



臺北市立萬芳醫院 - 委託臺北醫學大學辦理

Taipei Municipal Wanfang Hospital (Managed by Taipei Medical University)

住院病人刷牙至少2次是否可以預防非 呼吸器相關肺炎NVHAP的發生

引言人:黃曉萍督導長

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JAMA Internal Medicine | Original Investigation

Association Between Daily Toothbrushing and Hospital-Acquired Pneumonia

A Systematic Review and Meta-Analysis

Selina Ehrenzeller, MD; Michael Klompas, MD, MPH

IMPORTANCE Hospital-acquired pneumonia (HAP) is the most common and morbid health care-associated infection, but limited data on effective prevention strategies are available.

OBJECTIVE To determine whether daily toothbrushing is associated with lower rates of HAP and other patient-relevant outcomes.

DATA SOURCES A search of PubMed, Embase, Cumulative Index to Nursing and Allied Health, Cochrane Central Register of Controlled Trials, Web of Science, Scopus, and 3 trial registries was performed from inception through March 9, 2023.

STUDY SELECTION Randomized clinical trials of hospitalized adults comparing daily oral care with toothbrushing vs regimens without toothbrushing.

DATA EXTRACTION AND SYNTHESIS Data extraction and risk of bias assessments were performed in duplicate. Meta-analysis was performed using random-effects models.

MAIN OUTCOMES AND MEASURES The primary outcome of this systematic review and meta-analysis was HAP. Secondary outcomes included hospital and intensive care unit (ICU) mortality, duration of mechanical ventilation, ICU and hospital lengths of stay, and use of

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+ [Multimedia](#)

+ [Supplemental content](#)

影響係數IF: 22.3

評讀工具: FAITH



Q:住院病人每日刷牙至少
2次是否能降低吸入性肺炎
發生呢?





SR Appraisal sheets(FAITH)

Appraisal Tool

[系統性文獻回顧Systematic Review]

步驟1: 系統性文獻回顧探討的問題為何? (PICO)

步驟2: 系統性文獻回顧的品質如何? (內在效度)

步驟3: 結果為何? (效益)



步驟1:系統性文獻回顧探討的問題為何?

✓ P(Patient/Population/Problem)

住院病人

✓ I(Intervention)

每日刷牙至少2次

✓ C(Comparison)

每日刷牙少於2次

✓ O(Outcomes)

預防非呼吸器相關肺炎(NVHAP)



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[系統性文獻回顧Systematic Review]

步驟1: 系統性文獻回顧探討的問題為何? (PICO)

步驟2: 系統性文獻回顧的品質如何? (內在效度)

步驟3: 結果為何? (效益)



步驟2:系統性文獻回顧的品質如何?

- F-研究是否找到(Find)所有的相關證據?

Identification of Studies

We searched the **PubMed, Embase, Web of Science, Cochrane Central Register of Controlled Trials, Scopus, and Cumulative Index to Nursing and Allied Health databases** from inception through **March 9, 2023**. We also searched 3 trial registries: **ClinicalTrials.gov**, the **International Standard Randomized Controlled Trial Number Registry**, and the **International Clinical Trials Registry Platform**. We further searched the reference lists of articles that met inclusion criteria and recent review articles^{20,21,24,26-29} and queried **Google Scholar** for similar articles for all included studies. No date or language restrictions were applied.

- 檢索時間範圍從建庫至 2023 年 3 月 9 日
- 語言、日期不限制
- 資料庫與文獻引用檢索:Pubmed、Embase、Scopus、Web of Science、考科藍對照試驗中心註冊庫(Cochrane Central Register of Controlled Trials)、CINAHL(Cumulative Index to Nursing and Allied Health databases)、Google Scholar
- 臨床試驗中心:臨床試驗資料庫(ClinicalTrials.gov)、國際標準隨機對照試驗編號登記處、ICTRP(國際臨床試驗註冊平台)

步驟2:系統性文獻回顧的品質如何?

- F-研究是否找到(Find)所有的相關證據?

Search Strategy

The primary search strategy was developed for PubMed with the support of a medical information specialist. It included a combination of Medical Subject Heading terms and keywords related to toothbrushing and HAP and was adapted as needed for each database and registry (eMethods 1 in [Supplement 1](#)).

Eligibility Criteria

Studies meeting the following criteria were eligible: (1) randomized clinical trials; (2) adult participants 16 years or older in acute care hospitals; (3) investigation of the effects of toothbrushing vs no toothbrushing; and (4) inclusion of at least 1 of the following outcomes: HAP (VAP and/or NV-HAP), duration of mechanical ventilation, ICU length of stay, hospital length of stay, mortality, or use of antibiotics. An overview of excluded studies, including reasons for exclusions, is provided in eTable 2 in [Supplement 1](#).

- 關鍵字搜尋使用MeSH、刷牙、院內感染肺炎 (HAP) 相關的關鍵詞

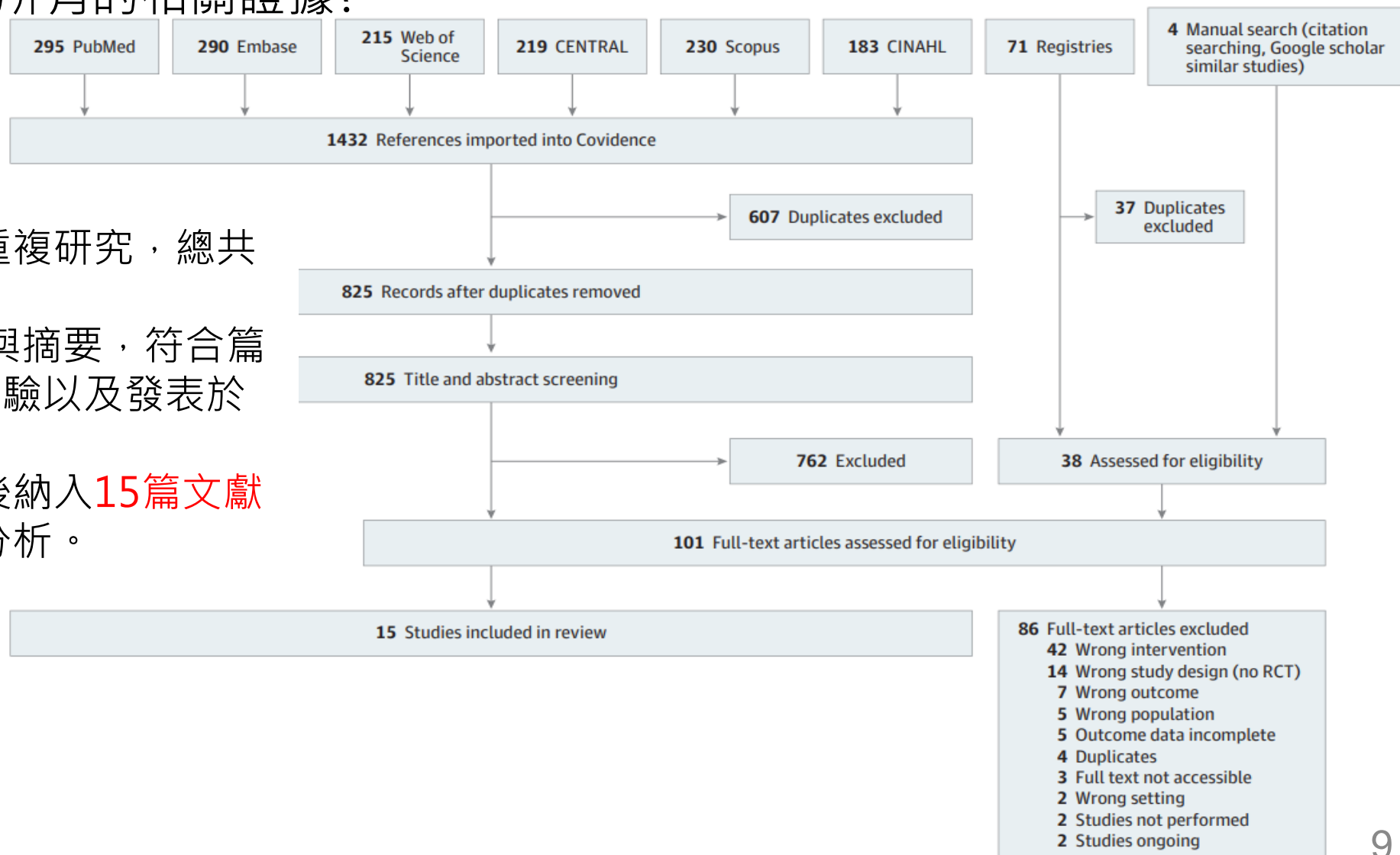
納入條件

1. 隨機臨床試驗(RCT)
2. 16歲以上住院病人
3. 探討刷牙和沒有刷牙的效果
4. 至少包含一項結果:
院內感染肺炎(使用呼吸器感染肺炎和/或是未呼吸器使用院內感染肺炎)、
呼吸器使用時間、
加護病房住院天數、
醫院住院天數、
死亡率、
抗生素使用情形

步驟2:系統性文獻回顧的品質如何?

- F-研究是否找到(Find)所有的相關證據?

