

**Cookies**

Our site uses cookies to improve your experience. You can find out more about our use of cookies in About Cookies, including instructions on how to turn off cookies if you wish to do so. By continuing to browse this site you agree to us using cookies as described in [About Cookies](#).

I accept



Explore new Cochrane Library features [here](#).

**We noticed your browser language is Spanish.**

You can select your preferred language at the top of any page, and you will see translated Cochrane Review sections in this language. Change to [Spanish](#).

**Cochrane Clinical Answers****Question:****For adults with pain following intra-abdominal surgery, how does epidural analgesia compare with intravenous patient-controlled analgesia (IV PCA)?**

Jane Burch, Agustín Ciapponi

<https://doi.org/10.1002/cca.2333> | 6 December 2018

Answer

Although pain control after intra-abdominal surgery may be better with epidural analgesia than with IV PCA, the need for a second analgesic technique and adverse events may be greater.

RCTs compared epidural analgesia (most often, bupivacaine or ropivacaine plus an opioid at the thoracic level via a programmable pump) with IV PCA (most often morphine) for adults who had undergone intra-abdominal surgery (most with American Society of Anesthesiologists physical status I to II). Pain scores at rest (moderate-certainty evidence) and pain on movement (low-certainty evidence) were better with epidural anesthesia within the first 24 hours and beyond (5.1 to 26 points lower on a 100-point scale with epidural; all values on average). Duration of hospital stay may be slightly shorter with epidural anesthesia, but low-certainty evidence suggests that time to ambulation may be similar for the two analgesic regimens. However, moderate-certainty evidence shows that more people could experience failure of analgesia (defined as a clinical decision for any reason to use a second analgesic technique; 87 vs 35 per 1000 people), pruritus (219 vs 93 per 1000

people), and hypotension (121 vs 17 per 1000 people) with epidural analgesia than with IV PCA. The impact of analgesic regimen on mortality, development of venous thromboembolism, nausea/vomiting, hypoxemia (low- to moderate-certainty evidence), and sedation remains unclear, as results are too imprecise to draw conclusions.

Comparisons

1. Epidural analgesia versus intravenous patient-controlled analgesia (IV PCA)

Expand All »

> **OUTCOME 1.1 Pain at rest**

Narrative result

Pain at rest was assessed at 6, 7 to 24 and > 24 hours post-surgery using a 100-point VAS score. Pain scores were lower with epidural than with IV PCA at all three time points. Click below for details.[1]

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> **Subgroup analysis 1.1.1 Pain at rest – [subgroup: Within 6 hours of surgery]**

Narrative result

Seven RCTs with 384 participants found that pain scores were lower (better) with epidural analgesia than with IV PCA. Most trials used a programmable pump for epidural analgesia (336 participants); the result for this subgroup was similar to the main analysis. The smaller subgroup of trials using a preprogrammed pump (48 participants) showed no statistically significant difference between groups.[2]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was a statistically significant difference between groups, in favor of epidural analgesia (mean difference - 5.70 points, 95% CI -9.48 to -1.92).

Review: Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults
 Comparison: 1 Epidural analgesia versus intravenous patient-controlled analgesia
 Outcome: 1 Pain score early phase - at rest

