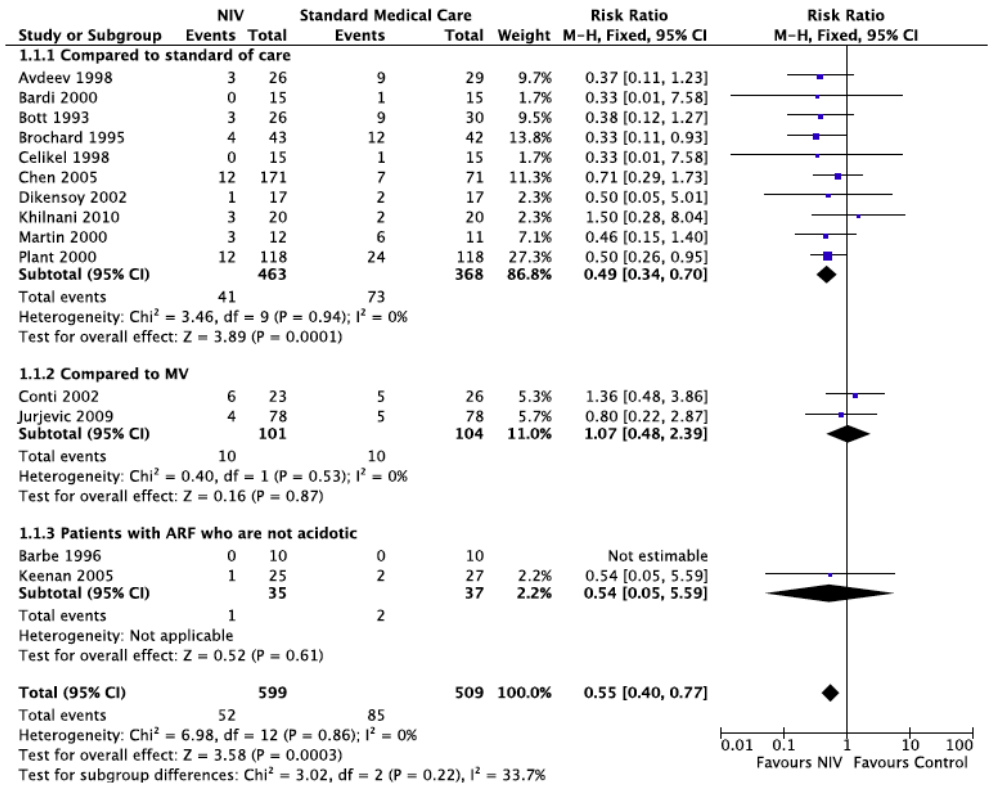
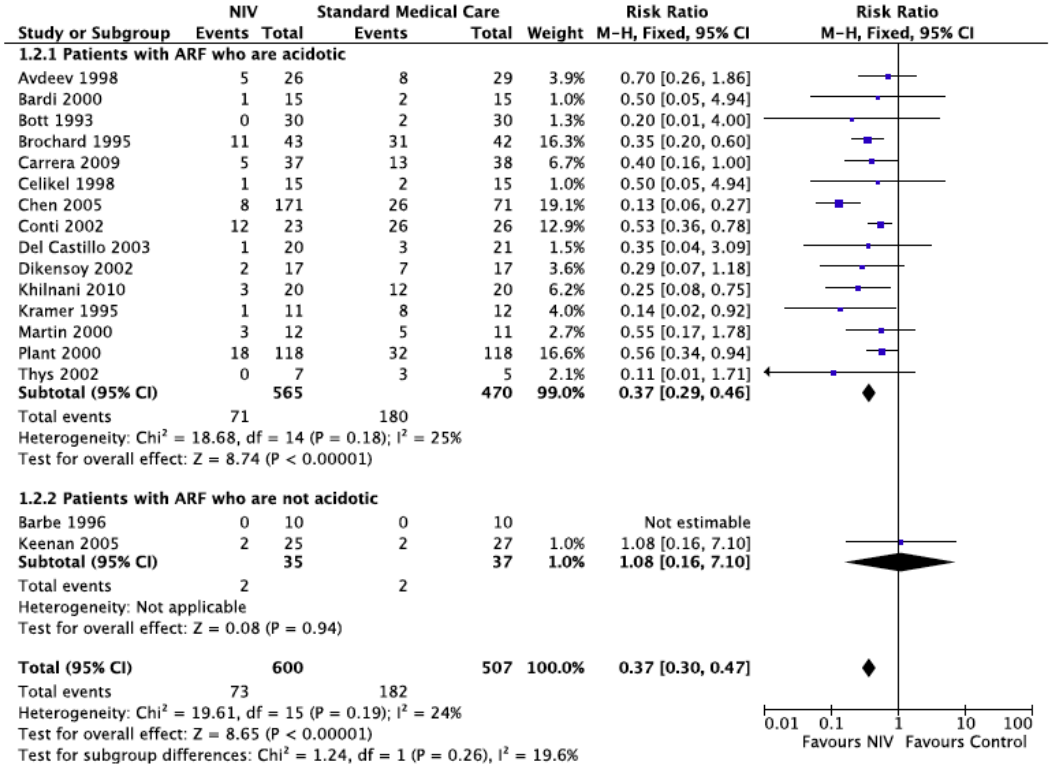
## Question #1: Should NIV be used in acute hypercapnic respiratory failure due to an acute exacerbation of COPD (AECOPD)?

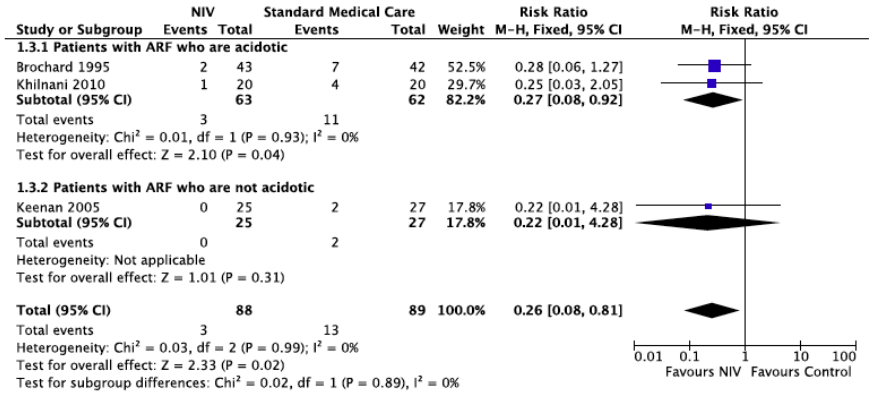
Mortality (1.1.1 & 1.1.2 in acidotic patients)



Intubation


NIV
Standard Medical Care
Risk Ratio
Risk Ratio
Study or Subgroup Events Total Events Total Weight M-H, Fixed, 95% CI
M-H, Fixed, 95% CI
1.2.1 Patients with ARF who are acidotic
Avdeev 1998 5 26 8 29 3.9% 0.70 [0.26, 1.86]
Bardi 2000 1 15 2 15 1.0% 0.50 [0.05, 4.94]
Bott 1993 0 30 2 30 1.3% 0.20 [0.01, 4.00]
Brochard 1995 11 43 31 42 16.3% 0.35 [0.20, 0.60]
Carrera 2009 5 37 13 38 6.7% 0.40 [0.16, 1.00]
Celikel 1998 1 15 2 15 1.0% 0.50 [0.05, 4.94]
Chen 2005 8 171 26 71 19.1% 0.13 [0.06, 0.27]
Conti 2002 12 23 26 26 12.9% 0.53 [0.36, 0.78]
Del Castillo 2003 1 20 3 21 1.5% 0.35 [0.04, 3.09]
Dikensoy 2002 2 17 7 17 3.6% 0.29 [0.07, 1.18]
Khilnani 2010 3 20 12 20 6.2% 0.25 [0.08, 0.75]
Kramer 1995 1 11 8 12 4.0% 0.14 [0.02, 0.92]
Martin 2000 3 12 5 11 2.7% 0.55 [0.17, 1.78]
Plant 2000 18 118 32 118 16.6% 0.56 [0.34, 0.94]
Thys 2002 0 7 3 5 2.1% 0.11 [0.01, 1.71]
Subtotal (95% CI) 565 470 99.0% 0.37 [0.29, 0.46]
Total events 71 180
Heterogeneity: Chi² = 18.68, df = 14 (P = 0.18); I² = 25%
Test for overall effect: Z = 8.74 (P < 0.00001)
1.2.2 Patients with ARF who are not acidotic
Barbe 1996 0 10 0 10 Not estimable
Keenan 2005 2 25 2 27 1.0% 1.08 [0.16, 7.10]
Subtotal (95% CI) 35 37 1.0% 1.08 [0.16, 7.10]
Total events 2 2
Heterogeneity: Not applicable
Test for overall effect: Z = 0.08 (P = 0.94)
Total (95% CI) 600 507 100.0% 0.37 [0.30, 0.47]
Total events 73 182
Heterogeneity: Chi² = 19.61, df = 15 (P = 0.19); I² = 24%
Test for overall effect: Z = 8.65 (P < 0.00001)
Test for subgroup differences: Chi² = 1.24, df = 1 (P = 0.26), I² = 19.6%
0.01 0.1 1 10 100
Favours NIV Favours Control