- ✓ 經過資料庫搜尋，刪除重複研究，總共找出825篇。
- ✓ 限制搜索:根據文獻標題與摘要，符合篇數101篇、並且為臨床試驗以及發表於描述的時間範圍內。
- ✓ 經評估文章全文後，最後納入**15篇文獻**進行系統性回顧及統合分析。



步驟2:系統性文獻回顧的品質如何?

- F-研究是否找到(Find)所有的相關證據?

Table. Characteristics of Included Studies

| Source | Country | No. of patients | Setting | Procedure | | Pneumonia definition | End of follow-up | Blinded outcome assessors |
|--|---------|-----------------------------------|--|--|--|--|---|---------------------------|
| | | | | Intervention | Control | | | |
| Bellissimo-Rodrigues et al, ⁴² 2014 | Brazil | 254 | ICU | <u>Thrice-daily routine care and toothbrushing 4-5 times/wk performed by a dental surgeon with soft child toothbrush, tongue scraping, calculus removal, atraumatic restorative treatment of caries, teeth extraction, and oral application of chlorhexidine</u> | <u>Thrice-daily oral care by oral cavity cleaning with spatula wrapped in gauze, followed by topical application chlorhexidine, 0.12% or 0.2% (depending on consciousness)</u> | VAP and NV-HAP defined by CDC's NHSN surveillance definition of health care-associated infection (according to CDC) ⁵² | 48 h After ICU discharge | Yes |
| Chacko et al, ⁴⁴ 2017 | India | 206 | ICU | <u>Thrice-daily toothbrushing and tongue brushing with chlorhexidine, 0.2%, in the oral cavity</u> | Thrice-daily oral care by swabbing with <u>sponges soaked in chlorhexidine, 0.2%</u> | VAP defined as patient receiving ventilation; abnormal chest radiographic finding suggestive of pneumonia; fever or hypothermia; leukopenia or leukocytosis; purulent endotracheal aspirate or increased respiratory secretions or suction; worsening gas exchange or increasing oxygen demand (if only the last 2 are present, then positive culture yield needed according to CDC guidelines valid in 2014) | ICU discharge | Yes |
| de Lacerda Vidal et al, ⁴¹ 2017 | Brazil | 213 | ICU | <u>Twice-daily toothbrushing and brushing of all surfaces, tongue, and mucosal surface of the mouth with a toothbrush with small and soft bristles, and dental gel based on chlorhexidine, 0.12%</u> | Twice-daily oral care by <u>swabbing all tooth surfaces, tongue, and mucosal surfaces of the mouth and applying chlorhexidine, 0.12%, oral solution</u> | Suspected VAP defined as new or progressive pulmonary infiltrate on chest radiographic finding and ≥ 2 of 3 clinical criteria (fever, leukocytosis or leukopenia, purulent respiratory secretions). Confirmed VAP defined as bacterial growth of endotracheal aspirates and bronchoalveolar lavage with values $\geq 10^6$ CFU/mL and $\geq 10^4$ CFU/mL (according to the American Thoracic Society) ⁵³ | Day 28, death, extubation, or ICU discharge | Yes |
| Falahinia et al, ³⁹ 2016 | Iran | 68 | ICU | <u>Twice-daily toothbrushing with soft child toothbrush and chlorhexidine, 0.2%, for 3 min</u> | Twice-daily oral care with <u>gauze swab soaked in chlorhexidine, 0.2%</u> | VAP defined as CPIS ≥ 6 , including the parameters temperature, leukocytes, tracheal secretions, blood oxygenation, chest radiographic results, and tracheal aspirate culture (according to Pugin et al) ⁵⁴ | 5 d (Duration of intervention) | Yes |
| Félix, ⁵¹ 2016 | Brazil | 58 | ICU | <u>Twice-daily toothbrushing with toothbrush soft bristles soaked in chlorhexidine, 0.12%</u> | Twice-daily oral care with <u>gauze soaked in chlorhexidine, 0.12%</u> | VAP defined by Diagnostic Criteria for Healthcare-Related Infections (according to National Brazil Guidelines) ⁵⁵ | Extubation, VAP diagnosis | Yes |
| Giuliano et al ⁴⁷ 2021 | US | 8709 (Effective sample size, 753) | 2 Medical and 2 surgical wards (Cluster RCT) | <u>Toothbrushing 4 times/d with soft toothbrushes with plaque-removing toothpaste as provided to patients (target frequency*)</u> | Patients were not reminded to brush their teeth, no oral care supplies were provided | NV-HAP defined by radiological diagnosis, cultures when available, and symptom assessment (according to CDC) ⁵⁶ | Hospital discharge | No |
| Gong et al, ³¹ 2018 | China | 80 ^b | ICU | <u>Toothbrushing 4 times/d with soft toothbrush dipped in saline, brushing of tongue, each tooth, and interdental space with gentle movement</u> | <u>Oral care 4 times/d by using saline on teeth, tongue, throat, cheeks, and jaw</u> | VAP defined by Intensive Care Branch of Chinese Medical Association ⁵⁷ | 5 d (Duration of intervention) | Unclear |

步驟2:系統性文獻回顧的品質如何?

- F-研究是否找到(Find)所有的相關證據?

| Source | Country | No. of patients | Setting | Procedure | | Pneumonia definition | End of follow-up | Blinded outcome assessors |
|-------------------------------------|----------|-----------------|---------|--|---|---|---------------------------------|---------------------------|
| | | | | Intervention | Control | | | |
| Khan et al, ⁴⁹ 2017 | Malaysia | 9 | ICU | Thrice-daily <u>toothbrushing</u> with chlorhexidine, 0.2% | Thrice-daily <u>oral care</u> with chlorhexidine, 0.2%, foam swab | VAP defined by physician and ICU nursing staff | 11 d (Duration of intervention) | Unclear |
| Long et al ⁵⁰ 2012 | China | 61 | ICU | Thrice-daily <u>toothbrushing</u> with a soft child toothbrush, preceded by povidone, 0.1%-iodine gauze scrubbing before intubation | Thrice-daily <u>oral care</u> by scrubbing teeth and buccal area with povidone, 0.1%-iodine swab | VAP defined by positive culture of secretions of lower respiratory tract ^c | Extubation | Unclear |
| Lorente et al, ⁴⁵ 2012 | Spain | 436 | ICU | Thrice-daily <u>toothbrushing</u> (tooth by tooth on anterior and posterior surfaces, gumline, and tongue for 90 s) with a brush soaked in chlorhexidine, 0.12%, preceded by oral care with gauze soaked in chlorhexidine, 0.12% | Thrice-daily oral care with <u>gauze</u> soaked in chlorhexidine, 0.12% | VAP defined by all fulfilled: new onset of bronchial purulent sputum, temperature >38 °C or <35.5 °C, leukocytosis and/or leukopenia, chest radiograph with new or progressive infiltrates, significant quantitative culture of respiratory secretions by tracheal aspirate | 7 d for VAP outcome | Yes |
| Nasiriani et al, ⁴⁰ 2016 | Iran | 168 | ICU | Twice-daily <u>toothbrushing</u> and tongue brushing with soft child toothbrush and distilled water; a swab with chlorhexidine was then rubbed on the tongue, followed by normal saline | Thrice-daily oral care by mouth rinsing with <u>normal saline</u> and rubbing a swab with <u>chlorhexidine</u> on the tongue | VAP defined as CPIS ≥6 ^d including the parameters temperature, leukocytes, tracheal secretions, blood oxygenation, chest radiographic results, and tracheal aspirate culture (according to Pugin et al) ⁵⁴ | 5 d (Duration of intervention) | Yes |
| Pobo et al, ⁴⁶ 2009 | Spain | 147 | ICU | Thrice-daily <u>toothbrushing</u> tooth by tooth on anterior and posterior surfaces, along the gumline and the tongue with electric toothbrush, followed by oral care with chlorhexidine, 0.12%, same as the control group | Thrice-daily oral care with chlorhexidine, 0.12%-soaked gauze to all teeth, tongue, and mucosal surface and injection of chlorhexidine, 0.12%, into the oral cavity which is aspirated after 30 s | Suspected VAP defined by new or progressive pulmonary opacities, purulent respiratory secretions, and fever or leukocytosis; confirmed VAP defined by presence of ≥1 potentially pathogenic organism in respiratory samples according to predefined thresholds | 28 d | Yes |
| Salarzahi et al, ³² 2021 | Iran | 60 ^a | ICU | Thrice-daily <u>toothbrushing for 5 min</u> all the outer and inner surfaces of the teeth and gums and then the tongue and palate surfaces with an infant toothbrush and antimicrobial toothpaste containing fluoride by making rotating movements or moving from the back to the front of the mouth; each part of the mouth was then cleaned with sterile distilled water; mouth, tongue, and teeth were then rinsed with a chlorhexidine, 0.2%-soaked swab | Oral care with chlorhexidine, 0.2%, mouthwash (no frequency reported for control group) | VAP defined as modified CPIS ≥5, including the parameters temperature, leukocytes, tracheal secretions, blood oxygenation, and chest radiographic results (according to Lauzier et al) ⁵⁸ | 5 d (Duration of intervention) | Yes |
| Singh et al, ⁴³ 2022 | India | 220 | ICU | Twice-daily <u>toothbrushing</u> with ultrasoft toothbrush (gauze wrapped around fingers if brushing was not possible), lubrication of oral mucosa, and chlorhexidine, 0.2%, mouthwash | Oral care with chlorhexidine, 0.2%, mouthwash; frequency according to BOAS score | Suspected VAP defined by fever, positive ETT cultures, chest auscultation, increased ventilator demand, or new abnormal chest radiographic findings | VAP, death, or discharge | Unclear |

步驟2:系統性文獻回顧的品質如何?

