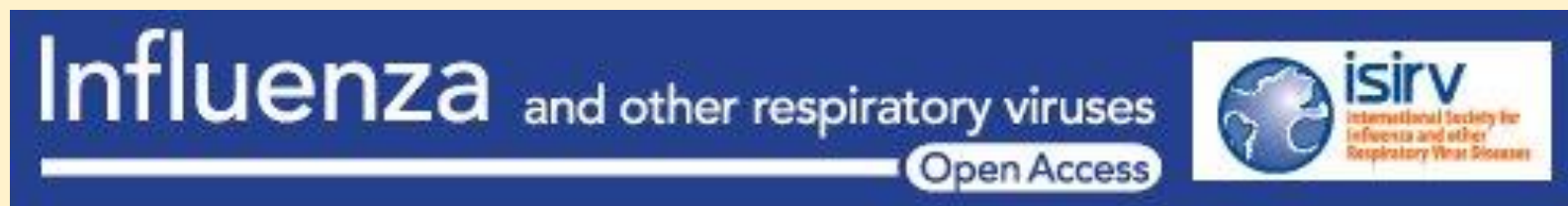




Medical Masks vs N95 Respirators for Preventing COVID-19 in Health Care Workers A Systematic Review and Meta-Analysis of Randomized Trials



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Medical Masks vs N95 Respirators for Preventing COVID-19 in Health Care Workers A Systematic Review and Meta-Analysis of Randomized Trials

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本篇研究重點整理

- 與使用N95口罩相比，醫療工作者使用醫用口罩沒有增加病毒(含冠狀病毒)造成呼吸道感染(OR: 1.06; 95%CI: 0.90-1.25)或臨床呼吸道疾病(OR: 1.49; 95%CI: 0.98-2.28)的風險。
- 低確定性證據(low certainty evidence)顯示，醫療工作者在執行沒有產生氣霧的醫療處置(during non-aerosol generating procedures)時，醫用口罩和N95口罩提供類似的病毒呼吸道感染(含冠狀病毒)的保護能力。
- 只有一篇研究針對N95與醫用口罩在冠狀病毒的防護，研究顯示兩者的防護能力沒有顯著差異。
- 資源缺乏時，N95口罩可考慮保留在大流行期，且醫療人員執行高危險及產生氣霧處置時(for high-risk, aerosol generating procedures)使用。

Introduction

- 自從2020/3/11全球超過114個國家以及超過118000個新冠病毒感染個案確認後，世界衛生組織宣布“2019新型冠狀病毒”造成全球疾病大流行。
- 2003年SARS流行期，全球醫療工作者染病佔了21%(1706/8096)。
- 武漢地區一篇針對138名因新冠病毒住院病人的研究，醫療人員佔了29%，截至2020/2/11，中國疾管部門報導了1716位醫療工作人員感染新冠病毒。

Introduction

- 雖然新冠病毒的傳播方式還不是完全清楚，但目前證據顯示大部分是透過呼吸道飛沫傳染(large respiratory droplets)。
- 而在容易產生氣霧的處置過程(例如插管或支氣管鏡檢查過程)，N95比醫用口罩能提供醫療人員較好的保護效果是有共識的。

Introduction

- 目前針對醫療人員在照護及治療新冠病毒病人時(一般處置，非產生氣霧處置)的口罩使用沒有共識，例如美國、歐洲建議使用N95口罩，而WHO及加拿大建議醫用口罩即可。
- 然而目前全球醫療人員的醫療裝備普遍不足，尤其是在執行容易產生氣霧的處置過程時，N95口罩是必要的。
- 然而在執行一般處置時是否使用N95口罩以提供較有效的保護力，或是和醫用口罩保護效果差不多，需要進一步的證據證實，也是本篇研究的目的所在。