# Nosocomial Pneumonia



# Evidence Profile

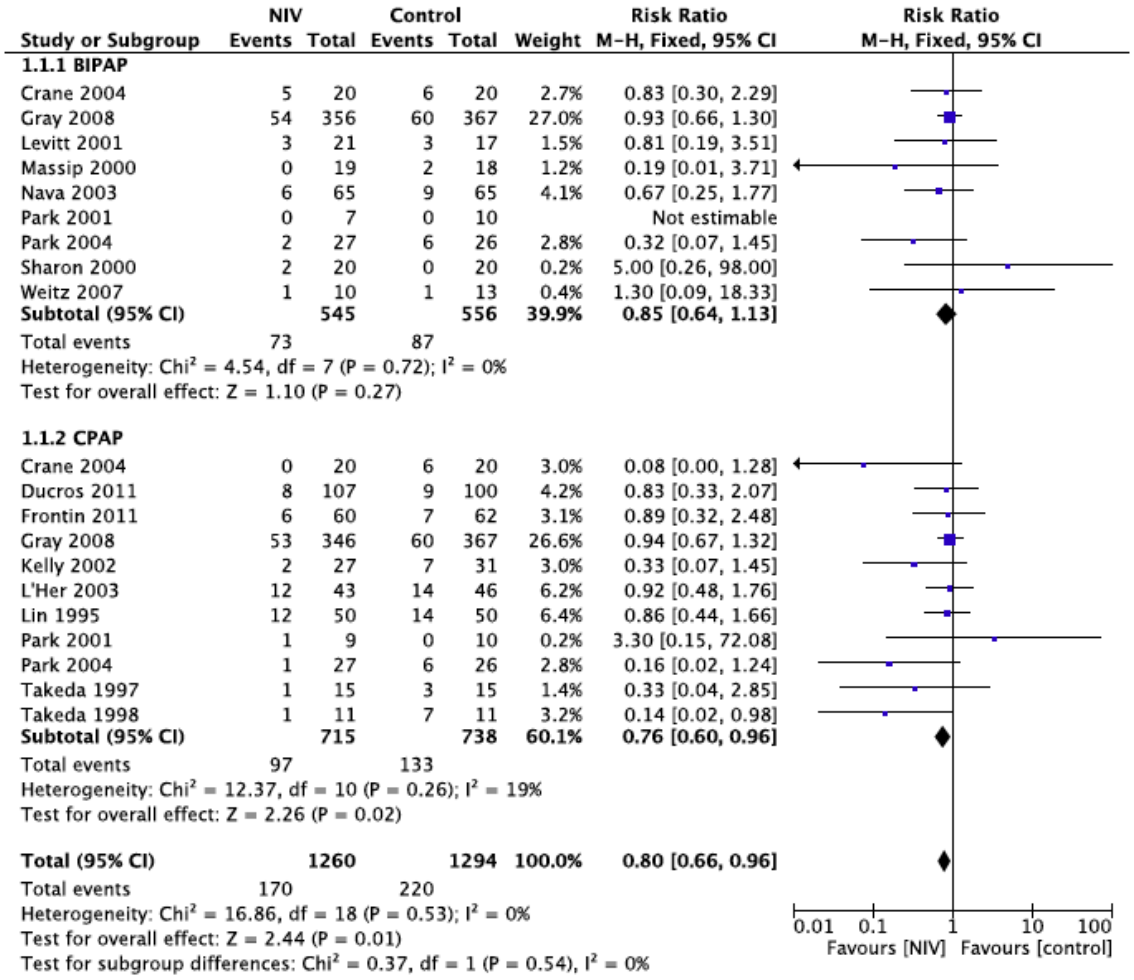
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen +/- invasive mechanical ventilation | Relative (95% CI) | Absolute (95% CI) | | |
| **Mortality** | | | | | | | | | | | | |
| 14 [1-14] | randomised trials | not serious | not serious | not serious | not serious | strong association | 52/599 (8.7%) | 85/609 (14.0%) | **RR 0.63** (0.46 to 0.87) | 52 fewer per 1000 (from 18 fewer to 75 fewer) | ⊕⊕⊕⊕ HIGH | CRITICAL |
| **Intubation** | | | | | | | | | | | | |
| 17 [1-9, 11-18] | randomised trials | serious [1] | not serious | not serious | not serious | strong association | 73/600 (12.2%) | 182/607 (30.0%) | **RR 0.41** (0.33 to 0.52) | 177 fewer per 1000 (from 144 fewer to 201 fewer) | ⊕⊕⊕◯ MODERATE | CRITICAL |
| **Nosocomial Pneumonia** | | | | | | | | | | | | |
| 3 [6, 11, 12] | randomised trials | serious [1] | not serious | serious [2] | not serious | none | 3/88 (3.4%) | 13/89 (14.6%) | **RR 0.26** (0.08 to 0.81) | 108 fewer per 1000 (from 28 fewer to 134 fewer) | ⊕⊕◯◯ LOW | CRITICAL |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

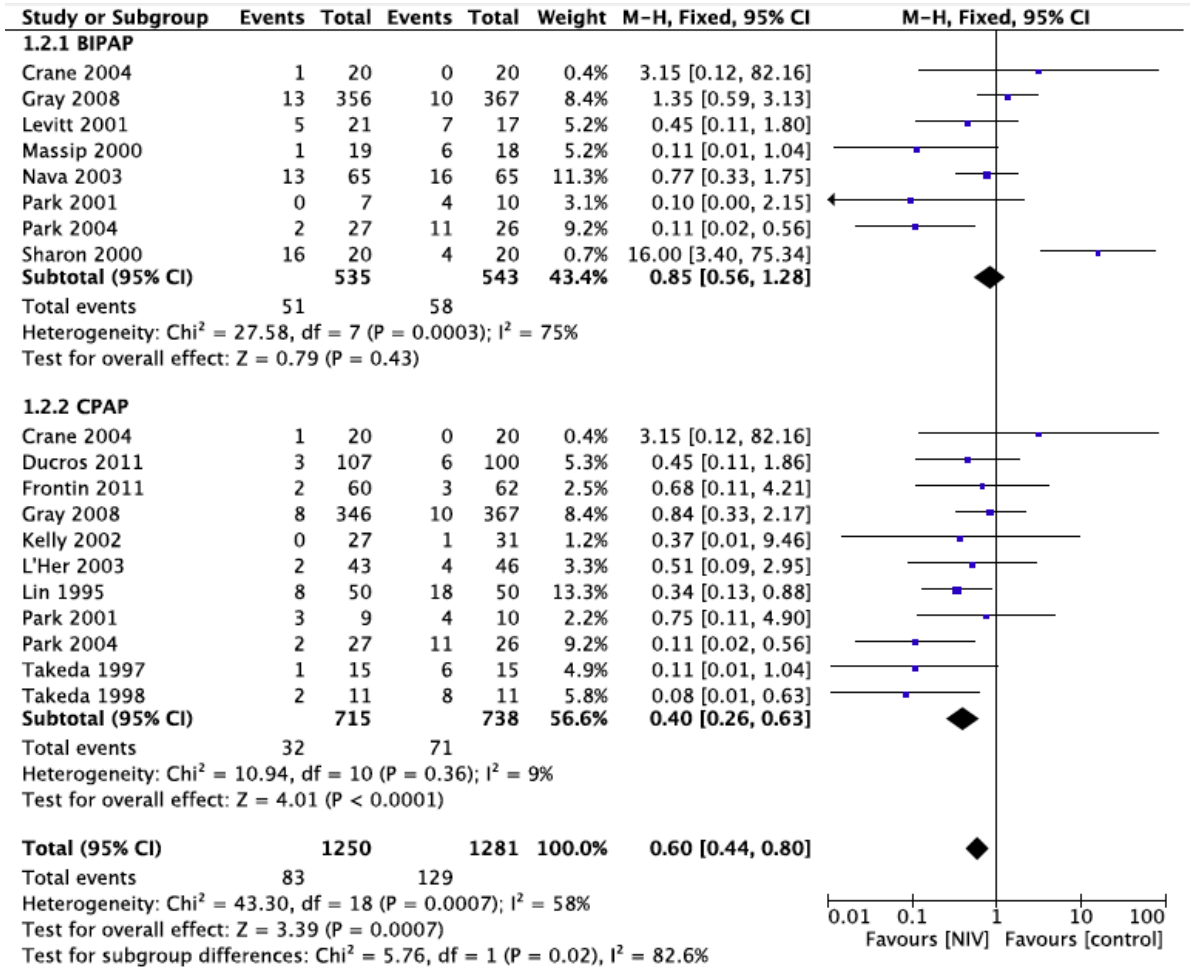
1. Lack of blinding of intervention in all included trials.
2. Variable definition of nosocomial pneumonia used across studies with variable severity and perceived importance to patients.

## Question #2a: Should NIV be used in acute respiratory failure due cardiogenic pulmonary edema (CPE)?

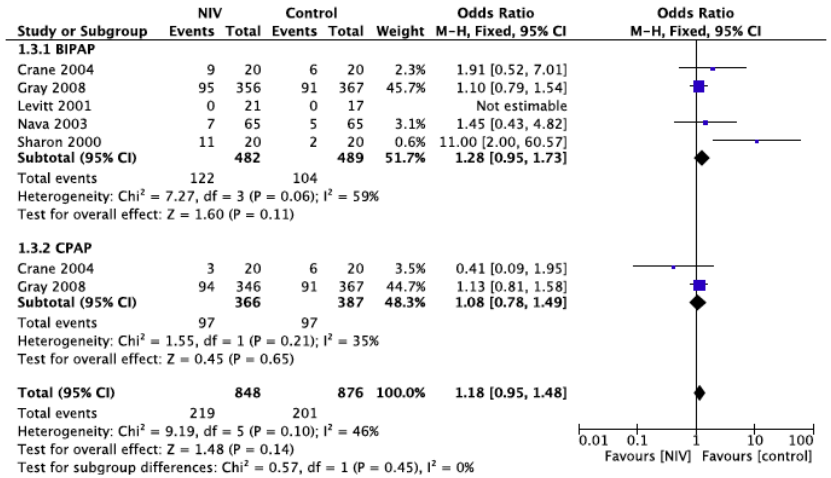
Mortality



Intubation


Study or Subgroup Events Total Events Total Weight M-H, Fixed, 95% CI
M-H, Fixed, 95% CI
1.2.1 BIPAP
Crane 2004 1 20 0 20 0.4% 3.15 [0.12, 82.16]
Gray 2008 13 356 10 367 8.4% 1.35 [0.59, 3.13]
Levitt 2001 5 21 7 17 5.2% 0.45 [0.11, 1.80]
Massip 2000 1 19 6 18 5.2% 0.11 [0.01, 1.04]
Nava 2003 13 65 16 65 11.3% 0.77 [0.33, 1.75]
Park 2001 0 7 4 10 3.1% 0.10 [0.00, 2.15]
Park 2004 2 27 11 26 9.2% 0.11 [0.02, 0.56]
Sharon 2000 16 20 4 20 0.7% 16.00 [3.40, 75.34]
Subtotal (95% CI) 535 543 43.4% 0.85 [0.56, 1.28]
Total events 51 58
Heterogeneity: Chi² = 27.58, df = 7 (P = 0.0003); I² = 75%
Test for overall effect: Z = 0.79 (P = 0.43)
1.2.2 CPAP
Crane 2004 1 20 0 20 0.4% 3.15 [0.12, 82.16]
Ducros 2011 3 107 6 100 5.3% 0.45 [0.11, 1.86]
Frontin 2011 2 60 3 62 2.5% 0.68 [0.11, 4.21]
Gray 2008 8 346 10 367 8.4% 0.84 [0.33, 2.17]
Kelly 2002 0 27 1 31 1.2% 0.37 [0.01, 9.46]
L'Her 2003 2 43 4 46 3.3% 0.51 [0.09, 2.95]
Lin 1995 8 50 18 50 13.3% 0.34 [0.13, 0.88]
Park 2001 3 9 4 10 2.2% 0.75 [0.11, 4.90]
Park 2004 2 27 11 26 9.2% 0.11 [0.02, 0.56]
Takeda 1997 1 15 6 15 4.9% 0.11 [0.01, 1.04]
Takeda 1998 2 11 8 11 5.8% 0.08 [0.01, 0.63]
Subtotal (95% CI) 715 738 56.6% 0.40 [0.26, 0.63]
Total events 32 71
Heterogeneity: Chi² = 10.94, df = 10 (P = 0.36); I² = 9%
Test for overall effect: Z = 4.01 (P < 0.0001)
Total (95% CI) 1250 1281 100.0% 0.60 [0.44, 0.80]
Total events 83 129
Heterogeneity: Chi² = 43.30, df = 18 (P = 0.0007); I² = 58%
Test for overall effect: Z = 3.39 (P = 0.0007)
Test for subgroup differences: Chi² = 5.76, df = 1 (P = 0.02), I² = 82.6%
0.01 0.1 1 10 100
Favours [NIV] Favours [control]