- F-研究是否找到(Find)所有的相關證據?

Table. Characteristics of Included Studies (continued)

| Source | Country | No. of patients | Setting | Procedure | | Pneumonia definition | End of follow-up | Blinded outcome assessors |
|-------------------------------|---------|-----------------|---------|--|---|--|------------------------|---------------------------|
| | | | | Intervention | Control | | | |
| Yao et al, ⁴⁸ 2011 | Taiwan | 53 | ICU | <u>Twice-daily toothbrushing</u> the teeth's facial sides with an electric toothbrush, moisturizing the oral cavity with purified water, cleansing lingual sides and massaging tongue, gums, and mucosa with a soft child toothbrush; cleaning oral cavity with oral swab connected to the suction tube and rinsing with purified water (duration 15-20 min) and daily usual oral care | <u>Once-daily</u> usual oral care with oral swabs or cotton swabs and twice daily mock care for 10-15 min; lips were moisturized using an oral swab with purified water | VAP defined as modified CPIS >6, including the parameters temperature, leukocytes, tracheal secretions, blood oxygenation, chest radiographic results, progression of pulmonary infiltrate, and tracheal aspirate culture (according to Singh et al) ⁵⁹ | 9 d (7 d Intervention) | Yes |

➤ 評讀結果:清楚

✓ 說明：文獻搜尋包括二個主要的資料庫 並且加上文獻引用檢索、驗登錄資料等。文獻搜尋不只限於英文，並且應同時使用 MeSH 字串 及一般檢索詞彙(text words)。

步驟2:系統性文獻回顧的品質如何?

- A-文獻是否經過嚴格評讀(Appraisal)?

Study Selection and Data Extraction

Two reviewers (S.E. and M.K.) independently screened all titles and abstracts to assess eligibility. Full-text articles from potentially eligible studies were further reviewed for inclusion. Discrepancies between reviewers were resolved through discussion and consensus.

Study selection and data extraction were performed using Covidence software and a standardized data extraction form.³⁰ Data were extracted by the 2 reviewers independently, and inconsistencies were resolved through consensus discussions.

Extracted data included study characteristics, intervention and control group procedures, funding sources, HAP rates, mortality, hospital length of stay, ICU length of stay, duration of mechanical ventilation, and use of antibiotics (data collection form in eMethods 2 in [Supplement 1](#)). When primary outcome data were incomplete or inconsistently reported, authors were contacted for clarification. The study was excluded if no response was received within 4 weeks and clarification was necessary to determine study eligibility. If a study included multiple groups, only pertinent groups were extracted.^{31,32}

Extracted data included study characteristics, intervention and control group procedures, funding sources, HAP rates, mortality, hospital length of stay, ICU length of stay, duration of mechanical ventilation, and use of antibiotics (data collection form in eMethods 2 in [Supplement 1](#)). When primary outcome data were incomplete or inconsistently reported, authors were contacted for clarification. The study was excluded if no response was received within 4 weeks and clarification was necessary to determine study eligibility. If a study included multiple groups, only pertinent groups were extracted.^{31,32}

- 由兩位研究者篩選文獻，若意見分歧，透過討論和協商解決。
- 當研究結果不完整，會聯繫原作者以進行釐清。若在四週內未收到回覆，則該研究將被排除。若研究包含多個組別，則僅擷取與本研究相關的組別資料。

步驟2:系統性文獻回顧的品質如何?

- A-文獻是否經過嚴格評讀(Appraisal)?

Risk of Bias and Quality Assessment

Both reviewers (S.E. and M.K.) independently assessed risk of bias in all included studies using the **Cochrane risk of bias template** for randomized clinical trials.³³ Inconsistencies were resolved through consensus discussions. **The Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) framework** was used to evaluate certainty of evidence and strength of recommendations.³⁴

➤ 評讀結果:清楚

- 兩位研究員 (S.E. 和 M.K.) 皆獨立使用 **Cochrane 隨機臨床試驗偏倚風險評估工具** 對所有納入研究進行偏倚風險評估。對於不一致之處，透過共識討論予以解決。並採用 **GRADE** (Grading of Recommendations, Assessment, Development, and Evaluation) 架構來評估證據的確實性與建議的強度。

步驟2:系統性文獻回顧的品質如何?

- 1-是否只納入(Included)具良好效度的文章?

Figure 2. Risk of Bias Summary

| | | | | | | | | | | | | | | | |
|---|--------------------|----------------------|------------------------|---------------------|-------------------------|------------------------|---------------------|---------------------|---------------------|-------------------------|----------------|-------------------------|---------------------------------|-----------------------|------------------------------------|
| Random sequence generation (selection bias) | + | + | + | + | + | + | ? | + | + | + | + | + | + | + | + |
| Allocation concealment (selection bias) | + | + | + | + | + | + | ? | + | ? | + | + | + | + | + | + |
| Blinding of participants and personnel (performance bias) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Blinding of outcome assessment (detection bias) | + | ? | + | + | + | + | ? | ? | ? | ? | + | + | + | + | + |
| Incomplete outcome data (attrition bias) | + | ? | ? | + | - | + | + | ? | - | + | + | + | + | + | + |
| Selective reporting (reporting bias) | + | + | ? | + | + | + | + | + | + | + | + | + | + | + | + |
| Other bias ^a | | | - | | | | | | ? | | - | | | | |
| | Yao et al. 44 2011 | Singh et al. 43 2022 | Salazar et al. 33 2021 | Pobo et al. 46 2009 | Nasirani et al. 40 2016 | Lorente et al. 45 2012 | Long et al. 50 2012 | Khan et al. 49 2017 | Gong et al. 31 2018 | Giuliano et al. 47 2021 | Félix, 51 2016 | Falahima et al. 39 2016 | de Lacerda Vidal et al. 41 2017 | Chacko et al. 44 2017 | Bellisimo-Rodrigues et al. 42 2014 |

➤ 評讀結果:是

✓ 說明：納入的15篇研究中有 8 篇被判定為高風險或風險不明的偏倚，7 篇研究被評定為低偏倚風險，這是因為刷牙的介入措施很難做到雙盲。

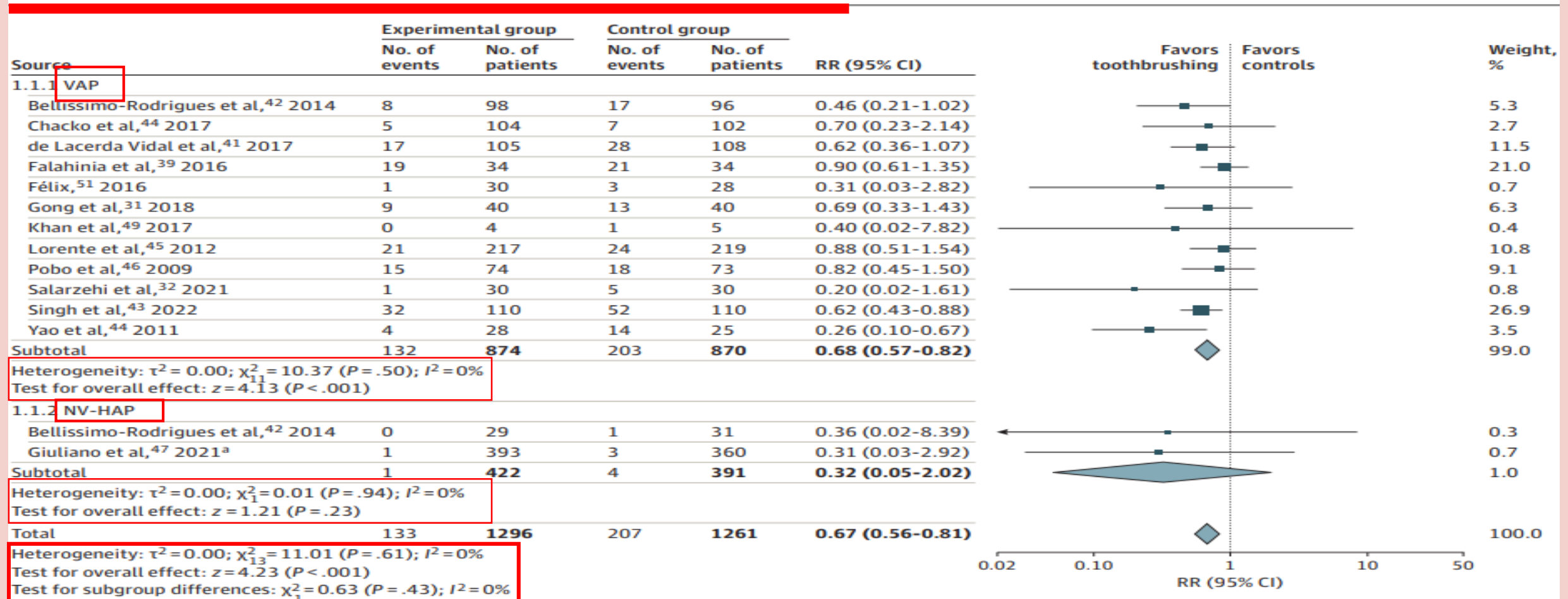
步驟2:系統性文獻回顧的品質如何?

