINAHL databases
  - EMBASE
  - The Cochrane Central Register of Controlled Trials
  - Chinese Electronic Publication Service (CEPS)
  - Chinese Electronic Theses and Dissertations Service (CETD)

# Keywords Used

- enteral feeding
  - nasogastric feeding
- mechanically ventilated
- gastric emptying
- ventilator-associated pneumonia
- aspiration pneumonias
- gastric aspiration



# Data Collection & Analysis

# Selection Of Studies

- One review author screened the title, abstract and descriptors of identified studies for possible inclusion.
- From the full text, two authors independently assessed potentially eligible trials for inclusion
- Differences were resolved by consensus, or 3dr third party adjudication.
- 7 studies were included in the final data analysis

# Data Collection

- Data extracted from the publications included
  - Study
  - Intervention
  - Participants' characteristics
  - methodological quality
  - outcome measures
- Data were extracted using a pre-tested extraction form by two independent reviewers

**Step 3: Critically appraising  
that evidence for its validity,  
impact, and applicability**

# Assessment Of Methodological Quality

- Research rigor of these studies was evaluated using the Quality Index, developed by Downs and Black (1998)
  - It consists of five subscales, including (a) reporting (10 items), (b) external validity (3 items), (c) bias (7 items), (d) confounding (6 items), and (e) power (1 item).
  - The highest possible score was 32.

# Methodological Quality of Included Studies

Author	Total	Report	External Validity	Bias	Confounding	Power
Wu et al (1999)	18.00	7.00	1.00	5.00	5.00	.00
Cho et al (2003)	21.00	8.00	3.00	6.00	4.00	.00
Chen (2007)	15.00	8.00	1.00	5.00	1.00	.00
Bonten et al (1995)	20.00	7.00	3.00	5.00	5.00	.00
Chen et al (2006)	20.00	8.00	3.00	5.00	5.00	.00
MacLeod et al. (2007)	19.00	9.00	3.00	4.00	3.00	.00
Steevens et al. (2002)	14.00	7.00	3.00	2.00	2.00	.00
Max. Total Score	32	10	3	7	6	5
Interrater Kappa	.836	.776	.618	.859	.854	<sup>22</sup> N/A

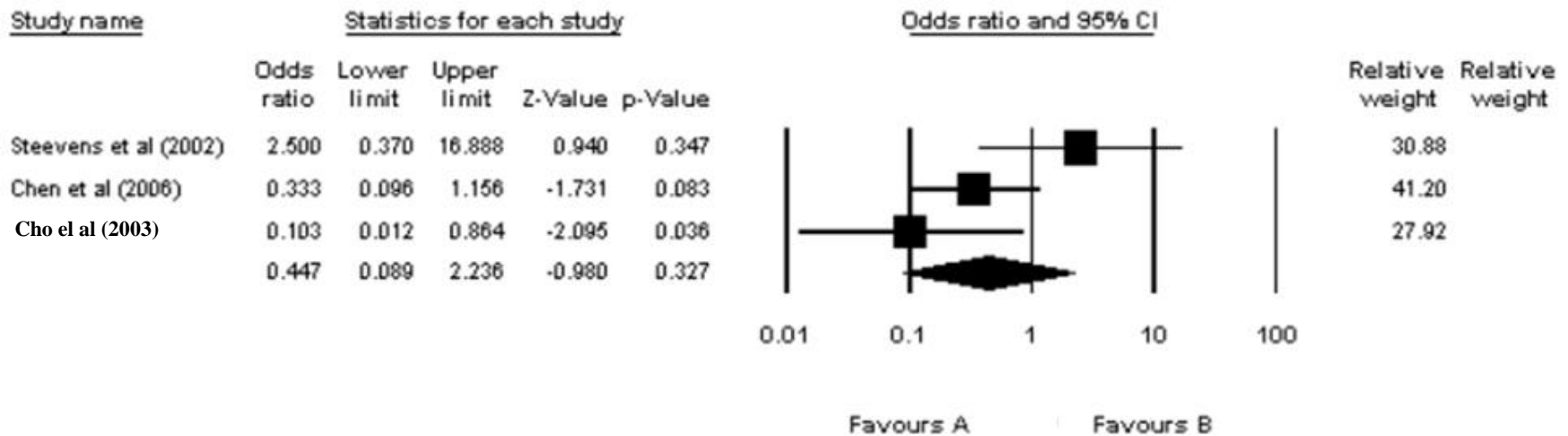
**Step 4: Synthesize the  
available evidence**

# Data Analysis

- Comprehensive Meta Analysis version 2.2 (Biostat, 2006) was used to analysis statistical data extracted from retrieved articles and to conduct meta-analysis.
  - i.e., sample size, mean, change score, SD,  $t$ ,  $p$  values
- Odds ratio, standard difference in mean, 95% confidence intervals (CI) and  $p$ -values were calculated for each of studies as well as combined effects.