Acute myocardial infarction



# Evidence Profile

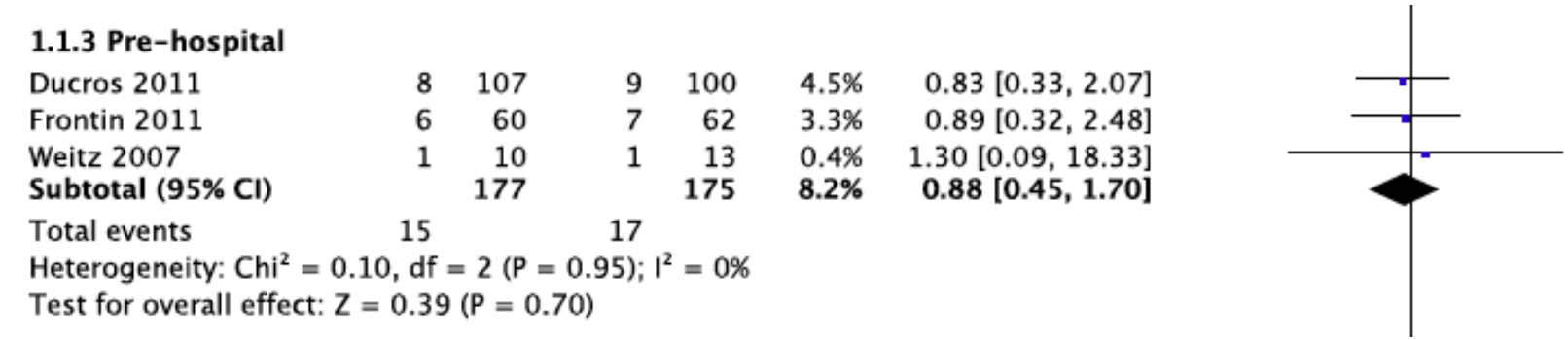
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen +/- invasive mechanical ventilation | Relative (95% CI) | Absolute (95% CI) | | |
| **Mortality (assessed with: longest available)** | | | | | | | | | | | | |
| 16 [19-34] | randomised trials | serious [1] | not serious | not serious | not serious | none | 170/1260 (13.5%) | 220/1294 (17.0%) | **RR 0.80** (0.66 to 0.96) | 34 fewer per 1000 (from 7 fewer to 58 fewer) | ⊕⊕⊕◯ MODERATE | CRITICAL |
| **Intubation** | | | | | | | | | | | | |
| 15 [19-33] | randomised trials | serious [1] | serious [2] | not serious | not serious | none | 83/1250 (6.6%) | 129/1281 (10.1%) | **RR 0.60** (0.44 to 0.80) | 40 fewer per 1000 (from 20 fewer to 56 fewer) | ⊕⊕◯◯ LOW | CRITICAL |
| **Acute Myocardial infarction (assessed with: criteria reported in individual study)** | | | | | | | | | | | | |
| 5 [19, 22, 25, 28, 31] | randomised trials | serious [1] | not serious | serious [3] | serious [4] | none | 219/848 (25.8%) | 201/876 (22.9%) | **OR 1.18** (0.95 to 1.48) | 41 more per 1000 (from 11 fewer to 110 more) | ⊕◯◯◯ VERY LOW | IMPORTANT |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

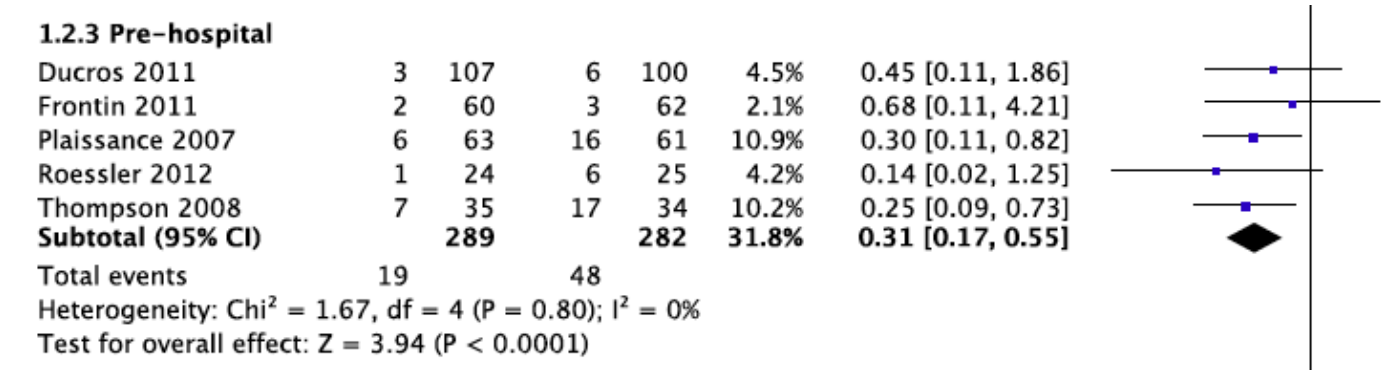
1. Included study stopped early for harm.
2. Isquared = 60%, visually evident statistical heterogeneity
3. Variable diagnostic criteria for AMI used between studies.
4. Wide confidence intervals that do not exclude benefit.

**Question #2b: Should patients with acute respiratory failure due to cardiogenic pulmonary edema receive a trial of CPAP to prevent deterioration prior to hospitalization?**

Mortality




Intubation



# Evidence Profile

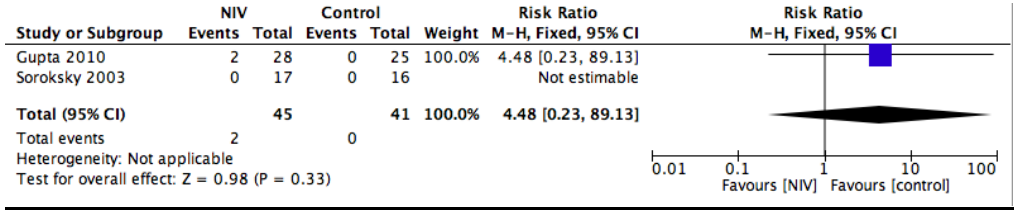
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen +/- invasive mechanical ventilation | Relative (95% CI) | Absolute (95% CI) | | |
| Mortality | | | | | | | | | | | | |
| 3 [20, 21, 34] | randomised trials | not serious [1] | not serious | not serious | serious [2] | none | 15/177 (8.5%) | 17/175 (9.7%) | **RR 0.88** (0.45 to 1.70) | **12 fewer per 1000** (from 53 fewer to 68 more) | ⊕⊕⊕◯ MODERATE | CRITICAL |
| Intubation | | | | | | | | | | | | |
| 5 [20, 21, 35-37] | randomised trials | serious [3] | not serious | not serious | serious [4] | none | 19/289 (6.6%) | 48/282 (17.0%) | **RR 0.31** (0.17 to 0.55) | **117 fewer per 1000** (from 77 fewer to 141 fewer) | ⊕⊕◯◯ LOW | CRITICAL |

MD – mean difference, RR – relative risk , NIV – noninvasive ventilation, CI – Confidence interval

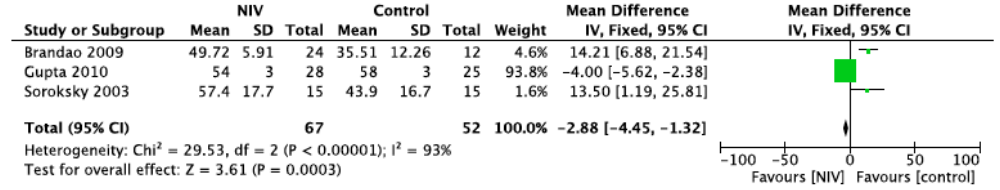
1. Lack of blinding but not lowered for ROB given objective nature of outcome.
2. Wide confidence intervals do not exclude harm or benefit and low number of events.
3. Lack of blinding for all studies.
4. Although point estimate and confidence interval suggest benefit there is a low number of events lowering overall certainty.

## Question #3: Should NIV be used in acute respiratory failure due to an acute exacerbation of asthma?

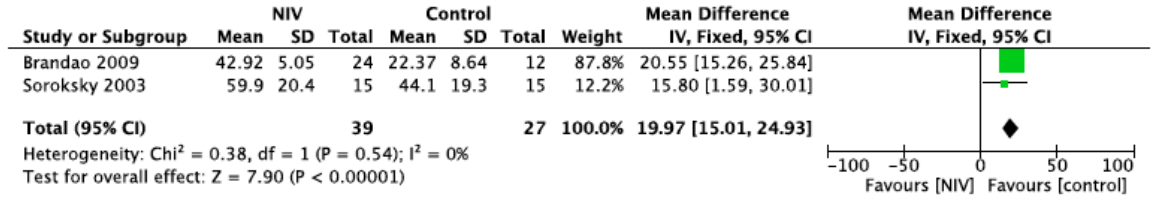
Intubation




FEV1 Change




Peak Expiratory Flow



# Evidence Profile

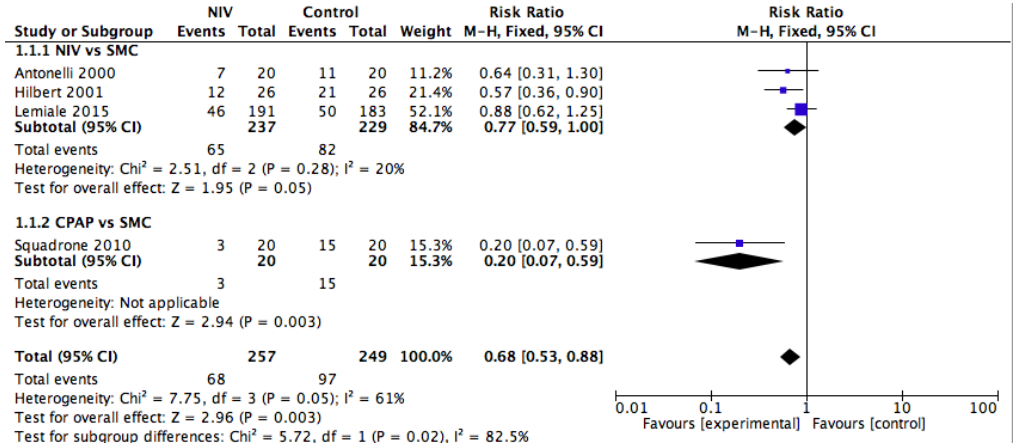
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen +/- invasive mechanical ventilation | Relative (95% CI) | Absolute (95% CI) | | |
| **Hospital Mortality** | | | | | | | | | | | | |
| 2 [38, 39] | randomised trials | serious [1] | not serious | not serious | very serious [2] | none | 0/45 (0.0%) | 0/41 (0.0%) | not estimable | not estimable | ⨁◯◯◯ VERY LOW | CRITICAL |
| **Intubation** | | | | | | | | | | | | |
| 2 [38, 39] | randomised trials | serious [1] | not serious | not serious | very serious [3] | none | 2/45 (4.4%) | 0/41 (0.0%) | **RR 4.48** (0.23 to 89.13) | 0 fewer per 1000 (from 0 fewer to 0 fewer) | ⨁◯◯◯ VERY LOW | CRITICAL |
| **Forced Expiratory Volume in 1 second Change (measured with % predicted, higher being better)** | | | | | | | | | | | | |
| 3 [38-40] | randomised trials | serious [1] | not serious | serious [4] | not serious | none | 39 | 27 | - | MD **14.02 higher** (7.73 higher to 20.32 higher) | ⨁⨁◯◯ LOW | IMPORTANT |
| **Peak Expiratory Flow (measured with % predicted, higher being better)** | | | | | | | | | | | | |
| 2 [39, 40] | randomised trials | serious [1] | not serious | serious [4] | not serious | none | 39 | 27 | - | MD **19.97 higher** (15.01 higher to 24.93 higher) | ⨁⨁◯◯ LOW | IMPORTANT |
| **ICU Length of Stay** | | | | | | | | | | | | |
| 1 [39] | randomised trials | serious [5] | not serious | serious [4] | serious [6] | none | 15 | 15 | - | MD **0.3 higher** (0.63 lower to 1.23 higher) | ⨁◯◯◯ VERY LOW | IMPORTANT |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