➤ 評讀結果:是

• T-作者是否以表格和圖表「總結」(Total)試驗結果?

• H-試驗的結果是否相近-異質性(Heterogeneity)?

Figure 3. Association of Toothbrushing With Hospital-Acquired Pneumonia (HAP)



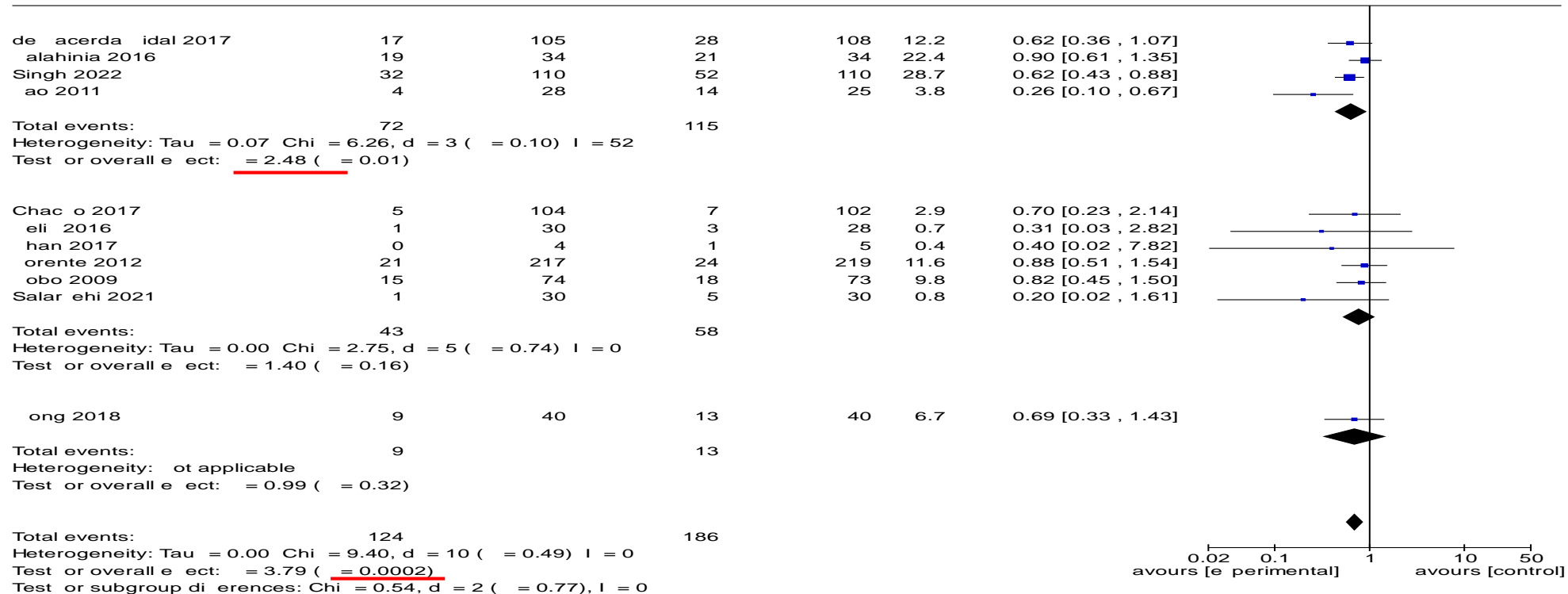
步驟2:系統性文獻回顧的品質如何?

➤ 評讀結果:是

• T-作者是否以表格和圖表「總結」(Total)試驗結果?

• H-試驗的結果是否相近-異質性(Heterogeneity)?

eFigure 2. Association of Frequency of Toothbrushing With Ventilator-Associated Pneumonia



步驟2:系統性文獻回顧的品質如何?

➤ 評讀結果:是

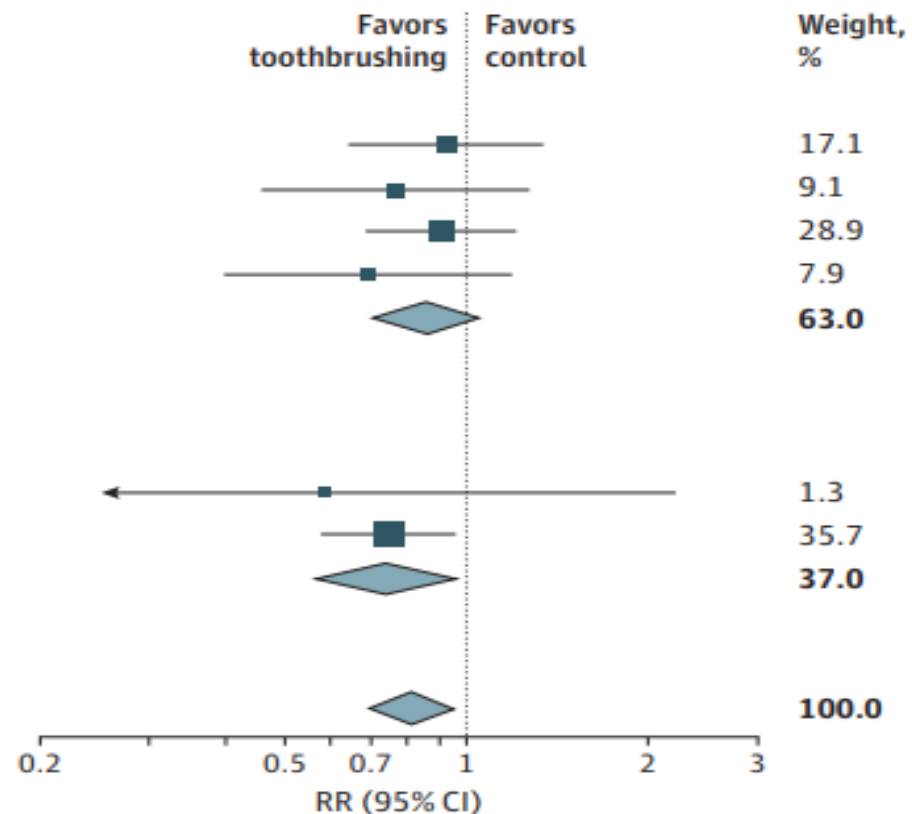
• T-作者是否以表格和圖表「總結」(Total)試驗結果?

• H-試驗的結果是否相近-異質性(Heterogeneity)?

Figure 4. Association of Toothbrushing With Intensive Care Unit Mortality

| Source | Toothbrushing | | Control group | | RR (95% CI) |
|--|---------------|-----------------|---------------|-----------------|-------------------------|
| | No. of events | No. of patients | No. of events | No. of patients | |
| 2.1.1 Low risk of bias | | | | | |
| Bellissimo-Rodrigues et al, ⁴² 2014 | 37 | 127 | 40 | 127 | 0.93 (0.64-1.34) |
| de Lacerda Vidal et al, ⁴¹ 2017 | 20 | 105 | 27 | 108 | 0.76 (0.46-1.27) |
| Lorente et al, ⁴⁵ 2012 | 62 | 217 | 69 | 219 | 0.91 (0.68-1.21) |
| Pobo et al, ⁴⁶ 2009 | 16 | 74 | 23 | 73 | 0.69 (0.40-1.19) |
| Subtotal | 135 | 523 | 159 | 527 | 0.86 (0.71-1.04) |
| Heterogeneity: $\tau^2 = 0.00$; $\chi^2_3 = 1.14$ ($P = .77$); $I^2 = 0\%$ Test for overall effect: $z = 1.54$ ($P = .12$) | | | | | |
| 2.1.2 Unclear/high risk of bias | | | | | |
| Long et al, ⁵⁰ 2012 | 3 | 31 | 5 | 30 | 0.58 (0.15-2.22) |
| Singh et al, ⁴³ 2022 | 49 | 110 | 66 | 110 | 0.74 (0.57-0.96) |
| Subtotal | 52 | 141 | 71 | 140 | 0.74 (0.57-0.95) |
| Heterogeneity: $\tau^2 = 0.00$; $\chi^2_1 = 12$ ($P = .72$); $I^2 = 0\%$ Test for overall effect: $z = 2.37$ ($P = .02$) | | | | | |
| Total | 187 | 664 | 230 | 667 | 0.81 (0.69-0.95) |

Heterogeneity: $\tau^2 = 0.00$; $\chi^2_5 = 2.16$ ($P = .83$); $I^2 = 0\%$
Test for overall effect: $z = 2.66$ ($P = .008$)
Test for subgroup differences: $\chi^2_1 = 0.89$ ($P = .34$); $I^2 = 0\%$



總評(Summary)

系統性文獻回顧品質如何(FAITH)

F - 研究是否找到 (Find) 所有的相關證據？

YES

A - 文獻是否經過嚴格評讀 (Appraisal)？

YES

I - 是否只納入 (included) 具良好效度的文章？

YES

T - 作者是否以表格和圖表「總結」 (total up) 試驗結果？

YES

H - 試驗的結果是否相近 - 異質性 (Heterogeneity)？

YES



SR Appraisal sheets(FAITH)