Methods

搜尋MEDLINE(1946-), Embase(1974-), Cochrane(2014-2020)條件

(1)醫用口罩與N95口罩隨機分派試驗英文文獻

(2)受試對象限制醫療工作人員

(3)原始試驗結果變項包括：經PCR確認的病毒呼吸道感染、血清或病毒培養、冠狀病毒/流感病毒感染確診、類流感疾病、臨床呼吸道疾病或醫療人員曠工(clinical respiratory illness or workplace absenteeism)

本篇文章自述經過嚴謹的統合分析程序

(有興趣者請自行閱讀) <https://onlinelibrary.wiley.com/doi/pdf/10.1111/irv.12745>

結果

本篇統合分析共收納四篇隨機分派試驗

Table 1. Characteristics of the studies included in meta-analysis.

Study	Setting	Healthcare Workers	Viral Testing	Outcomes
Loeb 2009 (25)	Emergency departments, medical units and pediatric units; 8 tertiary care hospitals in Ontario (6 in Toronto); Canada	446 nurses during the 2008-2009 influenza season in routine care, individually randomized	Influenza A and B; Noninfluenza viruses: parainfluenza virus types 1, 2, 3, and 4; respiratory syncytial virus types A and B; adenovirus; metapneumovirus; rhinovirus-enterovirus; and coronaviruses OC43, 229E, SARS, NL63, and HKU1	Primary: Laboratory confirmed influenza; Secondary: Respiratory syncytial virus; metapneumovirus; parainfluenza virus; rhinovirus-enterovirus; coronavirus; Laboratory confirmed viral respiratory infection; influenza-like illness; work-related absenteeism
MacIntyre 2011 (16)	Emergency departments and respiratory wards; 15 hospitals in Beijing; China	1441 nurses, doctors and ward clerks cluster-randomized by hospital during the winter season (December 2008 to January 2009); 33% participating in high-risk procedures†	Adenoviruses, human metapneumovirus, coronavirus 229E/NL63, parainfluenza viruses 1, 2 and 3, influenza A and B, respiratory syncytial virus A and B, rhinovirus A/B and coronavirus OC43 /HKU1	Primary: Laboratory confirmed viral respiratory infection; influenza infection; influenza-like illness; clinical respiratory illness