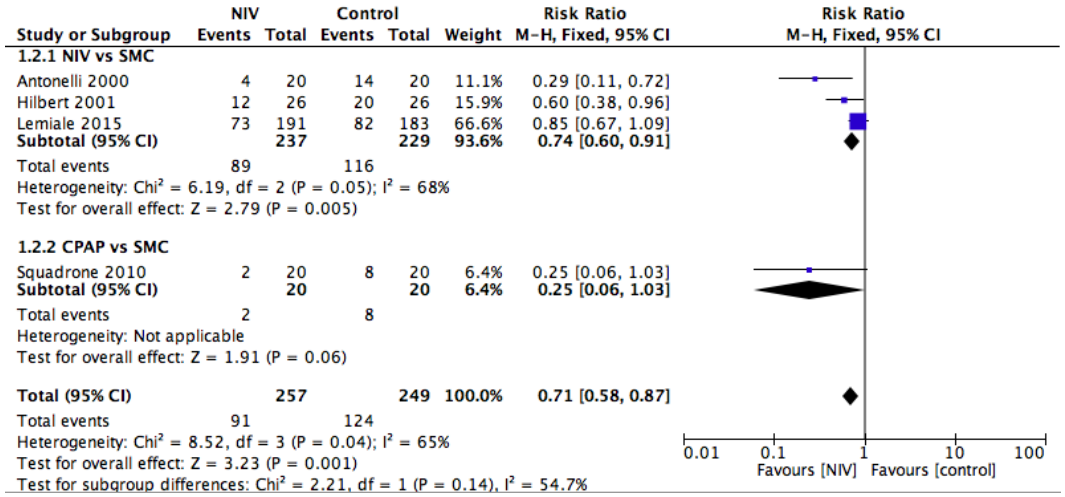
1. individual study low ROB in 1 study, moderate in the other
2. Point estimate not estimable due to no events in included studies.
3. Very wide confidence intervals with low number of events.
4. Surrogate outcome with unclear clinical implications to patients.
5. Moderate ROB in individual study.
6. Very wide confidence intervals.

## Question #4: Should NIV be used in acute respiratory failure in immunecompromised patients?

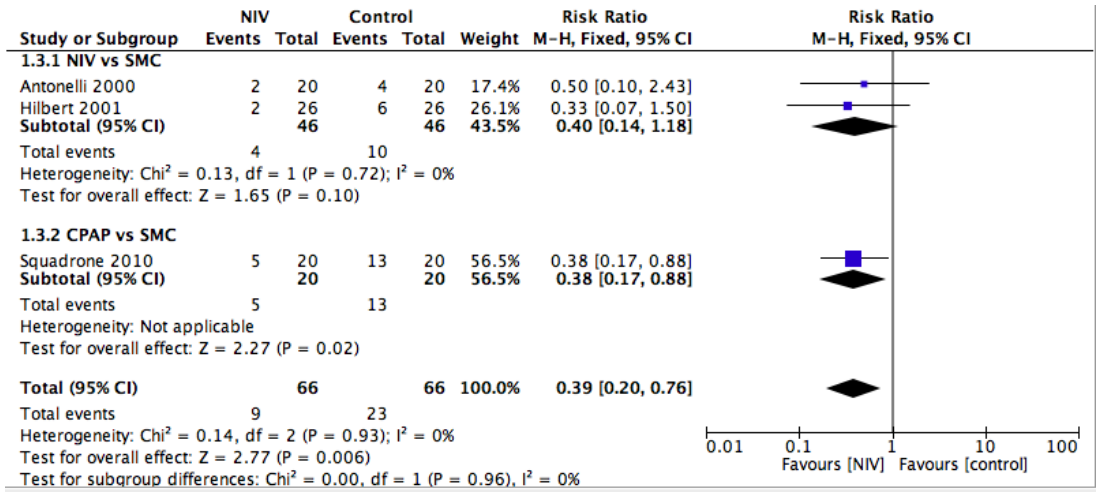
Mortality




Intubation



Nosocomial Pneumonia




SMC = standard medical care

# Evidence Profile

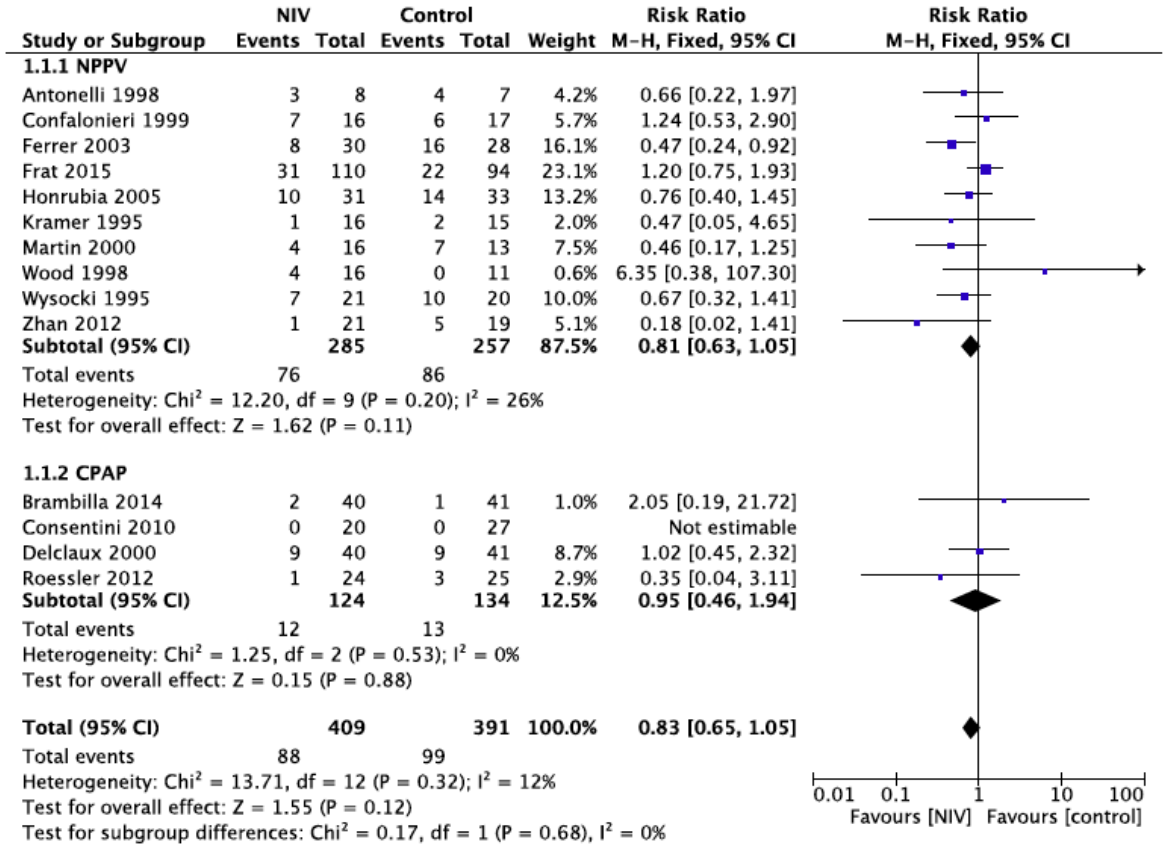
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **№ of studies** | **Study design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **NIV** | **supplemental oxygen +/- invasive mechanical ventilation** | **Relative (95% CI)** | **Absolute (95% CI)** | | |
| Mortality | | | | | | | | | | | | |
| 4 [41-44] | randomised trials | not serious [1] | serious [2] | not serious | not serious | none | 68/257 (26.5%) | 97/249 (39.0%) | **RR 0.68** (0.53 to 0.88) | **125 fewer per 1,000** (from 47 fewer to 183 fewer) | ⨁⨁⨁◯ MODERATE | CRITICAL |
| Intubation | | | | | | | | | | | | |
| 4 [41-44] | randomised trials | serious [3] | not serious | not serious | not serious | none | 91/257 (35.4%) | 124/249 (49.8%) | **RR 0.71** (0.58 to 0.87) | **144 fewer per 1,000** (from 65 fewer to 209 fewer) | ⨁⨁⨁◯ MODERATE | CRITICAL |
| Nosocomial Pneumonia | | | | | | | | | | | | |
| 3 [41, 42, 44] | randomised trials | serious [3] | not serious | serious [4] | not serious | none | 9/66 (13.6%) | 23/66 (34.8%) | **RR 0.39** (0.20 to 0.76) | **213 fewer per 1,000** (from 84 fewer to 279 fewer) | ⨁⨁◯◯ LOW | CRITICAL |

**CI:** Confidence interval; **RR:** Risk ratio, NIV – noninvasive ventilation, CI – Confidence interval

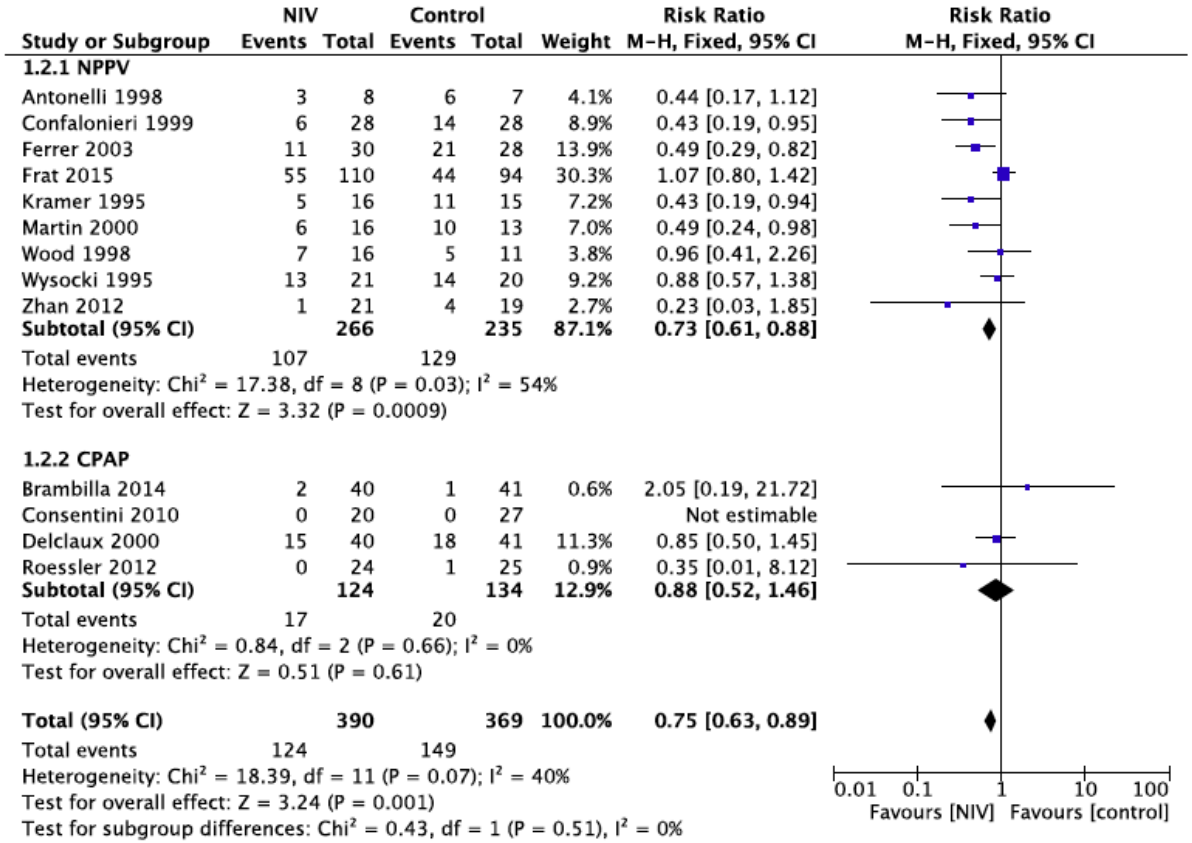
1. Intervention was not blinded but felt to be less important for objective outcome of mortality.
2. High Isquared value >80%.
3. Intervention was not blinded.
4. Variability in diagnosing nosocomial pneumonia.