Appraisal Tool

[系統性文獻回顧Systematic Review]

步驟1: 系統性文獻回顧探討的問題為何? (PICO)

步驟2: 系統性文獻回顧的品質如何? (內在效度)

步驟3: 結果為何? (效益)



結論

1. 本系統性文獻回顧與統合分析共納入15項隨機臨床試驗，其結果顯示：使用呼吸器的病人，進行刷牙相較於沒有刷牙的常規口腔護理，院內感染肺炎(HAP)發生率低，可能與有執行刷牙的口腔護理有關。
2. 刷牙能降低加護病房死亡率、縮短呼吸器使用時間與減少加護病房住院天數有關。
3. 制定相關政策與計畫以鼓勵住院病人—特別是使用呼吸器的病人—每日刷牙，具有重要意義。



限制

1. **缺乏雙盲設計**可能導致結果評估產生偏差。
2. 部分研究的**追蹤時間較短**，可能會低估院內感染肺炎的數量。
3. **不同國家、醫療環境、護理流程及輔助措施**，所做的研究會存在異質性；其中針對使用侵入性機械通氣病人的研究皆未在美國進行。
4. 很少研究納入未接受侵入性機械通氣和非ICU的患者，因此刷牙對這些族群效果的可信度有限。
5. 刷牙可能只是其他預防吸入性肺炎措施的代替指標，因為將病人隨機分派到刷牙組，可能讓**護理人員**對病人有吸入風險這件事變得更加敏感，進而**提高他們的警覺性與照護注意力**。

本院刷牙執行時間 ~

| 單位 | 刷牙+執行時機 |
|-----|---|
| ICU | 1次 + Q8H, 0.12%寶馬生漱口水10ml沖洗口腔 |
| 12A | 一天二次(大夜做由口進食，白班鼻胃管); 小夜全部住民 |
| 病房區 | <ol style="list-style-type: none">1.共照1次，大夜班執行2.家人/外傭：不一定會做3.清醒病人自己執行4.僅9B將口腔護理照護列入入院衛教指導的一環 |

9B 口腔護理照護

(二).執行期(2024年9月01日至9月30日)

於2024年09月10日到09月20日製作衛教單張
及拍攝衛教影片、剪輯後製成衛教QR code。



<https://drive.google.com/drive/home>

口腔護理包



Implementation of a structured oral hygiene program through nursing assistant education to address non-ventilator hospital-acquired pneumonia: A quasi-experimental study

透過護理助理教育實施結構化口腔衛生計劃以應對非呼吸機醫院獲得性肺炎:一項準實驗研究



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Abstract

Introduction: Non-ventilator hospital-acquired pneumonia (NV HAP) is a common complication for hospitalized patients. NV HAP develops when patients aspirate oral secretions containing pathogenic bacteria. Appropriate oral hygiene can help mitigate NV HAP development. Hospital staff, including nursing assistants, play an important role in ensuring that these cares are completed.

Design: A quasi-experimental pre-post design was used to evaluate outcomes before and after implementation of a structured oral hygiene education program.

Methods: A structured oral hygiene program was developed and implemented in a large quaternary hospital. Change in NA knowledge, attitudes, and behaviors before and after implementation of the oral hygiene program was evaluated. Retrospective patient outcomes before and after the intervention were analyzed to detect changes in NV HAP rates.

Results: Following the education, nursing assistant knowledge of recommended frequency of oral care for patients who are NPO increased (67.2% vs. 82.1%, $p=0.003$). NAs were more likely to report oral hygiene tools including oral suctioning (80.8% vs. 90.2%, $p=0.005$) and toothbrushes (89.3% vs. 95.3%, $p=0.031$). The unadjusted incidence of NV HAP was significantly lower in the post-intervention cohort (0.25%) compared to the pre-intervention cohort (0.74%), $p<0.001$. In the adjusted model, non-invasive positive pressure ventilation increased the odds of NV HAP by nearly sevenfold (AOR=6.88, 95% CI: 3.99, 11.39).

Conclusion: Focused education for NAs is an effective strategy to increase knowledge related to oral hygiene. Implementing a structured oral hygiene program for NAs appears to be a promising practice to decrease NV HAP.

- **研究背景 (Introduction)**
NV-HAP 是住院病患常見的併發症，與吸入帶有致病菌的口腔分泌物有關。適當的口腔照護可以降低此風險，護理助理在日常照護中扮演關鍵角色。
- **研究設計 (Design)**
採用準實驗性前後測設計 (quasi-experimental pre-post design)，比較教育介入前後的變化。
- **研究方法 (Methods)**
 1. 在一所美國明尼蘇達州明尼阿波利斯 (Minneapolis, MN) 的第四級轉診醫學中心實施結構化口腔衛生教育計畫。
 2. 評估教育前後 NAs 的知識、態度與行為改變，並分析介入前後病患的 NV-HAP 發生率。
- **研究結果 (Results)**
 1. 教育後 NAs 知道 NPO (禁食) 病人建議的口腔照護頻率的比列顯著提升 (67.2% → 82.1%, $p = 0.003$)。
 2. 使用口腔吸引 (80.8% → 90.2%, $p = 0.005$) 與牙刷 (89.3% → 95.3%, $p = 0.031$) 的報告頻率也明顯增加。
 3. NV-HAP 發生率由 0.74% 降至 0.25%，差異具統計顯著性 ($p < 0.001$)。
 4. 調整後模型顯示，**非侵入性陽壓呼吸器 (NIPPV) **使用者發生 NV-HAP 的機率為一般病患的近 7 倍 (AOR = 6.88, 95% CI: 3.99–11.39)。
- **結論 (Conclusion)**
 - 教育計畫能有效提升護理助理對口腔衛生的知識與使用工具的行為。
 - 對護理助理實施結構化的口腔衛生介入是降低 NV-HAP 的有效策略。

研究方法與設計

口腔衛生教育計畫開發

- 為護理助理 (NA) 制定了結構化的 OHEP，並將其納入常規開展的強制性護理助理技能日計劃。
- 課程描述了健康個體的誤吸頻率、誤吸受污染口腔分泌物的病理生理學和 NV HAP 的發病機制

教育內容實施

OHEP課程內容包括口腔衛生流程：

1. 抬高患者的床頭
2. 用牙膏刷洗牙齒、牙齦和舌頭
3. 將牙刷與牙齦線呈 45 度角
4. 然後用漱口水漱口
5. 最後根據需要使用口腔保濕劑

參與者數據收集與評估

- 所有在2022年2月至3月期間在急診護理機構工作並參加護理助理技能日計畫的護理助理均有資格
- 為了獲得 NV HAP 和不良後果發生率，從電子病歷 (EMR) 中提取了 OHEP 實施前 (2021 年 4 月 1 日至 10 月 1 日) 和實施後 (2022 年 4 月 1 日至 10 月 1 日) 入院的患者使用護理助理口腔衛生KAB調查評估知識變化，通過患者報告評估行為改變，並從電子病歷中提取NV HAP診斷和患者結果數據進行分析。



非呼吸器醫院獲得性肺炎的背景與重要性

NV HAP的定義與流行率

NV HAP 定義為非呼吸器住院病患入院後 48 小時內發生的肺炎，不包括社區型肺炎病患。在美國，每25名住院病患中就有1名會在住院期間感染醫院獲得性感染（HAI）。醫院獲得性肺炎（HAP）是醫院相關感染最常見的原因，其中非呼吸器（NV）HAP導致的HAP病例高達74%。

- 牙菌斑是已知會導致 NV HAP 的呼吸道病原體的儲存器。
- 這一點很重要，因為 50% 的健康成年人在睡眠期間會默默地吸入口腔分泌物；分泌物中含有生理上重要數量的細菌。無聲吸入可能發生在人們清醒和睡眠時。
- 然而，在接受過胸腔外科手術、中風、神經損傷或吞嚥困難的住院患者中，無症狀吸入更為普遍；因此，這些患者群體發生 NV HAP 的風險比一般住院人群更大。

NV HAP的風險因素

NV HAP 的危險因子很多，包括中風史、神經系統疾病、吞嚥困難、吸菸、免疫抑制、肥胖和急性心臟衰竭。口腔衛生不良是 NV HAP 的一個常見可改變的危險因子。口腔衛生不良會導致定植分泌物從口咽部吸入氣道。

口腔衛生的重要性

口腔衛生是預防 NV HAP 發展的關鍵策略。口腔衛生包括機械刷牙、牙齦和舌頭；滋潤嘴唇和口腔黏膜；以及適用時的假牙護理。研究表明，對高風險患者定期進行口腔衛生護理可降低 NV HAP 發生率。然而，常規口腔衛生作為一種預防策略經常被忽視，並且採用的技術不一致。

表一：護理助理對口腔衛生之知識、態度與行為調查（前後測比較）

TABLE 1 Nursing assistant oral hygiene knowledge attitudes behaviors survey.