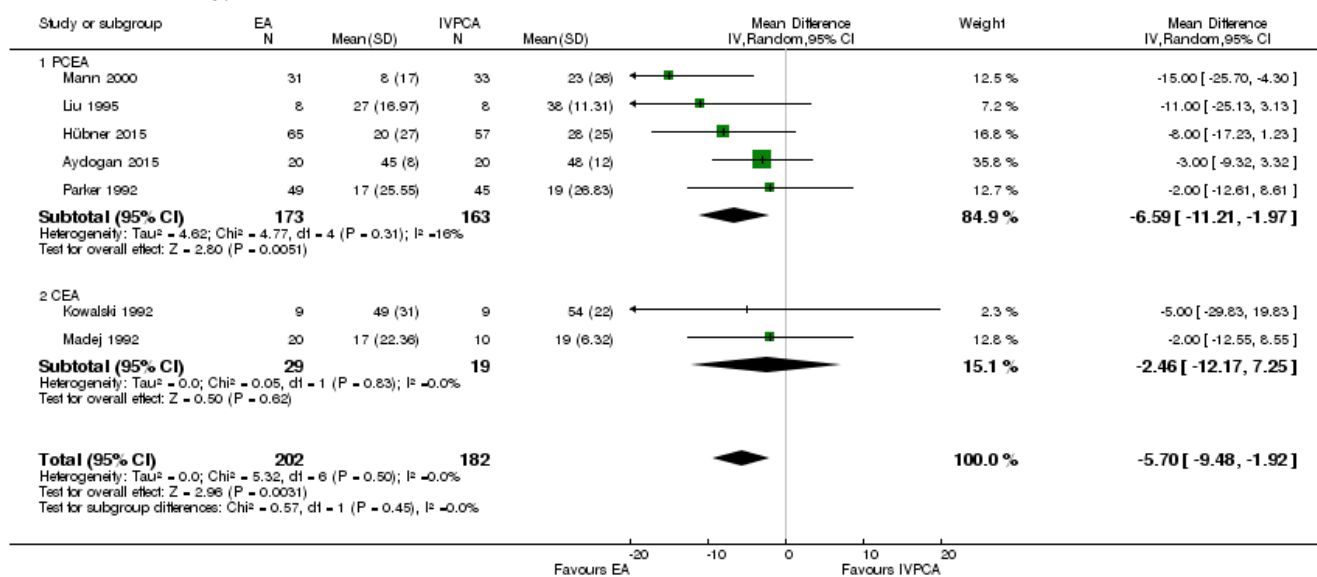


Figure 1

[Open in figure viewer](#)

Forest plot from Cochrane Review

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> Subgroup analysis 1.1.2 Pain at rest – [subgroup: 7 to 24 hours post-surgery]

Narrative result

11 RCTs with 558 participants found that pain scores were lower (better) with epidural analgesia than with IV PCA. Trials used either a programmable (431 participants) or preprogrammed (127 participants) pump for epidural analgesia; result for these subgroups were similar to the main analysis.[3]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was a statistically significant difference between groups, in favor of epidural analgesia (mean difference - 9.02 points, 95% CI -13.41 to -4.63).

Review: Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults
 Comparison: 1 Epidural analgesia versus intravenous patient-controlled analgesia
 Outcome: 2 Pain score mid-phase - at rest