## Question #5: Should NIV be used in de novo acute respiratory failure?

Mortality



Intubation


NIV
Control
Risk Ratio
Risk Ratio
Study or Subgroup
Events Total Events Total Weight M-H, Fixed, 95% CI
M-H, Fixed, 95% CI
1.2.1 NPPV
Antonelli 1998 3 8 6 7 4.1% 0.44 [0.17, 1.12]
Confalonieri 1999 6 28 14 28 8.9% 0.43 [0.19, 0.95]
Ferrer 2003 11 30 21 28 13.9% 0.49 [0.29, 0.82]
Frat 2015 55 110 44 94 30.3% 1.07 [0.80, 1.42]
Kramer 1995 5 16 11 15 7.2% 0.43 [0.19, 0.94]
Martin 2000 6 16 10 13 7.0% 0.49 [0.24, 0.98]
Wood 1998 7 16 5 11 3.8% 0.96 [0.41, 2.26]
Wysocki 1995 13 21 14 20 9.2% 0.88 [0.57, 1.38]
Zhan 2012 1 21 4 19 2.7% 0.23 [0.03, 1.85]
Subtotal (95% CI) 266 235 87.1% 0.73 [0.61, 0.88]
Total events 107 129
Heterogeneity: Chi² = 17.38, df = 8 (P = 0.03); I² = 54%
Test for overall effect: Z = 3.32 (P = 0.0009)
1.2.2 CPAP
Brambilla 2014 2 40 1 41 0.6% 2.05 [0.19, 21.72]
Consentini 2010 0 20 0 27 Not estimable
Delclaux 2000 15 40 18 41 11.3% 0.85 [0.50, 1.45]
Roessler 2012 0 24 1 25 0.9% 0.35 [0.01, 8.12]
Subtotal (95% CI) 124 134 12.9% 0.88 [0.52, 1.46]
Total events 17 20
Heterogeneity: Chi² = 0.84, df = 2 (P = 0.66); I² = 0%
Test for overall effect: Z = 0.51 (P = 0.61)
Total (95% CI) 390 369 100.0% 0.75 [0.63, 0.89]
Total events 124 149
Heterogeneity: Chi² = 18.39, df = 11 (P = 0.07); I² = 40%
Test for overall effect: Z = 3.24 (P = 0.001)
Test for subgroup differences: Chi² = 0.43, df = 1 (P = 0.51), I² = 0%
0.01 0.1 1 10 100
Favours [NIV] Favours [control]

# Evidence Profile

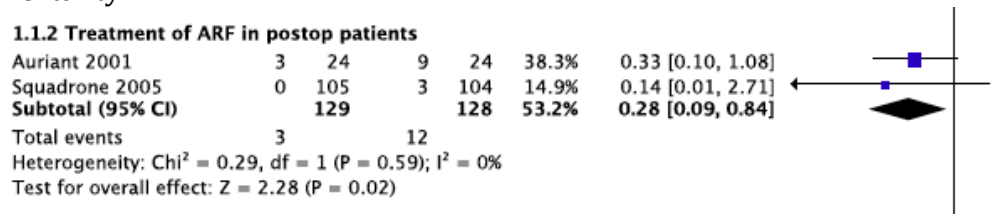
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen +/- invasive mechanical ventilation | Relative (95% CI) | Absolute (95% CI) | | |
| **Mortality (assessed with: Longest available)** | | | | | | | | | | | | |
| 14 [13, 17, 36, 45-55] | randomised trials | not serious | not serious | serious [1] | serious [2] | none | 88/409 (21.5%) | 99/391 (25.3%) | **RR 0.83** (0.65 to 1.05) | 43 fewer per 1000 (from 13 more to 89 fewer) | ⨁⨁◯◯ LOW | CRITICAL |
| **Intubation** | | | | | | | | | | | | |
| 13 [13, 17, 36, 45-51, 53-55] | randomised trials | serious [3] | not serious | serious [1] | not serious | none | 124/390 (31.8%) | 149/369 (40.4%) | **RR 0.75** (0.63 to 0.89) | 101 fewer per 1000 (from 44 fewer to 149 fewer) | ⨁⨁◯◯ LOW | CRITICAL |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

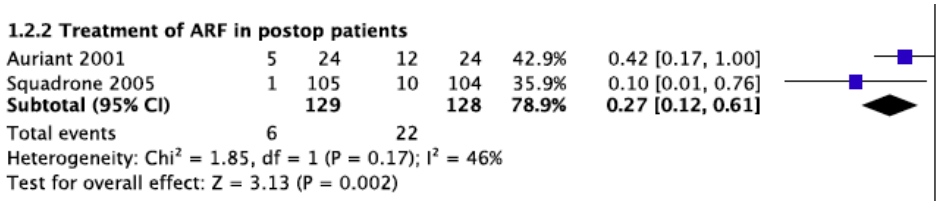
1. Most trials used standard medical care comparator, 1 used IMV comparator.
2. Wide confidence intervals do not exclude harm.
3. Lack of blinding in all studies.

## Question #6: Should NIV be used in the treatment of acute respiratory failure in postoperative patients?

Mortality




Intubation



# Evidence Profile

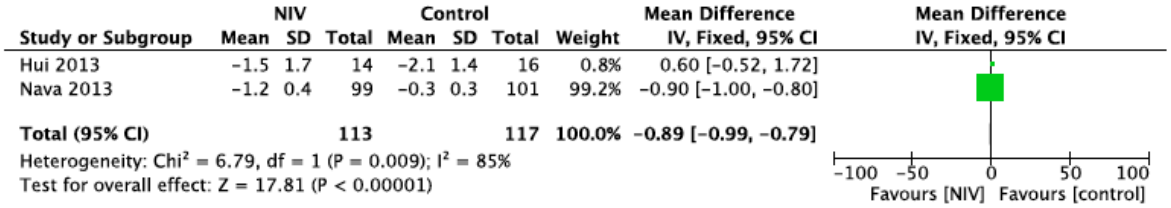
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen +/- invasive mechanical ventilation | Relative (95% CI) | Absolute (95% CI) | | |
| **Mortality (assessed with: longest available)** | | | | | | | | | | | | |
| 2 [56, 57] | randomised trials | not serious [1] | not serious | not serious | serious [2] | none | 3/129 (2.3%) | 12/128 (9.4%) | **RR 0.28** (0.09 to 0.84) | 68 fewer per 1000 (from 15 fewer to 85 fewer) | ⊕⊕⊕◯ MODERATE | CRITICAL |
| **Intubation** | | | | | | | | | | | | |
| 2 [56, 57] | randomised trials | serious [3] | not serious | not serious | serious [2] | none | 6/129 (4.7%) | 22/128 (17.2%) | **RR 0.27** (0.12 to 0.61) | 125 fewer per 1000 (from 67 fewer to 151 fewer) | ⊕⊕◯◯ LOW | CRITICAL |
| **Nosocomial Pneumonia** | | | | | | | | | | | | |
| 1 [57] | randomised trials | serious [3] | not serious | serious [4] | serious [2] | none | 2/105 (1.9%) | 10/104 (9.6%) | **RR 0.20** (0.04 to 0.88) | 77 fewer per 1000 (from 12 fewer to 92 fewer) | ⊕◯◯◯ VERY LOW | CRITICAL |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

1. All studies unblinded but not considered ROB for outcome of mortality.
2. Very small number of events leads to high fragility index and lower certainty.
3. Lack of blinding may have affected outcome assessment.
4. Variability in diagnostic criteria used.

## Question #7: Should NIV be used in acute respiratory failure in palliative patients?

Dyspnea



# Evidence Profile

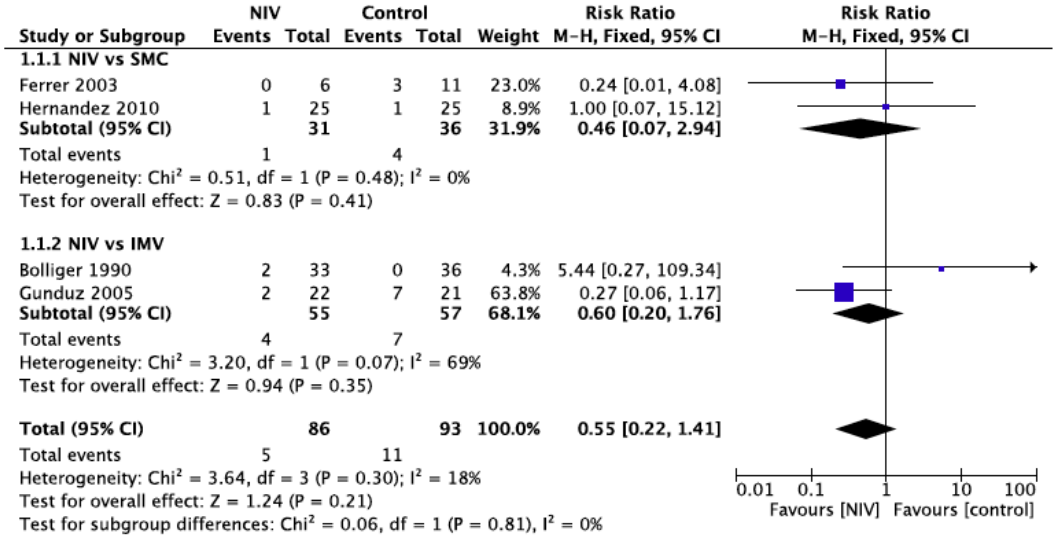
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen | Relative (95% CI) | Absolute (95% CI) | | |
| **Dyspnea (follow up: 1 hour; assessed with: BORG scale, lower means less dyspnea)** | | | | | | | | | | | | |
| 2 [58, 59] | randomised trials | serious [1] | not serious [2] | not serious | not serious | none | 113 | 117 | - | MD **0.89 lower** (0.99 lower to 0.79 lower) | ⊕⊕⊕◯ MODERATE | CRITICAL |
| **Respiratory Rate (follow up: 1 hour)** | | | | | | | | | | | | |
| 1 [58] | randomised trials | serious [1] | not serious | serious [3] | very serious [4] | none | 14 | 16 | - | MD **1 higher** (2.3 lower to 4.3 higher) | ⊕◯◯◯ VERY LOW | IMPORTANT |
| **Oxygenation (follow up: 1 hour; assessed with: Change in O2 saturation)** | | | | | | | | | | | | |
| 1 [58] | randomised trials | serious [1] | not serious | serious [3] | very serious [4] | none | 14 | 16 | - | MD **2 lower** (5.77 lower to 1.77 higher) | ⊕◯◯◯ VERY LOW | IMPORTANT |
| **Morphine Requirement (follow up: 2 days; assessed with: milligrams)** | | | | | | | | | | | | |
| 1 [59] | randomised trials | serious [1] | not serious | serious [3] | not serious | none | 99 | 101 | - | MD **32.4 lower** (47.41 lower to 17.39 lower) | ⊕⊕◯◯ LOW | IMPORTANT |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

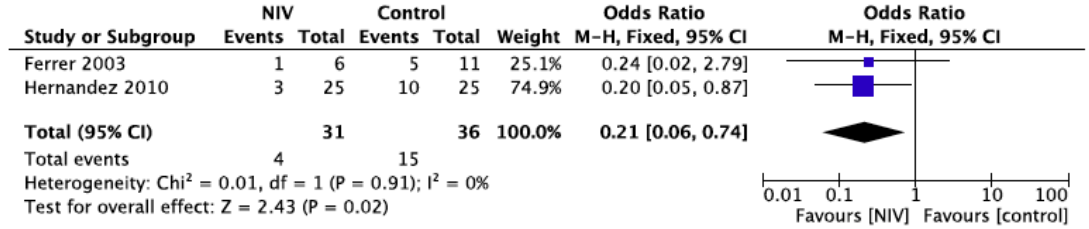
1. Unblinded intervention.
2. Results driven mostly by single study therefore insignificant inconsistency.
3. Surrogate outcome with unclear clinical implications to patients.
4. Wide confidence intervals do not exclude harm. Single study, small number of patients.