| Survey items | Pre-OHEP (baseline) | Post-OHEP | p-value |
|--|---------------------|-------------|--------------|
| How many times a day should oral care be done on a patient with a regular diet? | n = 202 | n = 202 | 1.000 |
| 0 | 2 (1.0%) | 0 (0.0%) | |
| 1 | 9 (4.5%) | 9 (4.5%) | |
| 2 to 4 ^a | 189 (93.6%) | 190 (94.1%) | |
| 5 | 2 (1.0%) | 3 (1.5%) | |
| How many times a day should oral care be done on a patient who is NPO or has tube feeding? | n = 195 | n = 195 | <u>0.003</u> |
| 0 | 7 (3.6%) | 3 (1.5%) | |
| 1 | 19 (9.7%) | 10 (5.1%) | |
| 2 to 3 ^a | 131 (67.2%) | 160 (82.1%) | |
| 4 | 38 (19.5%) | 22 (11.3%) | |
| How long should a patient brush their teeth? | n = 194 | n = 194 | 0.990 |
| <1 min | 4 (2.1%) | 4 (2.1%) | |
| 1-2 min ^a | 109 (56.2%) | 127 (65.5%) | |
| 3-4 min | 56 (28.9%) | 44 (22.7%) | |
| 5+ min | 25 (12.9%) | 19 (9.8%) | |

一天應該為禁食或管灌飲食的病人進行幾次口腔護理？

| | | | |
|--|-------------|-------------|------------------|
| It is important to elevate the head of the bed when performing oral care to prevent aspiration risk. | n = 202 | n = 202 | 0.998 |
| False | 1 (0.5%) | 6 (3.0%) | |
| True ^a | 201 (99.5%) | 196 (97.0%) | |
| Patients can safely sleep with dentures in. | n = 202 | n = 202 | 0.065 |
| False ^a | 182 (90.1%) | 167 (82.7%) | |
| True | 20 (9.9%) | 35 (17.3%) | |
| As an NA I can perform a swallow screen to determine if the patient is an aspiration risk. | n = 170 | n = 170 | <u><0.001</u> |
| False ^a | 145 (85.3%) | 123 (72.4%) | |
| True | 25 (14.7%) | 47 (27.6%) | |
| I should aide or promote moisturization of a patient's mouth/lips after performing oral care. | n = 194 | n = 194 | 0.258 |
| False | 4 (2.1%) | 10 (5.2%) | |
| True ^a | 190 (97.0%) | 184 (94.8%) | |
| Oral care is a low priority. | n = 196 | n = 196 | 0.175 |
| Strongly agree | 7 (3.6%) | 13 (6.6%) | |
| Somewhat agree | 4 (2.0%) | 3 (1.5%) | |
| Agree | 6 (3.1%) | 6 (3.1%) | |
| Somewhat disagree | 23 (11.7%) | 6 (3.1%) | |
| Strongly disagree | 156 (79.6%) | 168 (85.7%) | |

作為護理助理，我可以進行吞嚥評估來判斷病人是否有吸入風險？

表一：護理助理對口腔衛生之知識、態度與行為調查（前後測比較）

TABLE 1 (Continued)

| Survey items | Pre-OHEP (baseline) | Post-OHEP | p-value |
|---|---------------------|-------------|------------------|
| Cleaning the oral cavity is unpleasant. | n = 197 | n = 197 | 0.557 |
| Strongly agree | 5 (2.5%) | 7 (3.6%) | |
| Somewhat agree | 25 (12.7%) | 19 (9.6%) | |
| Agree | 24 (12.2%) | 26 (13.2%) | |
| Somewhat disagree | 49 (24.9%) | 35 (17.8%) | |
| Strongly disagree | 94 (47.7%) | 110 (55.8%) | |
| The oral cavity is difficult to clean. | n = 198 | n = 198 | <u>0.007</u> |
| | 口腔護理很難做? | | |
| Strongly agree | 4 (2.0%) | 4 (2.0%) | |
| Somewhat agree | 36 (18.2%) | 23 (11.6%) | |
| Agree | 26 (13.1%) | 21 (10.6%) | |
| Somewhat disagree | 56 (28.3%) | 48 (24.2%) | |
| Strongly disagree | 76 (38.4%) | 102 (51.5%) | |
| I need an oral care guideline to provide quality oral care. | n = 194 | n = 194 | <u><0.001</u> |
| | 我需要口腔護理教育來提供高品質照護。 | | |
| Strongly agree | 35 (18.0%) | 22 (11.3%) | |
| Somewhat agree | 23 (11.9%) | 15 (7.7%) | |
| Agree | 42 (21.6%) | 39 (20.1%) | |
| Somewhat disagree | 36 (18.6%) | 34 (17.5%) | |
| Strongly disagree | 58 (29.9%) | 84 (43.3%) | |

| | | | |
|---|--------------------|-------------|------------------|
| I do not have enough training to provide oral care. | n = 200 | n = 200 | <u><0.001</u> |
| | 我沒有接受足夠訓練來提供口腔護理 | | |
| Strongly agree | 13 (6.5%) | 8 (4.0%) | |
| Somewhat agree | 19 (9.5%) | 8 (4.0%) | |
| Agree | 27 (13.5%) | 12 (6.0%) | |
| Somewhat disagree | 44 (22.0%) | 46 (23.0%) | |
| Strongly disagree | 97 (48.5%) | 126 (63.0%) | |
| I do not have enough supplies and equipment to provide oral care. | n = 194 | n = 194 | 0.258 |
| Strongly agree | 8 (4.1%) | 9 (4.6%) | |
| Somewhat agree | 7 (3.6%) | 7 (3.6%) | |
| Agree | 13 (6.7%) | 11 (5.7%) | |
| Somewhat disagree | 34 (17.5%) | 24 (12.4%) | |
| Strongly disagree | 132 (68.0%) | 143 (73.7%) | |
| It is one of the nursing assistant's responsibilities to provide oral care. | n = 194 | n = 194 | <u>0.023</u> |
| | 提供口腔護理是護理助理的工作責任之一 | | |
| Strongly agree | 123 (63.4%) | 142 (73.2%) | |
| Somewhat agree | 13 (6.7%) | 10 (5.2%) | |
| Agree | 31 (16.0%) | 28 (14.4%) | |
| Somewhat disagree | 8 (4.1%) | 4 (2.1%) | |
| Strongly disagree | 19 (9.8%) | 10 (5.2%) | |
| What tools do you use to provide oral care (select all that apply)? | n = 214 | n = 214 | |

針對護理助理在口腔護理工具使用與部位

TABLE 1 (Continued)

| Survey items | Pre-OHEP (baseline) | Post-OHEP | p-value |
|---|------------------------|-------------|---------|
| Adult toothbrush ^a | 191 (89.3%) | 204 (95.3%) | 0.031 |
| Mouthwash ^a | 120 (56.1%) | 97 (45.3%) | 0.017 |
| Foam swab | 37 (17.3%) | 35 (16.4%) | 0.999 |
| Gauze + tongue depressor | 126 (58.9%) | 160 (74.8%) | <0.001 |
| Suctioning ^a | 173 (80.8%) | 193 (90.2%) | 0.005 |
| Moisturizer ^a | 71 (33.2%) | 111 (51.9%) | <0.001 |
| Which part of the mouth is included when you provide oral care? | n = 214 | n = 214 | 0.492 |
| Brushing of teeth only | 16 (7.5%) | 8 (3.7%) | |
| Brushing of teeth and gums | 4 (1.9%) | 4 (1.9%) | |
| Brushing of teeth and tongue | 27 (12.6%) | 12 (5.6%) | |
| Brushing of gums and tongue | 1 (0.5%) | 0 (0.0%) | |
| All ^a | 149 (69.6%) | 179 (83.6%) | |
| None | 17 (7.9%) | 11 (5.1%) | |

- 教育後牙刷、吸引器、紗布+壓舌板與保潔劑的使用率顯著上升，表示護理助理在實際操作中使用更多有效工具。
- 雖然「全口皆刷」的比例有上升（69.6% → 83.6%），但 p 值為 0.492，代表統計上不顯著。
- 使用漱口水的人數略微減少，可能與教育中強調機械性清潔工具（如牙刷）效益較佳有關。