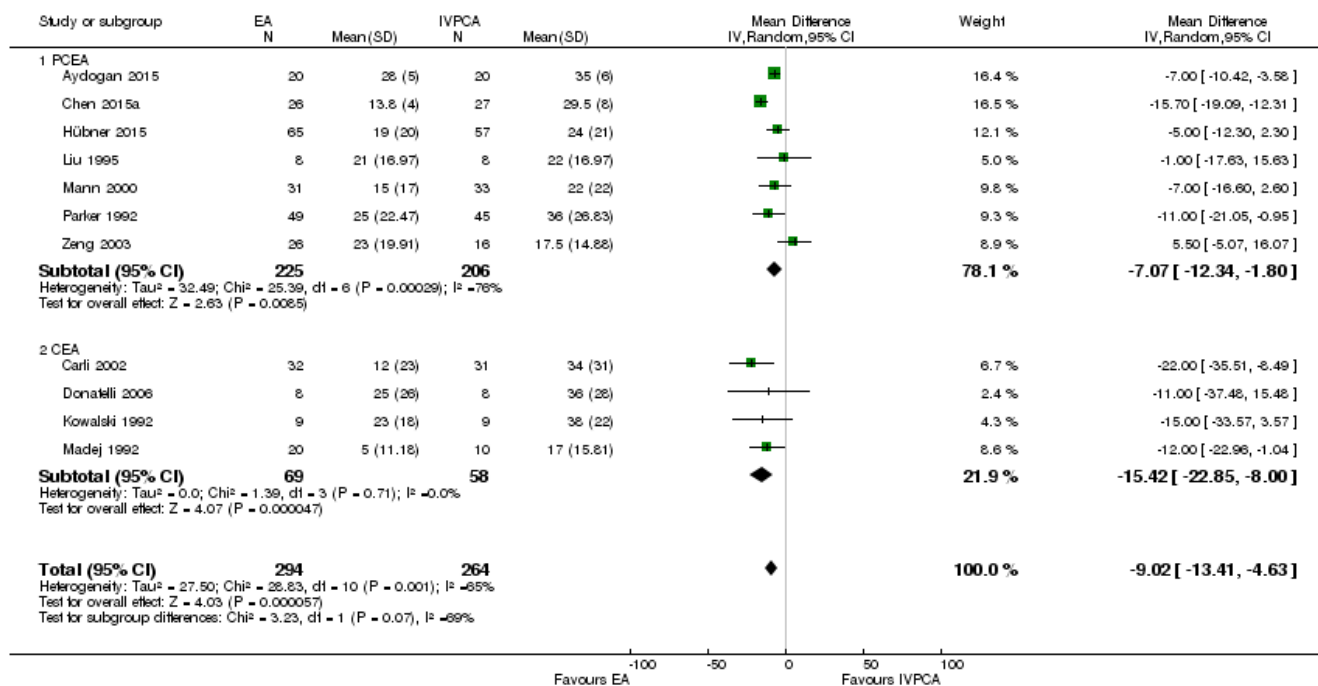


Figure 2

Forest plot from Cochrane Review

[Open in figure viewer](#)

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> Subgroup analysis 1.1.3 Pain at rest – [subgroup: > 24 hours post-surgery]

Narrative result

Seven RCTs with 393 participants found that pain scores were lower (better) with epidural analgesia than with IV PCA. Trials used either a programmable (296 participants) or preprogrammed (97 participants) pump for epidural analgesia; both subgroups showed similar a result to the main analysis though neither reached statistical significance.[4]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was a statistically significant difference between groups, in favor of epidural analgesia (mean difference - 5.14 points, 95% CI -9.38 to -0.90).

Review: Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults
 Comparison: 1 Epidural analgesia versus intravenous patient-controlled analgesia
 Outcome: 3 Pain score late phase - at rest