## Question #8: Should NIV be used in acute respiratory failure due trauma?

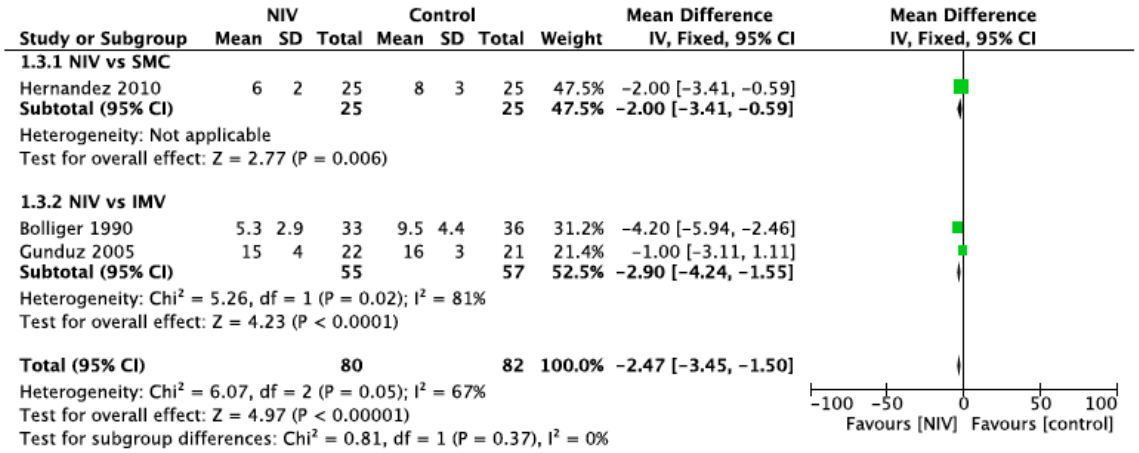
Mortality



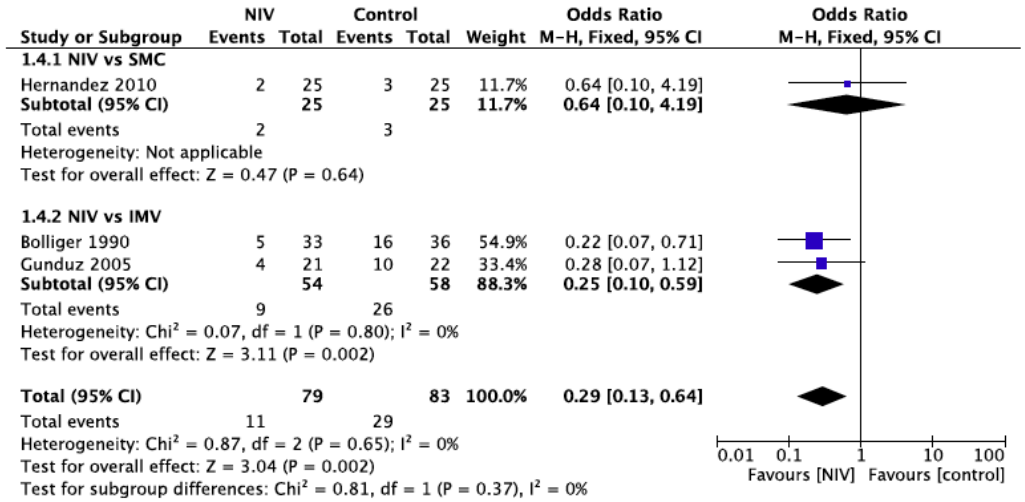

Intubation



ICU Length of Stay




Nosocomial Pneumonia



# Evidence Profile

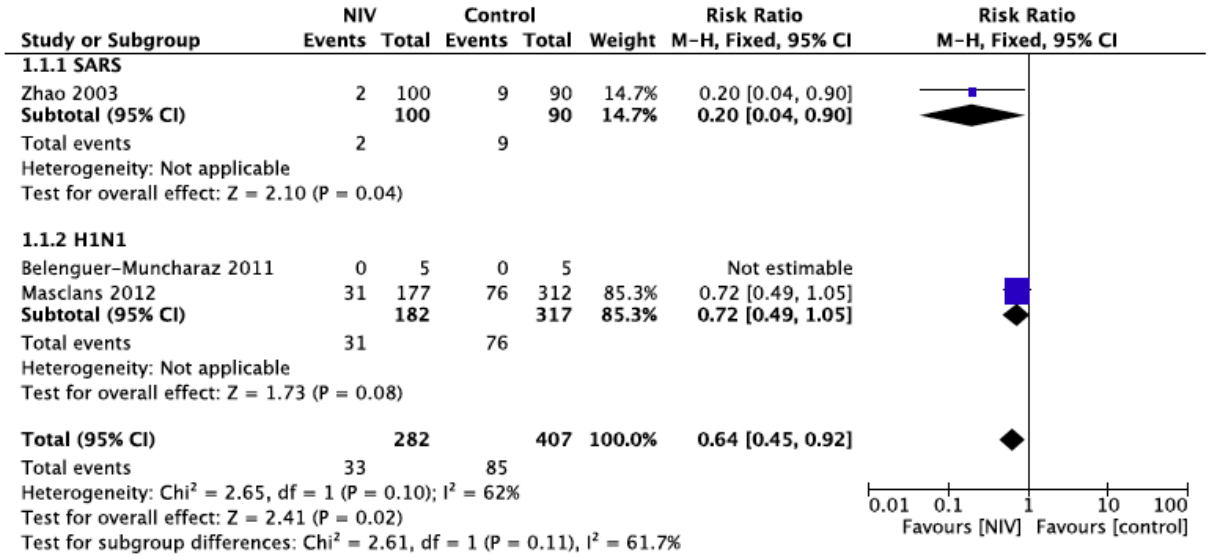
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **№ of studies** | **Study design** | **Risk of bias** | **Inconsistency** | **Indirectness** | **Imprecision** | **Other considerations** | **NIV** | **supplemental oxygen +/- invasive mechanical ventilation** | **Relative (95% CI)** | **Absolute (95% CI)** | | |
| Mortality | | | | | | | | | | | | |
| 4 [50, 60-62] | randomised trials | not serious [1] | not serious | not serious | serious [2] | none | 5/86 (5.8%) | 11/93 (11.8%) | **RR 0.55** (0.22 to 1.41) | 53 fewer per 1000 (from 48 more to 92 fewer) | ⊕⊕⊕◯ MODERATE | CRITICAL |
| Intubation | | | | | | | | | | | | |
| 2 [50, 62] | randomised trials | serious [3] | not serious | not serious | not serious | none | 4/31 (12.9%) | 15/36 (41.7%) | **OR 0.21** (0.06 to 0.74) | 329 fewer per 1000 (from 108 fewer to 392 fewer) | ⊕⊕⊕◯ MODERATE | CRITICAL |
| ICU Length of Stay (assessed with: days) | | | | | | | | | | | | |
| 4 [50, 60-62] | randomised trials | serious [3] | not serious | not serious | not serious | none | 80 | 82 | not estimable | MD **2.47 lower** (3.45 lower to 1.5 lower) | ⊕⊕⊕◯ MODERATE | IMPORTANT |
| Nosocomial Pneumonia | | | | | | | | | | | | |
| 3 [60-62] | randomised trials | serious [3] | not serious | serious [4] | not serious | none | 11/79 (13.9%) | 29/83 (34.9%) | **OR 0.29** (0.13 to 0.64) | 248 fewer per 1000 (from 126 fewer to 304 fewer) | ⊕⊕◯◯ LOW | CRITICAL |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

1. Intervention was not blinded however not as important for outcome of mortality. Also Hernandez et al was stopped early for benefit however not lowered for ROB.
2. Wide confidence intervals.
3. Intervention was unblinded in included studies.
4. Variability in diagnosing nosocomial pneumonia.

## Question #9: Should NIV be used in acute respiratory failure due to pandemic viral illness

Mortality



# Evidence Profile

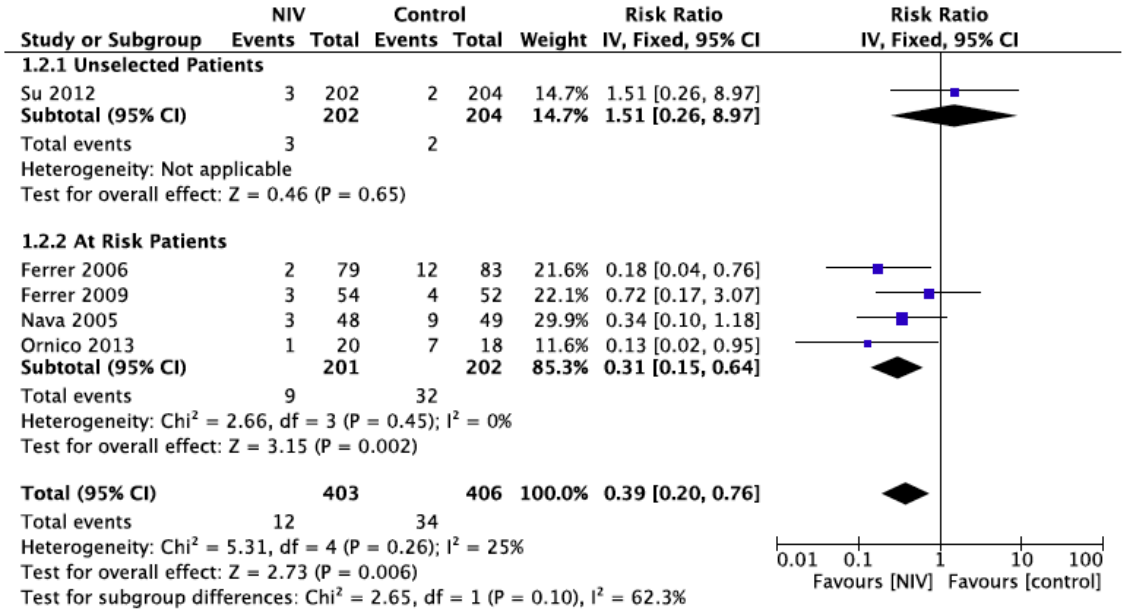
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen +/- invasive mechanical ventilation | Relative (95% CI) | Absolute (95% CI) | | |
| Mortality | | | | | | | | | | | | |
| 3 [63-65] | observational studies | not serious | serious [1] | not serious | serious [2] | none | 33/282 (11.7%) | 85/407 (20.9%) | **RR 0.64** (0.45 to 0.92) | **75 fewer per 1,000** (from 17 fewer to 115 fewer) | ⨁◯◯◯ VERY LOW | CRITICAL |