| Patient characteristics | Pre-intervention (April–Sept. 2021) (n = 8685) | Post-intervention (April–Sept. 2022) (n = 8325) | p-value |
|---|---|--|---------|
| Age, mean (SD) | 64.40 (17.08) | 63.77 (17.34) | 0.02 |
| Sex, n (%) | | | |
| Male | 4245 (48.9) | 4059 (48.8) | 0.89 |
| Female | 4440 (51.1) | 4266 (51.2) | |
| Race/Ethnicity, n (%) | | | |
| White, non-Hispanic | 7186 (82.7) | 6752 (81.1) | 0.03 |
| Black, non-Hispanic | 768 (8.8) | 821 (9.9) | |
| Hispanic/Latino | 233 (2.7) | 233 (2.8) | |
| Asian or Pacific Islander, non-Hispanic | 149 (1.7) | 151 (1.8) | |
| Native American, non-Hispanic | 157 (1.8) | 138 (1.7) | |
| Patient declined or missing | 192 (2.2) | 230 (2.8) | |
| BMI, mean (SD) | 29.59 (7.78) | 29.50 (7.94) | 0.50 |
| LOS, mean (SD) | 5.65 (5.58) | 5.80 (5.99) | 0.09 |
| LACE+ Score, mean (SD) | 59.34 (16.86) | 59.55 (16.68) | 0.42 |
| Charlson Comorbidity Index, mean (SD) | 0.75 (1.28) | 0.72 (1.25) | 0.20 |
| Bed rest, n (%) | 3995 (46.0) | 3747 (45.0) | 0.20 |
| Non-invasive positive pressure ventilation, n (%) | 315 (3.6) | 276 (3.3) | 0.29 |
| Nasogastric/oral gastric tube, n (%) | 329 (3.8) | 289 (3.5) | 0.29 |
| Surgery or procedure, n (%) | 3581 (41.2) | 3565 (42.8) | 0.04 |
| Relevant comorbid conditions, n (%) | | | |
| Smoking, current or previous | 4085 (47.0) | 3816 (45.8) | 0.13 |
| Type 2 diabetes | 2592 (29.8) | 2546 (30.6) | 0.30 |
| Asthma, history of | 1007 (11.6) | 957 (11.5) | 0.86 |
| Stroke, history of | 1386 (16.0) | 1252 (15.0) | 0.10 |
| Acute heart failure | 955 (11.0) | 968 (11.6) | 0.20 |
| Congestive heart failure, history of | 933 (10.7) | 865 (10.4) | 0.47 |
| Any neurological disease | 654 (7.5) | 631 (7.6) | 0.93 |
| Chronic heart disease | 583 (7.0) | 630 (7.3) | 0.55 |
| Immunosuppression | 489 (5.6) | 491 (5.9) | 0.47 |
| Dysphagia, history of | 358 (4.1) | 362 (4.3) | 0.49 |
| Anemia | 235 (2.7) | 186 (2.2) | 0.05 |
| Malnutrition | 29 (0.3) | 47 (0.6) | 0.03 |
| Preadmission setting, n (%) | | | |
| Non-healthcare facility point of origin | 6712 (77.3) | 6568 (78.9) | <0.001 |
| Transfer from a hospital | 1425 (16.4) | 1577 (18.9) | |
| Transfer from hospital inpatient in the same facility | 16 (0.2) | 28 (0.3) | |
| Transfer from other facility | 399 (4.6) | 37 (0.4) | |
| Clinic or physician's office | 113 (1.3) | 84 (1.0) | |
| Missing/information not available | 20 (0.2) | 31 (0.4) | |
| Admitting diagnosis, n (%) | | | |
| Cardiac/vascular | 1689 (19.4) | 1603 (19.3) | <0.001 |
| GI/GU | 1410 (16.2) | 1388 (16.7) | |
| Joint/spine/fractures | 1194 (13.7) | 927 (11.1) | |
| Neoplasm/malignancies | 668 (7.7) | 443 (5.3) | |

TABLE 3 (Continued)

| Patient characteristics | Pre-intervention (April–Sept. 2021) (n = 8685) | Post-intervention (April–Sept. 2022) (n = 8325) | p-value |
|--|---|--|---------|
| Infectious | 601 (6.9) | 673 (8.1) | |
| Pulmonary | 584 (6.7) | 533 (6.4) | |
| Malaise/fatigue/dizziness | 405 (4.7) | 283 (3.4) | |
| Other | 392 (4.5) | 616 (7.4) | |
| Neurologic | 366 (4.2) | 724 (8.7) | |
| Endocrine | 358 (4.1) | 229 (2.8) | |
| Coagulopathy/anemia/bleeding diathesis | 301 (3.5) | 323 (3.9) | |
| Complications of care | 249 (2.9) | 195 (2.3) | |
| Rheumatology | 144 (1.7) | 43 (0.5) | |
| Substance use disorder/poisoning | 103 (1.2) | 110 (1.3) | |
| Reproductive | 92 (1.1) | 61 (0.7) | |
| Skin/wounds | 82 (0.9) | 129 (1.5) | |
| Mental health | 47 (0.5) | 45 (0.5) | |
| Disposition at discharge, n (%) | | | |
| Home | 6714 (77.3) | 6468 (77.7) | 0.07 |
| Skilled nursing facility, long-term care | 1417 (16.3) | 1312 (15.8) | |
| Rehab | 161 (1.9) | 117 (1.4) | |
| Hospice | 150 (1.7) | 162 (1.9) | |
| Expired | 111 (1.3) | 132 (1.6) | |
| Other (AMA, psychiatric hospital, other healthcare settings, court/Law enforcement, still a patient) | 127 (1.5) | 128 (1.5) | |
| Missing | 5 (0.1) | 6 (0.1) | |

Abbreviations: A, acuity; AMA, against medical advice; BMI, body mass index; C, comorbidities; E, emergency visit; GI/GU, genitourinary/gastrointestinal; LACE+, L, length of patient stay in hospital; LOS, length of stay.

TABLE 4 Adverse patient outcomes.

| | Pre-intervention (April - Sept. 2021) | | Post-intervention (April - Sept. 2022) | | p-value |
|---|---------------------------------------|----------------------|--|----------------------|---------|
| | (n = 8685) | | (n = 8325) | | |
| Incidence of primary and secondary outcomes | | | | | |
| NV HAP incidence | 64 (0.74%) | | 21 (0.25%) | | <0.001 |
| Incidence (95% CI) | Unadjusted | Adjusted | Unadjusted | Adjusted | |
| NV HAP ^a | 0.74 (0.58, 0.94) | 0.32 (0.17, 0.59) | 0.25 (0.17, 0.39) | 0.11 (0.05, 0.22) | |
| 30-day mortality ^b | 4.22 (3.82, 4.67) | 2.34 (1.95, 2.80) | 4.39 (3.97, 4.67) | 2.53 (2.12, 3.03) | |
| 30-day readmission ^b | 21.45 (20.60, 22.33) | 20.58 (19.37, 21.85) | 21.45 (20.58, 22.35) | 20.52 (19.32, 21.78) | |
| Odds ratios (95% CI) ^c | | | | | |
| Primary and secondary outcomes | Unadjusted | | Adjusted | | |
| Odds ratios comparing pre- and post-intervention periods for primary and secondary outcomes | | | | | |
| NV HAP ^a | 0.34 (0.20, 0.55) | | 0.34 (0.20, 0.56) | | |
| 30-day mortality ^b | 1.04 (0.90, 1.21) | | 1.09 (0.93, 1.27) | | |
| 30-day readmission ^b | 1.00 (0.93, 1.08) | | 1.00 (0.93, 1.07) | | |

^aPredictors of NVHAP: period (pre/post), sex, age, race, and ethnicity (Black, White, or other), bed rest (Y/N), NPPV (Y/N), Charlson Comorbidity Index (CCI), length of stay (LOS), smoking, history of asthma (Y/N), history of stroke (Y/N), history of dysphagia (Y/N), anemia, neurological disease, preadmission setting (healthcare facility/non-healthcare facility).

^bPredictors of mortality and readmission: period (pre/post), NVHAP, sex, age, race, and ethnicity (Black, White, or other), bed rest (Y/N), NPPV (Y/N), CCI, LOS.

^cOdds ratios use the pre-intervention period as reference.

1. NV-HAP 發生率顯著下降

(從 0.74% 降至 0.25% , $p < 0.001$) :

1. 調整後 OR = 0.34 , 顯示風險下降 66% 。
2. 教育介入明顯有效。

1.30天死亡率與再住院率無顯著差異：

雖有輕微增加 (死亡率) 與穩定 (再住院率) , 但統計上無顯著差異。

2. 模型調整因子註解：

包含性別、年齡、族裔、是否臥床、是否使用 NIPPV、共病指數 (CCI)、住院天數、是否有吞嚥困難、中風史、貧血、神經疾病等。

TABLE 5 Adjusted odds ratio for NV HAP risk factors.

| Risk factor | Adjusted odds ratio | 95% CI lower | 95% CI upper |
|---|---------------------|--------------|--------------------|
| Sex—male | 1.16 | 0.74 | 1.81 |
| Age | 1.00 | 0.99 | 1.02 |
| Race and Ethnicity—Black/African American | 1.21 | 0.50 | 2.93 |
| Race and Ethnicity—Other | 0.82 | 0.27 | 2.49 |
| Bed rest | 0.53 | 0.32 | 0.86 ^a |
| Non-invasive positive pressure ventilation (NPPV) | 6.88 | 3.99 | 11.39 ^a |
| Charlson Comorbidity Index | 1.11 | 0.95 | 1.28 |
| Surgery or procedure | 1.04 | 0.65 | 1.64 |
| Length of stay | 1.04 | 1.02 | 1.06 ^a |
| Smoking, current or previous | 1.64 | 1.05 | 2.59 ^a |
| History of asthma | 1.15 | 0.57 | 2.14 |
| History of stroke | 1.79 | 1.06 | 2.92 ^a |
| History of dysphagia | 1.69 | 0.70 | 3.51 |
| Anemia | 1.35 | 0.32 | 3.74 |
| Neurological disease | 0.78 | 0.30 | 1.68 |
| Non-healthcare facility point of origin | 0.80 | 0.50 | 1.33 |

^aStatistically significant.