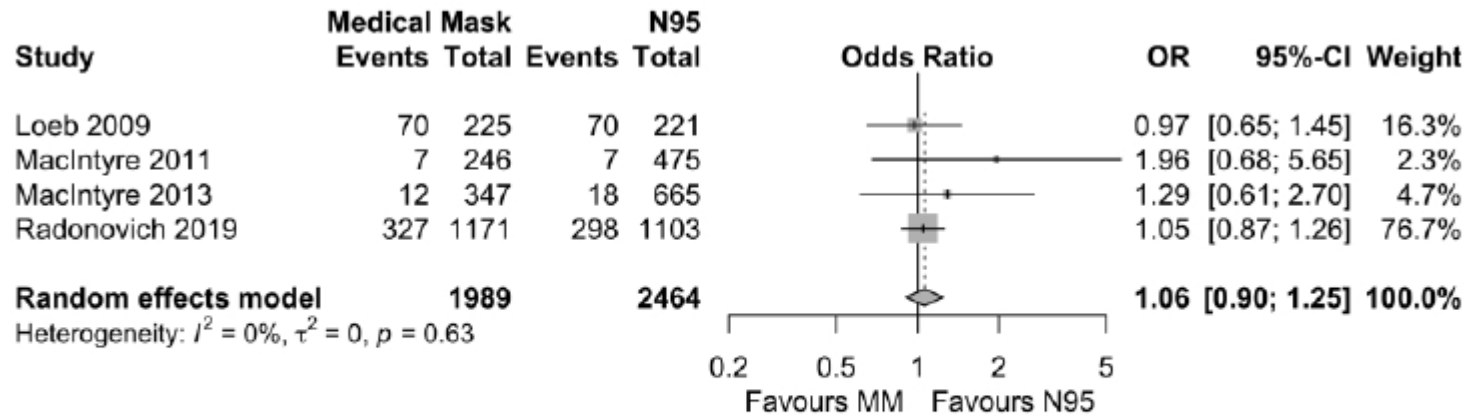
結果

本篇統合分析共收納四篇隨機分派試驗

MacIntyre 2013 (17)	68 wards (emergency departments and respiratory wards); 19 tertiary hospitals in Beijing; China	1669 nurses and doctors cluster-randomized by ward during the winter season (December 2009 to February 2010); 73% undertook high risk procedures [†]	Adenoviruses; human metapneumovirus; coronaviruses 229E/NL63 and OC43/HKU1; parainfluenza viruses 1, 2, and 3; influenza A and B; respiratory syncytial viruses A and B; or rhinoviruses A/B	Primary: Laboratory confirmed viral respiratory infection; laboratory confirmed influenza infection; influenza-like illness, clinical respiratory illness
Radonovich 2019 (18)	137 study sites comprised of varying outpatient settings: primary care facilities, dental clinics, adult and pediatric clinics, dialysis units, urgent care facilities and emergency departments, and emergency transport services; across 7 medical centers; USA	2862 health care personnel cluster-randomized by study site during 4 viral respiratory seasons (2011/12 to 2014/15); 60% at occupational high risk [†]	Coxsackie/echoviruses; coronaviruses HKU1, NL63, OC43 and 229E; human metapneumovirus; human rhinovirus; influenza A and B; parainfluenza virus types 1, 2, 3 and 4; respiratory syncytial virus types A and B	Primary: Laboratory confirmed influenza infection; Secondary: Laboratory confirmed viral respiratory infection; influenza-like illness; clinical respiratory illness

[†] High risk consisted of physical examination, barrier nursing of a patient with known respiratory illness, intubation, airway suctioning, nebulizer treatments, nasopharyngeal aspiration, aerosol generating procedures and/or chest physiotherapy