**CI:** Confidence interval; **RR:** Risk ratio, NIV – noninvasive ventilation, CI – Confidence interval

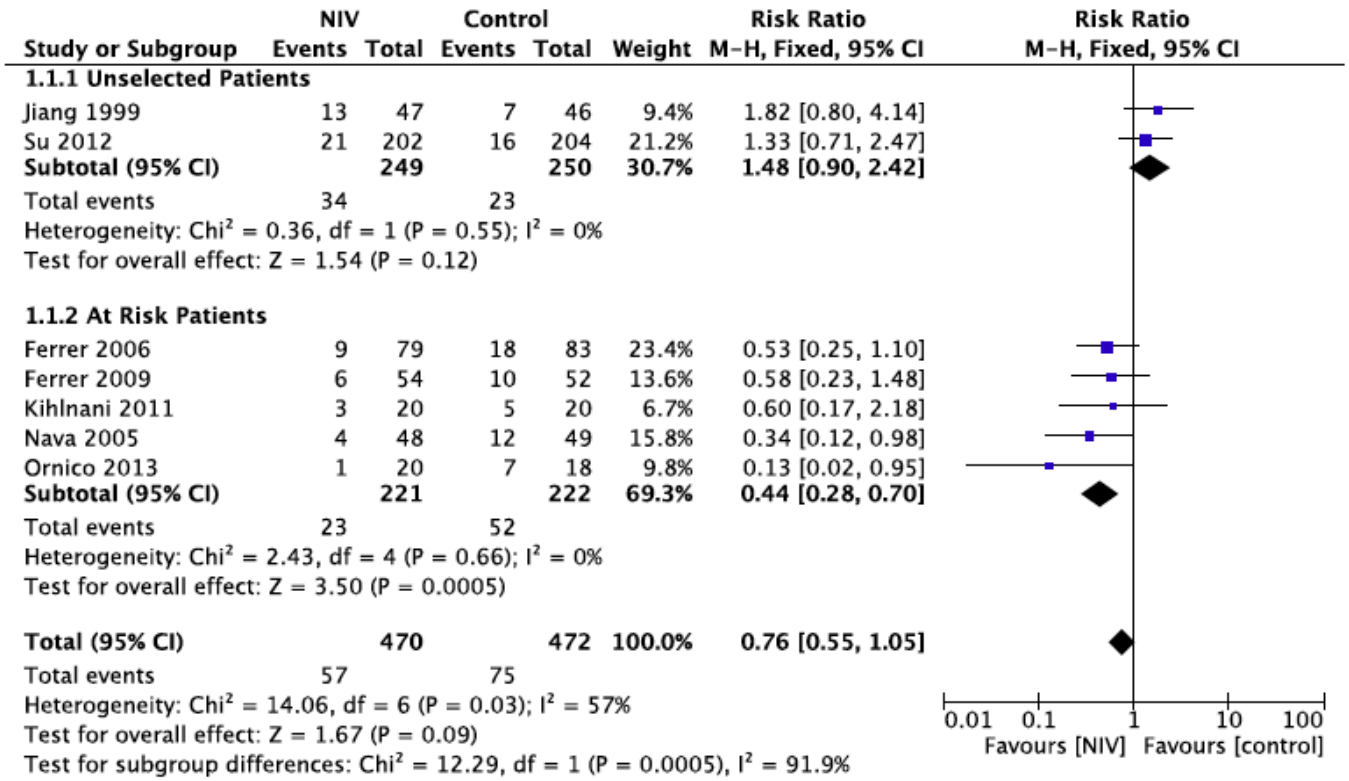
1. High Isquared (over 60%)
2. Low number of events

## Question #10a: Should NIV be used in the prevention of respiratory failure post extubation?

Mortality



Re-Intubation



# Evidence Profile

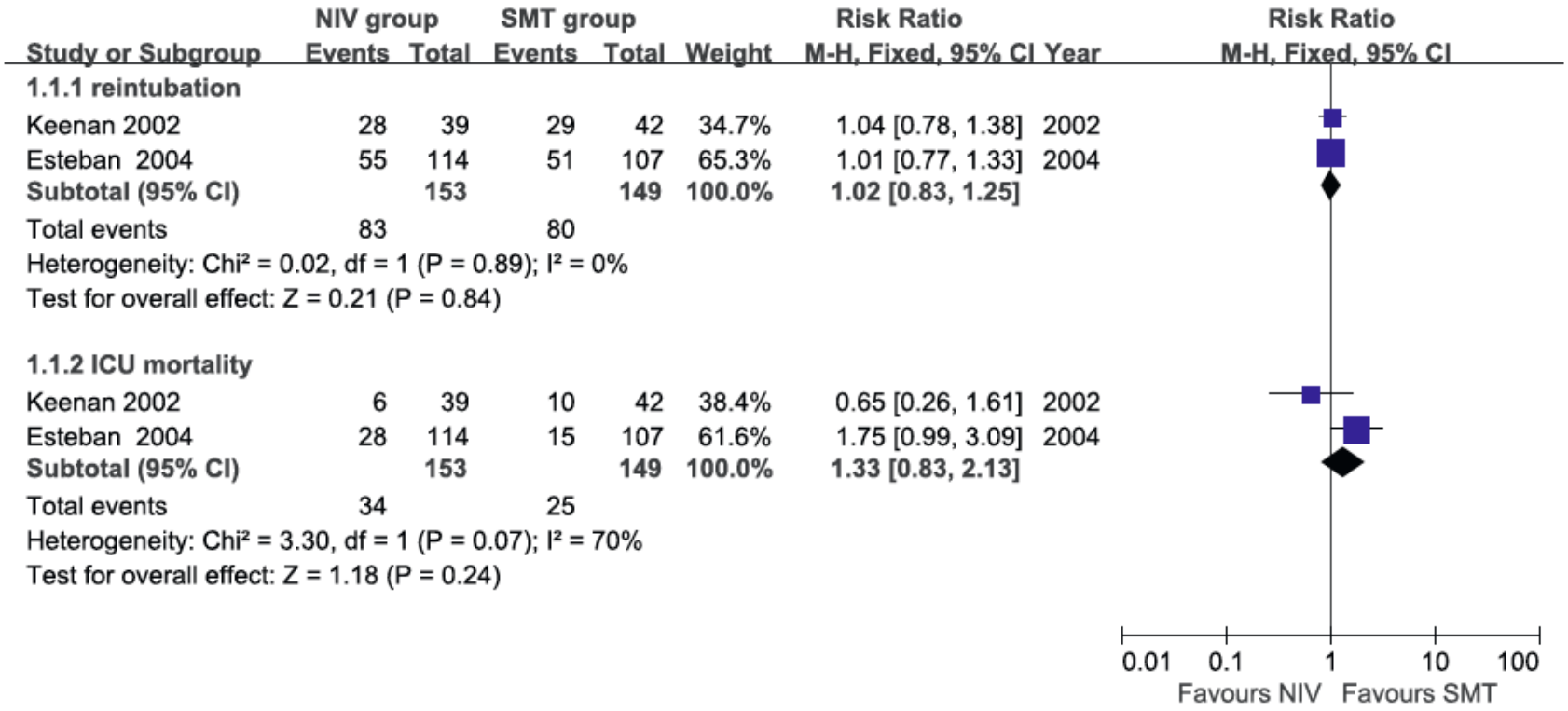
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen | Relative (95% CI) | Absolute (95% CI) | | |
| **Mortality (assessed with: hospital mortality)** | | | | | | | | | | | | |
| 5 [66-70] | randomised trials | not serious | not serious | not serious | serious [1] | none | 11/383 (2.9%) | 27/388 (7.0%) | **RR 0.41** (0.21 to 0.82) | 41 fewer per 1000 (from 13 fewer to 55 fewer) | ⨁⨁⨁◯ MODERATE | CRITICAL |
| **Re-intubation** | | | | | | | | | | | | |
| 7 [66-72] | randomised trials | serious [2] | not serious | not serious | serious [3] | none | 79/538 (14.7%) | 101/542 (18.6%) | **RR 0.75** (0.49 to 1.15) | 47 fewer per 1000 (from 28 more to 95 fewer) | ⨁⨁◯◯ LOW | CRITICAL |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

1. Small number of events leading to high fragility index.
2. Unblinded intervention in all studies.
3. Wide confidence intervals do not exclude harm.

**Question #10b: Should NIV be used in the treatment of respiratory failure post extubation?**

Mortality & Re-intubation




Reference: Changyang Lin, Dr, Huapeng Yu, MD, Huizhen Fan, Dr, Zhongli Li, Dr. The efficacy of noninvasive ventilation in managing postextubation respiratory failure: A meta-analysis. Heart & Lung 43 (2014) 99e104.

# Evidence Profile

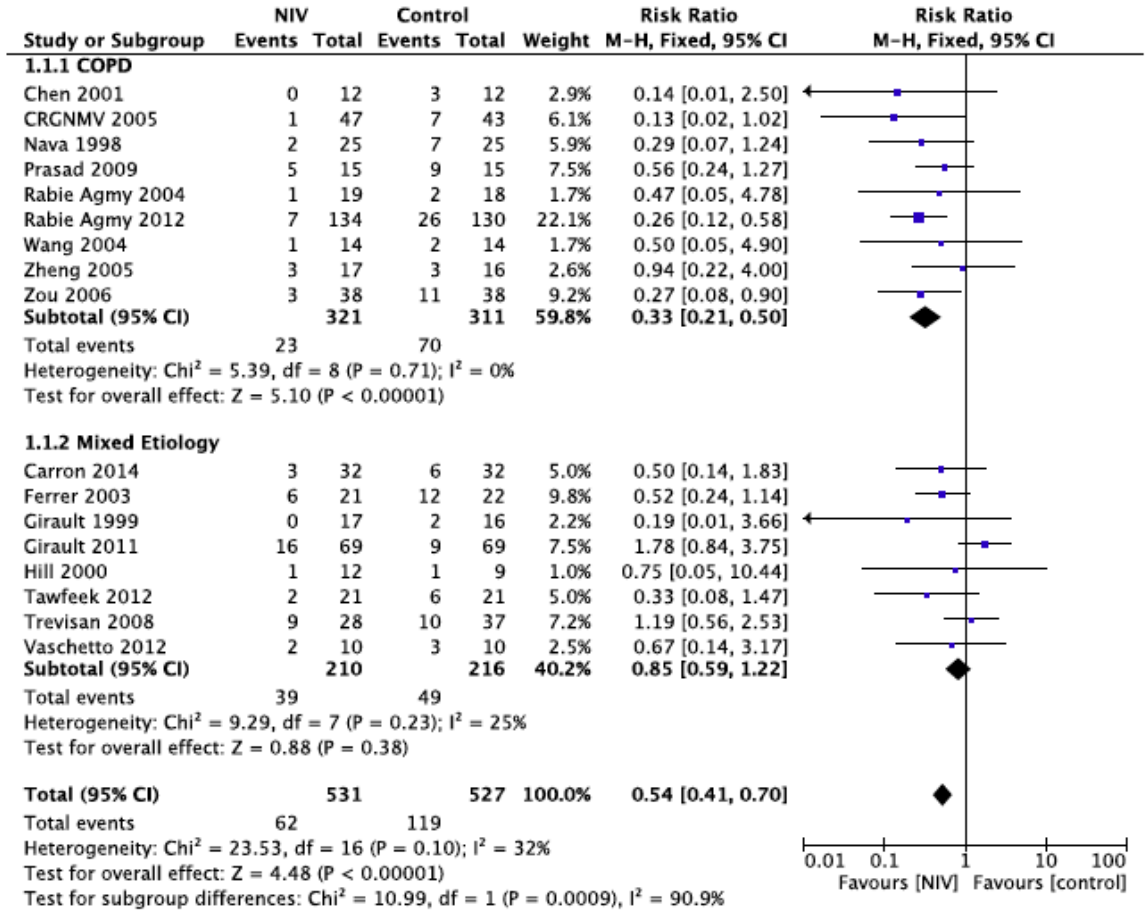
| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | supplemental oxygen +/- invasive mechanical ventilation | Relative (95% CI) | Absolute (95% CI) | | |
| ICU Mortality | | | | | | | | | | | | |
| 2 [73, 74] | randomised trials | not serious | serious [1] | not serious | serious [2] | none | 34/153 (22.2%) | 25/149 (16.8%) | **RR 1.33** (0.83 to 2.13) | **55 more per 1,000** (from 29 fewer to 190 more) | ⨁⨁◯◯ LOW | CRITICAL |
| Re-intubation | | | | | | | | | | | | |
| 2 [73, 74] | randomised trials | serious [3] | not serious | not serious | serious [2] | none | 83/153 (54.2%) | 80/149 (53.7%) | **RR 1.02** (0.83 to 1.25) | **11 more per 1,000** (from 91 fewer to 134 more) | ⨁⨁◯◯ LOW | CRITICAL |