小結:

- **NIPPV** 使用者為 最高風險群，建議列為口腔護理重點對象。
- 有吸菸史與長住院日數的病患，也需加強口腔清潔干預。
- 臥床反而成為保護因子，可能與照護人員注意程度提高有關。

研究結果：護理助理知識、態度和行為的變化

325

參與護理助理

共有325名護理助理參加了36場OHEP會議中的一場。護理助理參與者以女性為主（77.7%），超過一半的護理助理自認為是黑人/非裔美國人、亞裔或太平洋島民。

67.2%

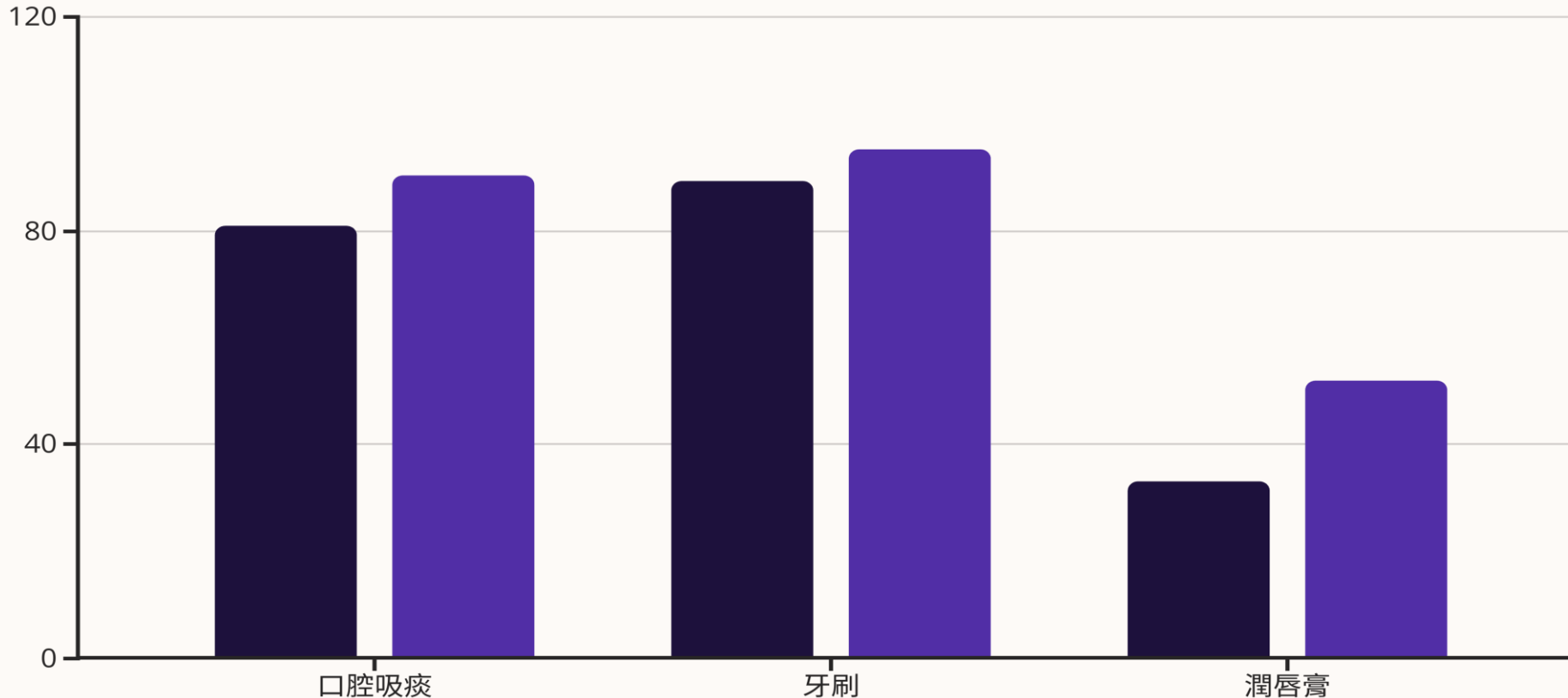
教育前認知

在教育前，67.2%的護理助理認識到NPO患者群體理想口腔護理頻率(每天2至3次)。

82.1%

教育後認知

在教育後，認識到NPO患者群體理想口腔護理頻率的護理人員增加到82.1%。



研究結果

NV HAP發生率與風險因素, NV HAP發生率顯著下降

1. 在應用納入和排除標準後，幹預前組有 8685 名患者符合研究患者結果部分的納入標準，幹預後組有 8325 名患者符合納入標準。
2. 整體 NV HAP 發生率從 0.74% 下降到 0.25% ($p < 0.001$) 。
3. OHEP 後發生 NV HAP 的幾率降低了 66% (OR 0.34 ; 95% CI 0.20, 0.55) 。
4. 在調整年齡、性別、種族和民族、CCI 和風險因素 (即臥床休息、手術、氣喘、中風、吞嚥困難和 NPPV) 後，這種降低仍然很顯著 (AOR = 0.34 ; 95% CI : 0.20, 0.56) 。

非侵入性正壓通氣

在調整模型中，接受NPPV的患者患有NV HAP的幾率幾乎增加了七倍
(AOR = 6.88 ; 95% CI : 3.99 · 11.39) 。

中風病史

有中風病史的患者患有NV HAP的幾率增加79%
(AOR = 1.79 ; 95% CI : 1.06 · 2.92) 。

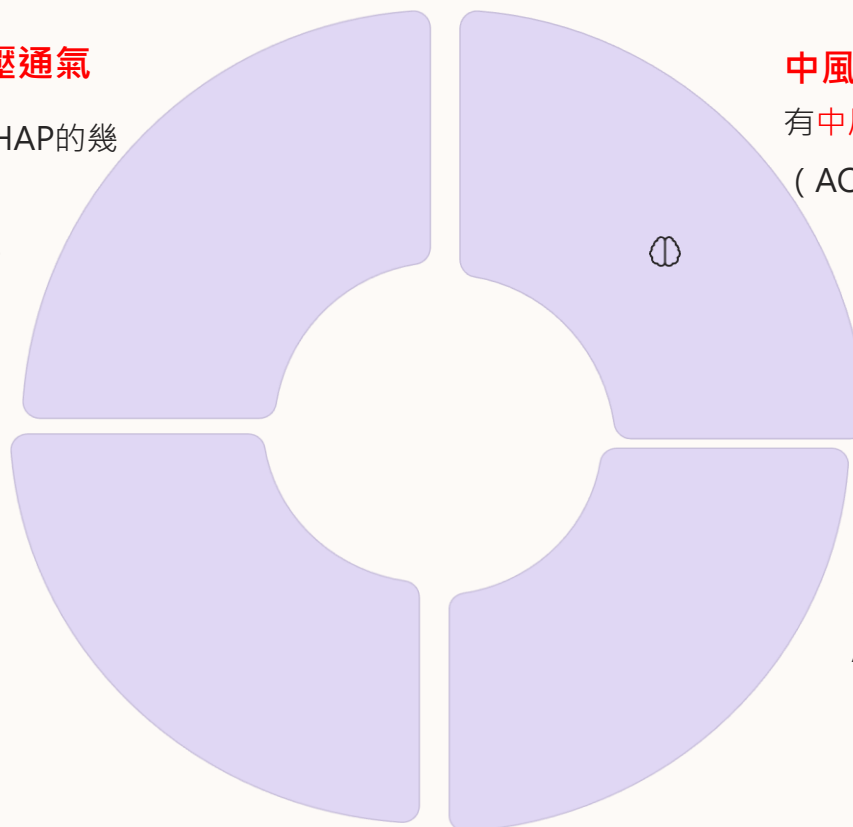
臥床休息

臥床休息降低了患有NV HAP的幾率 (AOR = 0.53 ;
95% CI : 0.32 · 0.86) 。

這可能是由於NA教育強調了患者臥床休息時口腔衛生的重要性及其吸入風險。

吸菸史

有吸菸史的患者罹患NV HAP的幾率增加了64% (AOR = 1.64 ; 95% CI : 1.05 · 2.59) 。



結論與臨床意義

有效的教育策略

本研究結果表明，為護理人員實施結構化口腔衛生計畫是提高護理人員口腔衛生知識、行為和行為能力的有效途徑。針對護理助理進行有針對性的教育是提升口腔衛生相關知識的有效策略。

降低NV HAP發生率

實施口腔衛生計畫後，NV HAP 的發生率有所下降。為護理助理實施結構化的口腔衛生計劃似乎是降低NV HAP的有效方法。

高風險患者群體

接受NPPV治療的患者以及有中風或吸煙史的患者患有NV HAP的風險較高。這些患者群體可能需要更積極的措施來預防NV HAP。

賦能護理助理

本研究旨在賦能護理助理（NA），他們作為護理團隊中至關重要但往往被低估的成員，成為預防可能對患者康復產生重大影響的醫院內感染（HAI）和不良後果的關鍵合作夥伴。

建立標準化的口腔衛生計劃並對護理助理進行培訓可能有助於降低住院患者的NV HAP發生率。

本研究的獨特之處在於僅針對護理助理及其在口腔衛生中的作用進行教育，因為其他計劃主要只關注護士。護理助理在預防常見醫院獲得性感染中扮演著重要角色，透過適當的教育和培訓，可以顯著改善患者結果。

護理助理員或整合護佐，將口腔照護列入標準規範與教育訓練的重要

問題

Q1:每日刷牙至少2次
是否能降低吸入性肺炎發生呢?

同意

需再評估

不同意



問題2

Q2: 將口腔護理標準教育介入護理佐理員到職訓練, 以降低NVHAP發生?

同意

需再評估

不同意



投票結果





0票



3票



30票





恭請指導