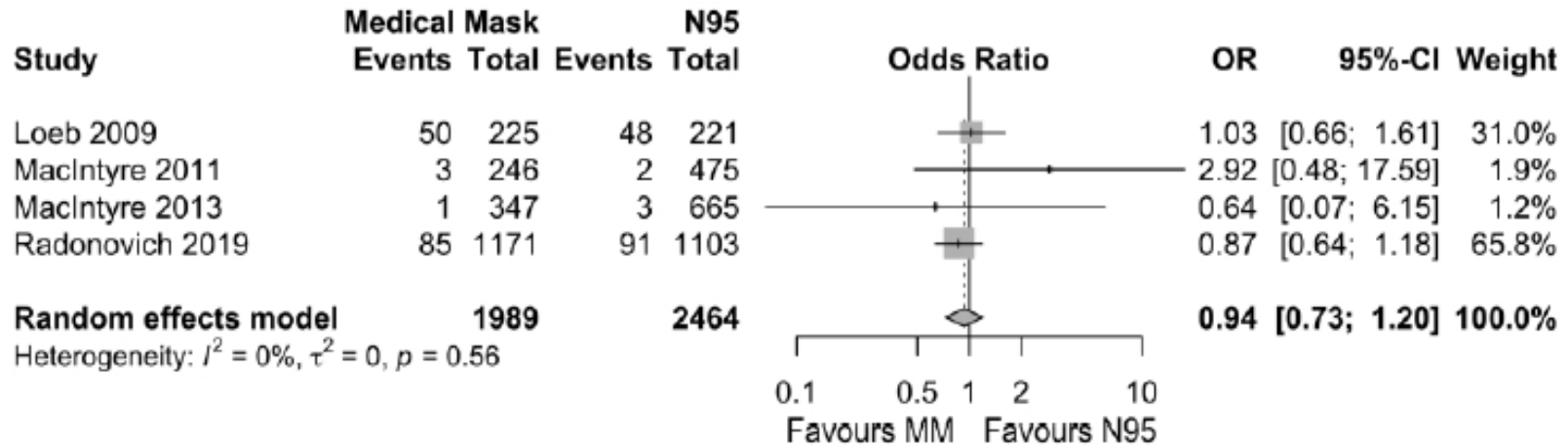
結果



High Res Fig 2A Lab confirmed viral resp infection

實驗室確認之病毒呼吸道感染防護，醫用口罩和N95口罩沒有顯著差異

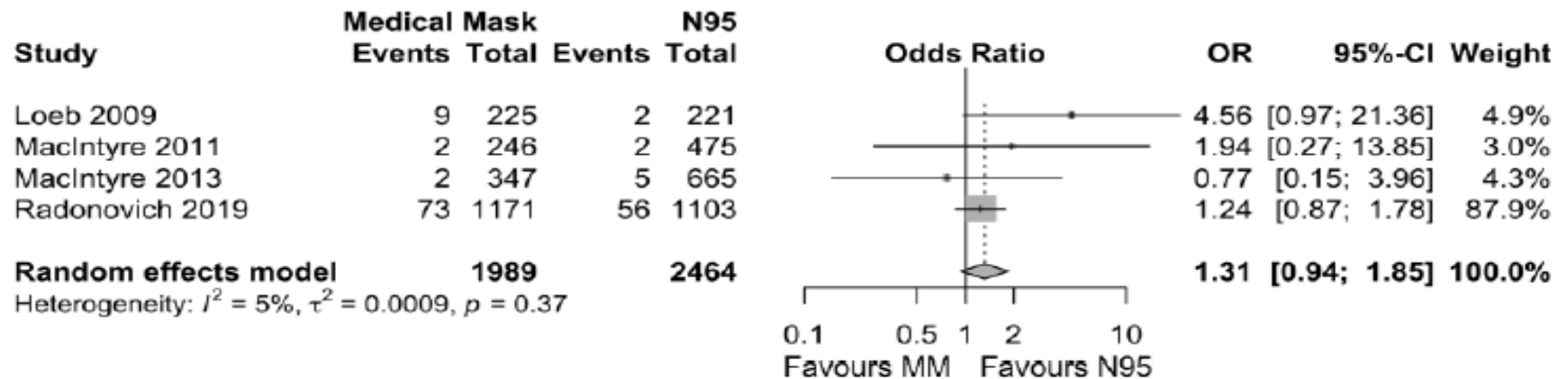
結果



High res Fig2B lab confirmed influenza infection

實驗室確認之流感病毒感染防護，醫用口罩和N95口罩沒有顯著差異

結果

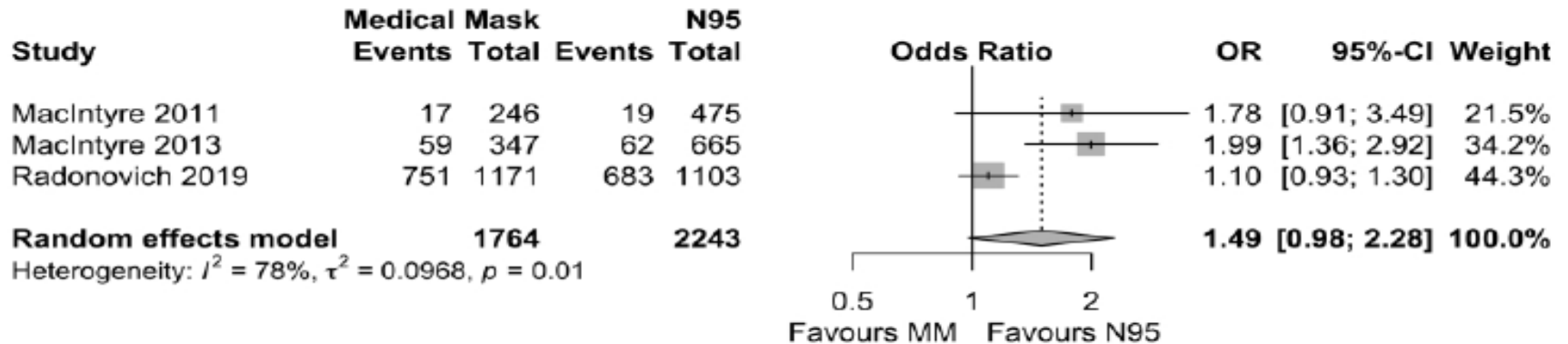


High res Fig 2C influenza like illness

類流感症狀防護，醫用口罩和N95口罩沒有顯著差異

雖然N95的保護效果在類流感症狀防護較佳(點估計)，
但95%CI顯示兩者在類流感症狀防護效果沒有統計學上差異

結果



high res fig 2d clinical resp illness