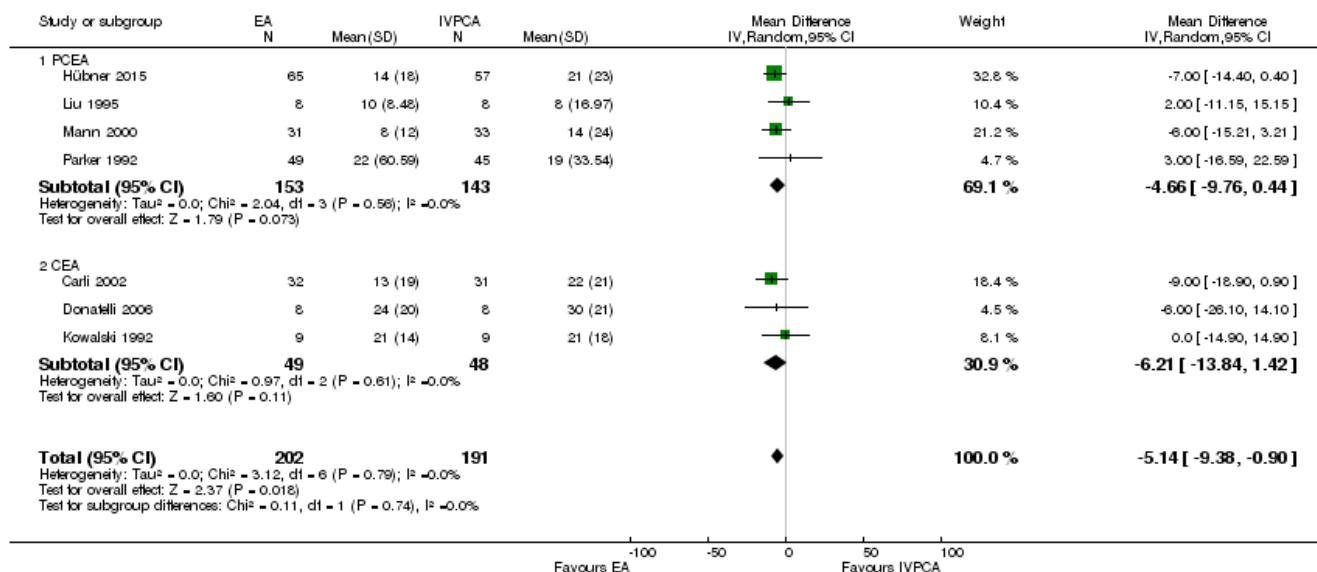


Figure 3

[Open in figure viewer](#)

Forest plot from Cochrane Review

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> OUTCOME 1.2 Pain on movement

Narrative result

Pain on movement was assessed at 6, 7 to 24 and > 24 hours post-surgery using a 100-point VAS score. Pain scores were lower (better) with epidural analgesia than with IV PCA at all three time points. Click below for details.[5]

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> Subgroup analysis 1.2.1 Pain on movement – [subgroup: Within 6 hours of surgery]

Narrative result

Two RCTs with 80 participants both reported lower pain scores with epidural analgesia than with IV PCA.[6]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was low certainty. [See Summary of findings from Cochrane Review](#)

Relative effect or mean difference

Pain scores were 7.0 and 8.0 points lower with epidural analgesia (mean scores with IV PCA 34 and 53 points, respectively).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

› Subgroup analysis 1.2.2 Pain on movement – [subgroup: 7 to 24 hours post-surgery]

Narrative result

Two RCTs with 103 participants both reported lower pain scores with epidural analgesia than with IV PCA. A further four RCTs (172 participants) could not be pooled; three favored epidural analgesia over IV PCA and one showed only a 1-point difference between groups.[7]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was low certainty. [See Summary of findings from Cochrane Review](#)

Relative effect or mean difference

Mean pain scores were 1, 10 and 26 points lower with epidural analgesia (mean scores with IV PCA 31, 38 and 51 points, respectively). Three trials reported median pain scores which were 30, 30 and 40-points lower with epidural analgesia (median scores with IV PCA 40, 50 and 48 points, respectively).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

› Subgroup analysis 1.2.3 Pain on movement – [subgroup: > 24 hours post-surgery]

Narrative result

Two RCTs with 102 participants reported mean pain scores (both used preprogrammed pumps for IV PCA): scores were 16-points or 3-points lower with a preprogrammed and programmable pump for epidural analgesia, respectively. Three trials reported median pain scores, which were 10 to 16 points lower with epidural analgesia. [8]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was low certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

Mean pain scores were 16-points lower with a preprogrammed pump for epidural analgesia (mean for IV PCA group 39), or 3-point lower score with a programmable pump (mean for IV PCA group 25 points). Median pain scores, which were 13, 16, and 10 points lower with epidural analgesia (median for IV PCA group 20, 26 and 40, respectively).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> OUTCOME 1.3 Failure of analgesia

Narrative result

Ten RCTs with 678 participants found that more people had failure of analgesia (defined as a clinical decision for any reason to use a second analgesic technique) with epidural analgesia than with IV PCA.[9]

Trials used either a programmable (268 participants) or preprogrammed (410 participants) pump for epidural analgesia. Both subgroups showed a similar result to the main analysis, although trials using a preprogrammed pump did not reach statistical significance. Event rates were very low.

Analyses that made assumptions about the outcomes for people with missing data showed similar results to the main analysis for worst-case scenarios, but no statistically significant differences between groups for best-case scenarios.