**CI:** Confidence interval; **RR:** Risk ratio, NIV – noninvasive ventilation, CI – Confidence interval

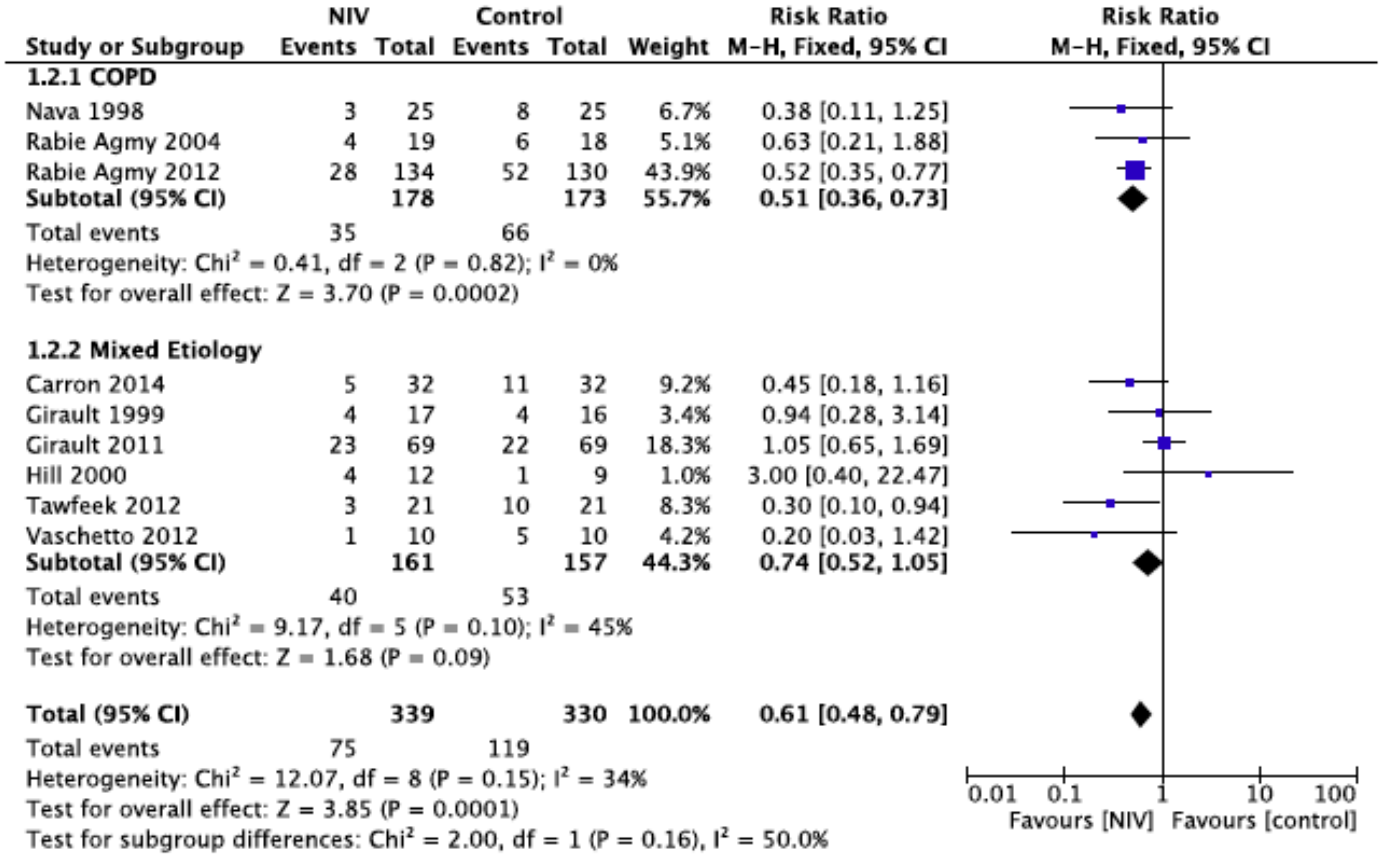
1. High Isquared value and non-overlapping confidence intervals.
2. Wide confidence intervals do not exclude harm or benefit.
3. Unblinded intervention.

## Question #11: Should NIV be used in to facilitate weaning patients from invasive mechanical ventilation?

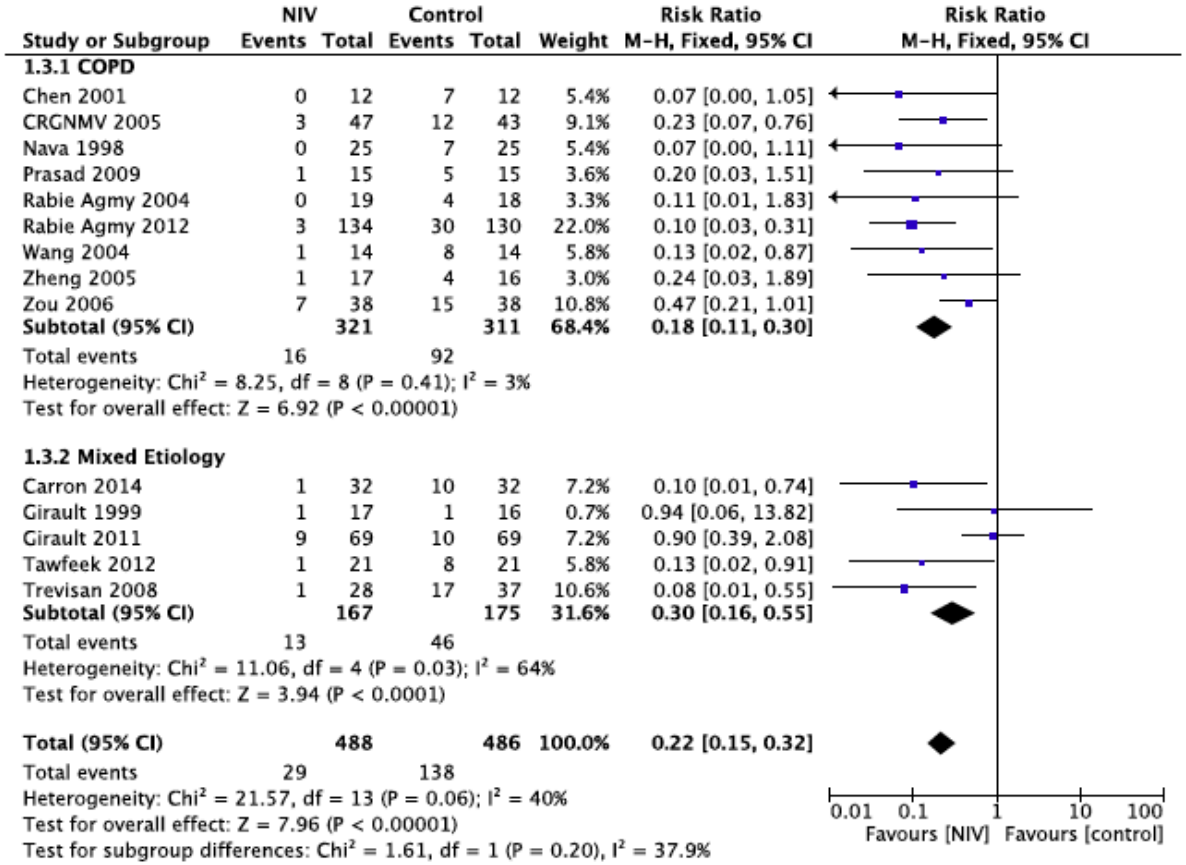
Mortality



Weaning Failure



Ventilator Associated Pneumonia



# Evidence Profile

| Quality assessment | | | | | | | № of patients | | Effect | | Quality | Importance |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | NIV | routine practice | Relative (95% CI) | Absolute (95% CI) | | |
| Mortality | | | | | | | | | | | | |
| 17 [75-91] | randomised trials | not serious [1] | not serious | serious [2] | not serious | none | 62/531 (11.7%) | 119/527 (22.6%) | **RR 0.54** (0.41 to 0.70) | 104 fewer per 1000 (from 68 fewer to 133 fewer) | ⊕⊕⊕◯ MODERATE | CRITICAL |
| Weaning Failure | | | | | | | | | | | | |
| 9 [76, 79-82, 84-86, 88] | randomised trials | serious [3] | not serious | serious [4] | not serious | none | 75/339 (22.1%) | 119/330 (36.1%) | **RR 0.61** (0.48 to 0.79) | 141 fewer per 1000 (from 76 fewer to 188 fewer) | ⊕⊕◯◯ LOW | CRITICAL |
| Ventilator Associated Pneumonia | | | | | | | | | | | | |
| 14 [75-77, 79, 80, 82-87, 89-91] | randomised trials | serious [3] | not serious | serious [5] | not serious | none | 29/488 (5.9%) | 138/486 (28.4%) | **RR 0.22** (0.15 to 0.32) | 221 fewer per 1000 (from 193 fewer to 241 fewer) | ⊕⊕◯◯ LOW | CRITICAL |

MD – mean difference, RR – relative risk, NIV – noninvasive ventilation, CI – Confidence interval

1. Despite a lack of blinding this was not judged to be as important for objective outcome of mortality.
2. Protocols for initiation of NIV varied including when to extubate.
3. Lack of blinding of the intervention affected overall ROB.
4. Weaning failure was heterogeniously defined across studies. Protocols for initiation of NIV also varied.
5. Different definitions of VAP employed. Also varying NIV protocols.

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