臨床呼吸道疾病防護，醫用口罩和N95口罩沒有顯著差異

雖然N95的保護效果在臨床呼吸道疾病防護較佳(點估計)，
但95%CI顯示兩者在臨床呼吸道疾病防護沒有統計學上差異

結果

只有一篇針對季節性冠狀病毒的研究，研究顯示4.3%(9/212)戴醫用口罩的護理師經由RT-PCR確認冠狀病毒感染，而戴N95口罩的護理師比例為5.7%(12/210)，統計上沒有顯著差異。曠工的比例兩組也沒有顯著差異。

討論

證據顯示醫療人員在一般處置及治療過程時，醫用口罩和N95口罩在病毒呼吸道感染、流感傳染的防護效果沒有顯著差異。

雖然在防護類流感疾病及臨床呼吸道疾病時，N95的點估計值似乎比醫用口罩保護力較好，但95%信賴區間較大、統計學上沒有差異，且研究顯示各研究的異質性須考慮。

目前並沒有隨機分派試驗直接驗證新冠病毒時醫用口罩和N95口罩的保護力，因此仍無法排除在照護新冠病毒感染病人時，醫用口罩防護力下降。

之前針對新冠病毒的個案報告，41位醫療人員在產生氣霧的治療環境(包括插管、拔管、非侵入性呼吸器等)中接觸新冠病毒感染者，儘管85%有戴外科口罩，但全數檢驗新冠病毒皆為陰性。