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was a statistically significant difference between groups, in favor of IV PCA (RR 2.48, 95% CI 1.13 to 5.45).

Review: Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults
 Comparison: 1 Epidural analgesia versus intravenous patient-controlled analgesia
 Outcome: 10 Failure of analgesic technique

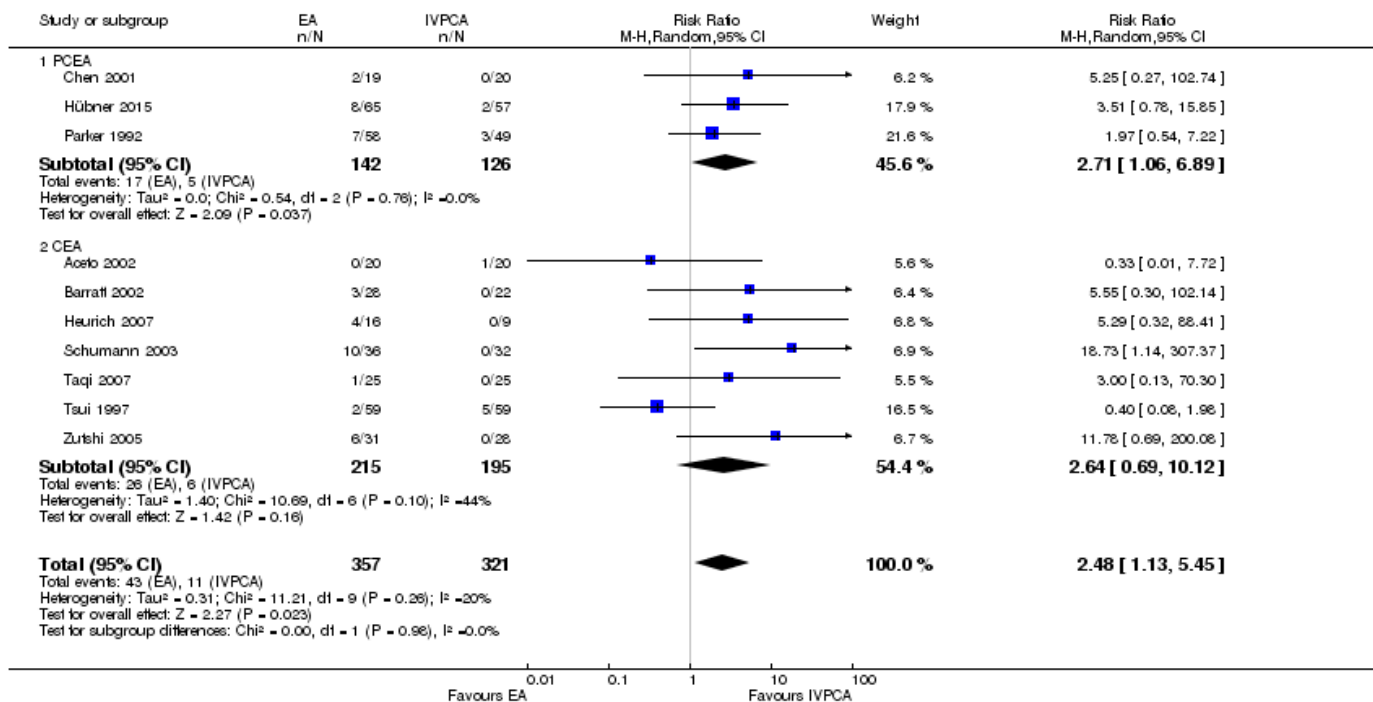


Figure 4

[Open in figure viewer](#)

Forest plot from Cochrane Review

Absolute effect

87 per 1000 people (95% CI 40 to 191) with epidural analgesia compared with 35 per 1000 people with IV PCA (calculated using median event rate).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

OUTCOME 1.4 30-day mortality

Narrative result

Nine RCTs with 560 participants found no statistically significant difference between groups. Trials used either a programmable (280 participants) or preprogrammed (329 participants) pump for epidural analgesia; both subgroups showed similar a result to the main analysis. Event rates were very low and all three analyses underpowered. In addition, analyses that made assumptions about the outcomes for people with missing data were inconsistent, ranging from a 75% decrease to a nearly 15-fold increase in mortality across analyses. Consequently, the impact on 30-day mortality is uncertain.[10]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was low certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was no statistically significant difference between groups (RR 3.37, 95% CI 0.72 to 15.88).