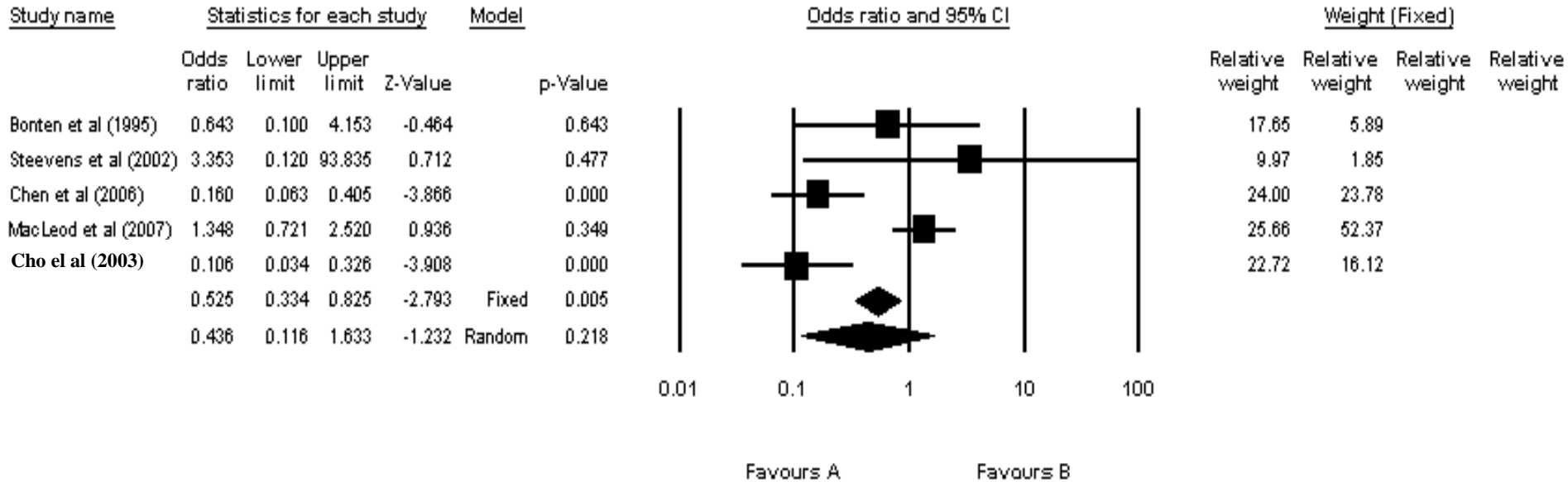
# Result



## Meta Analysis

No difference in gastric emptying between two modes of NG feedings

# Result

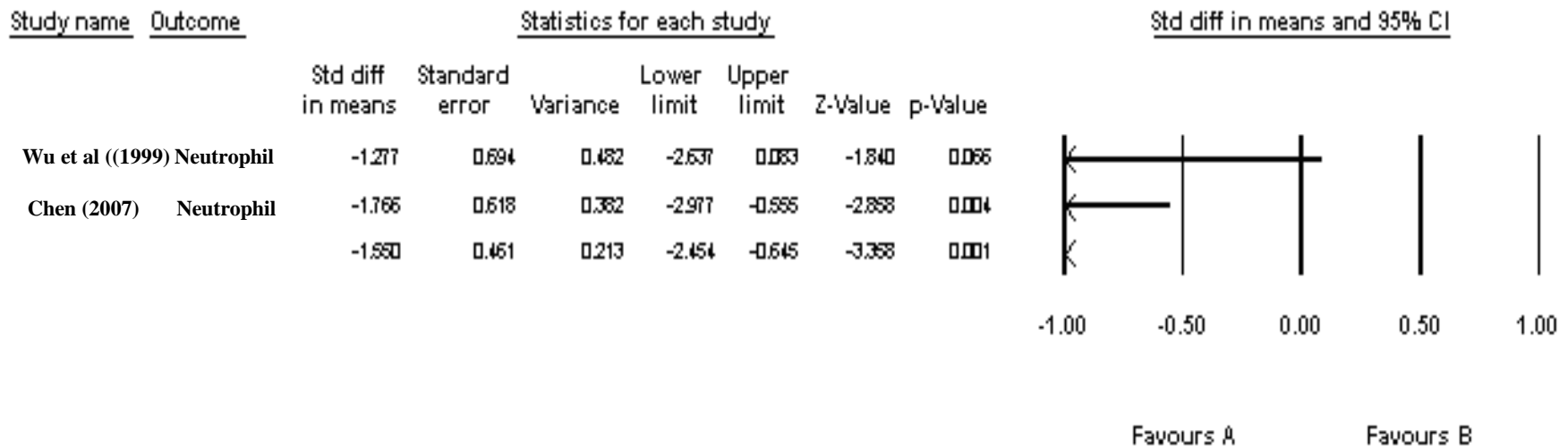


## Meta Analysis

No difference in pulmonary aspiration between two modes of NG feedings

# Result

## Meta Analysis

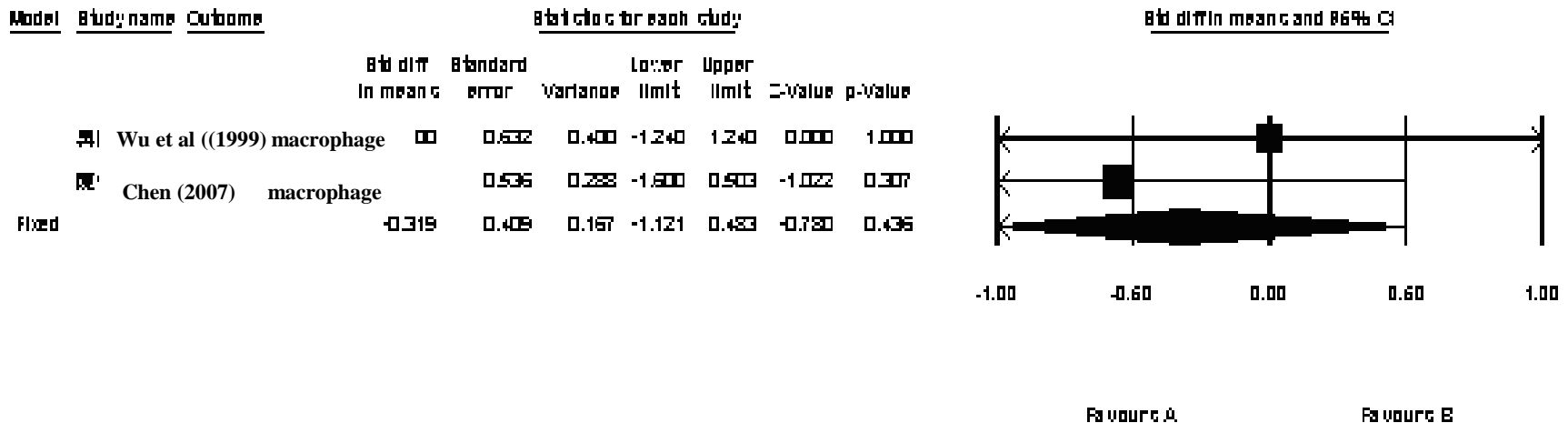


### Meta Analysis

Patients receiving intermittent NG Feeding had better outcome in Neutrophil cell concentration in sputum.

# Result

## Meta Analysis



No difference in lipid-laden macrophage cell concentration in sputum between two modes of NG feedings.

# Discussion

- Limitations of the study
  - Publication bias
  - Study quality
    - Non-RCT
    - Small sample size
  - Confounding factors
    - Homogeneity in population?

# Conclusion

- No definitive studies showing either intermittent or continuous NG feeding is better in the outcomes of gastric emptying or the amount of lipid-laden macrophage presented in sputum.
- Intermittent NG feeding is better than continuous NG feeding in terms of less neutrophils present in sputum.

# Conclusion

- The current strength of evidence is weak and well-designed studies are strongly recommended.
- Clinical application should take individuals' differences into consideration