討論

本研究支持目前WHO與加拿大在醫用口罩與N95口罩的使用建議，也就是一般治療以及不會產生氣霧處置時，使用醫用口罩即可以提供保護力。

在醫療裝備不足時，應保留N95口罩在大流行期，且醫療人員執行高危險及產生氣霧處置時使用。

延伸閱讀

aerosol generating procedures

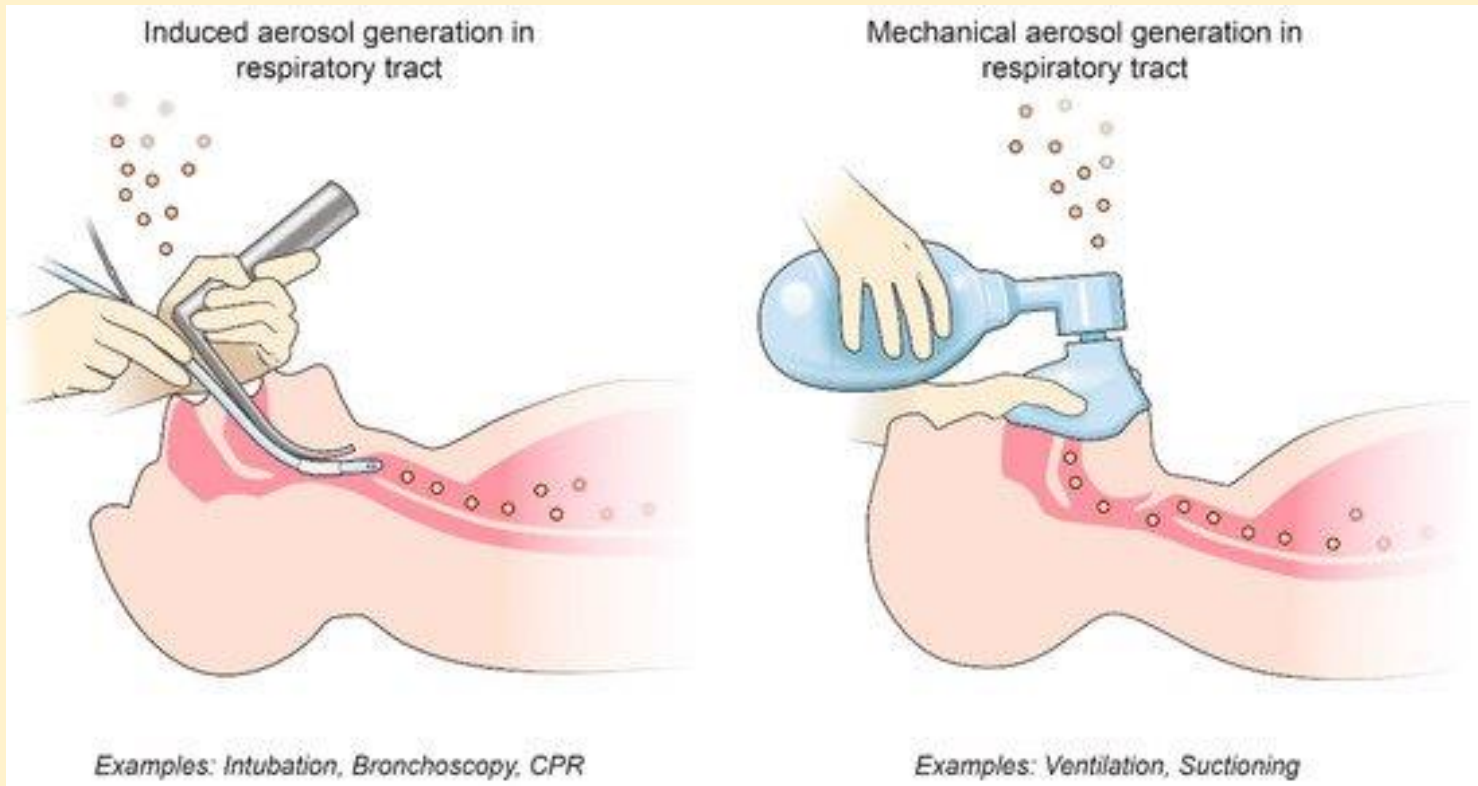


Figure 1. Potential types of aerosol-generating medical procedures (AGMPs). AGMPs can be divided into procedures that induce the patient to produce aerosols and procedures that mechanically generate aerosols themselves.

ABSTRACT

Background: Respiratory protective devices are critical in protecting against infection in health care workers at high risk of novel 2019 coronavirus disease (COVID-19); however, recommendations are conflicting and epidemiological data on their relative effectiveness against COVID-19 are limited.

Purpose: To compare medical masks to N95 respirators in preventing laboratory confirmed viral infection and respiratory illness including coronavirus specifically in health care workers.

Data Sources: MEDLINE, Embase and CENTRAL from January 1st 2014 to March 9th 2020. Update of published search conducted from January 1st 1990 to December 9th 2014.

Study Selection: Randomized controlled trials (RCTs) comparing the protective effect of medical masks to N95 respirators in health care workers.

Data Extraction: Reviewer pair independently screened, extracted data, and assessed risk of bias and the certainty of the evidence.

Data Synthesis: Four RCTs were meta-analysed adjusting for clustering. Compared to N95 respirators; the use of medical masks did not increase laboratory confirmed viral (including coronaviruses) respiratory infection (OR 1.06; 95% CI 0.90-1.25; $I^2=0\%$; low certainty in the evidence) or clinical respiratory illness (OR 1.49; 95%CI 0.98-2.28; $I^2=78\%$; very low certainty in the evidence). Only one trial evaluated coronaviruses separately and found no difference between the two groups ($p=0.49$).

Limitations: Indirectness and imprecision of available evidence.