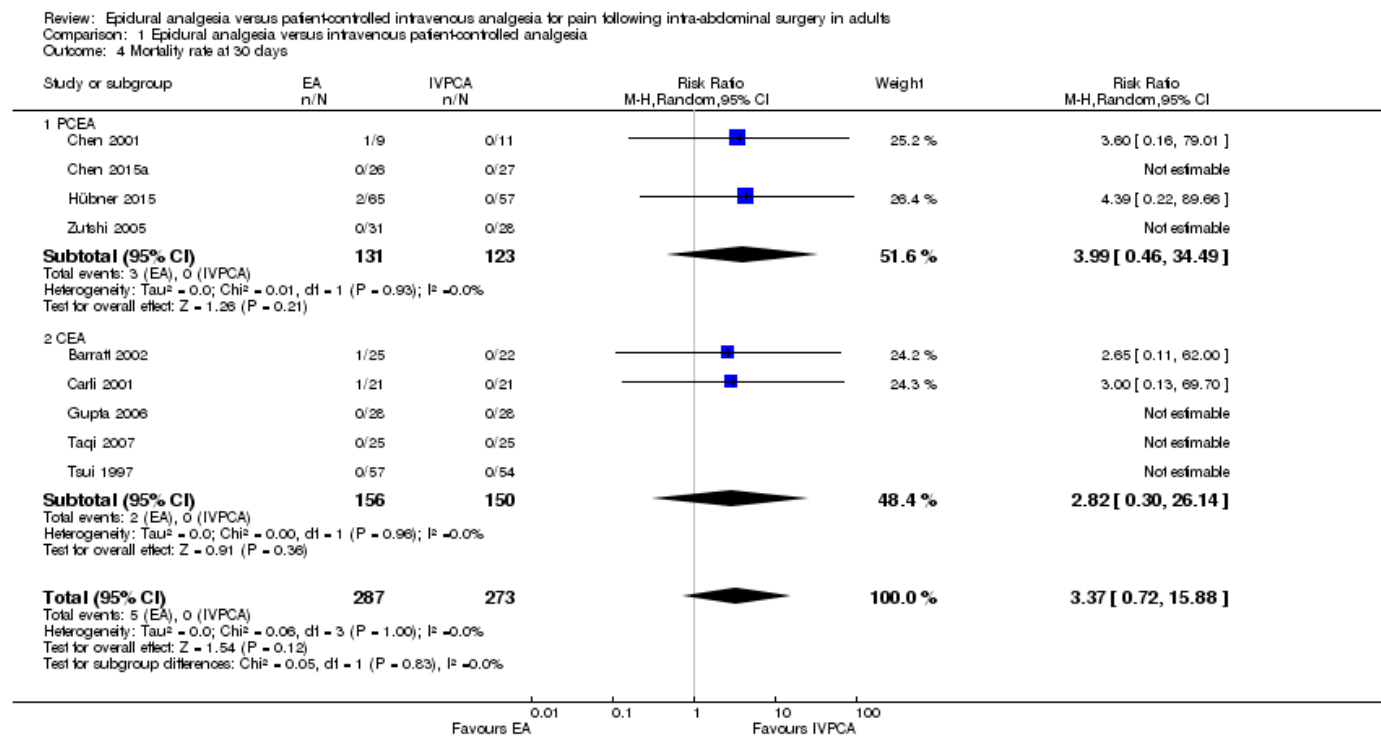


Figure 5

[Open in figure viewer](#)

Forest plot from Cochrane Review

Absolute effect

We could not calculate absolute results for this outcome because there were no events in the IV PCA group; there were 5 deaths across 287 participants with epidural analgesia.

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> OUTCOME 1.5 Venous thromboembolism

Narrative result

Two RCTs with 101 participants found no statistically significant difference between groups. Trials used either a programmable (59 participants) or preprogrammed (42 participants) pump for epidural analgesia. Both subgroups showed a similar result to the main analysis. All three analyses were underpowered.[11]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was low certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was no statistically significant difference between groups (RR 0.32, 95% CI 0.03 to 2.95).

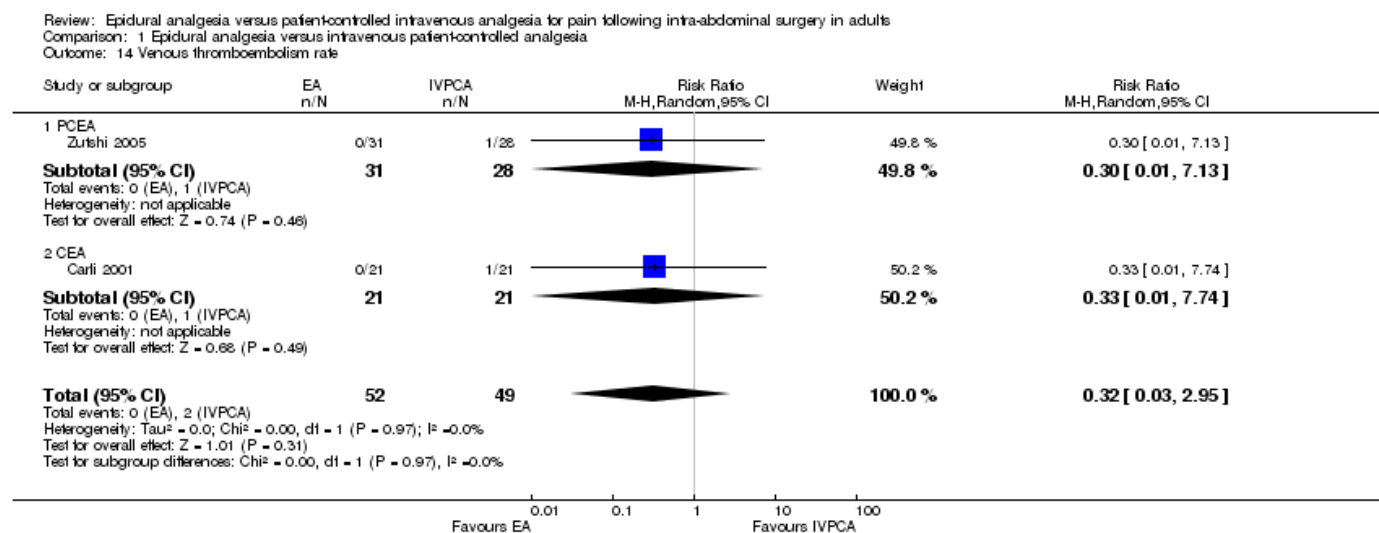


Figure 6

[Open in figure viewer](#)

Forest plot from Cochrane Review

Absolute effect

11 per 1000 people (95% CI 1 to 105) with epidural analgesia compared with 36 per 1000 people with IV PCA (calculated using median event rate).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> OUTCOME 1.6 Pruritus

Narrative result

Eight RCTs with 492 participants found that more people had pruritus with epidural analgesia than with IV PCA. Trials used either a programmable (244 participants) or preprogrammed (248 participants) pump for epidural analgesia. Both subgroups showed a similar result to the main analysis. Analyses that made assumptions about the outcomes for people with missing data showed similar results to the main analysis, although the best-case scenario for trials using preprogrammed pumps did not reach statistical significance.[12]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was a statistically significant difference between groups, in favor of IV PCA (RR 2.36, 95% CI 1.67 to 3.35).

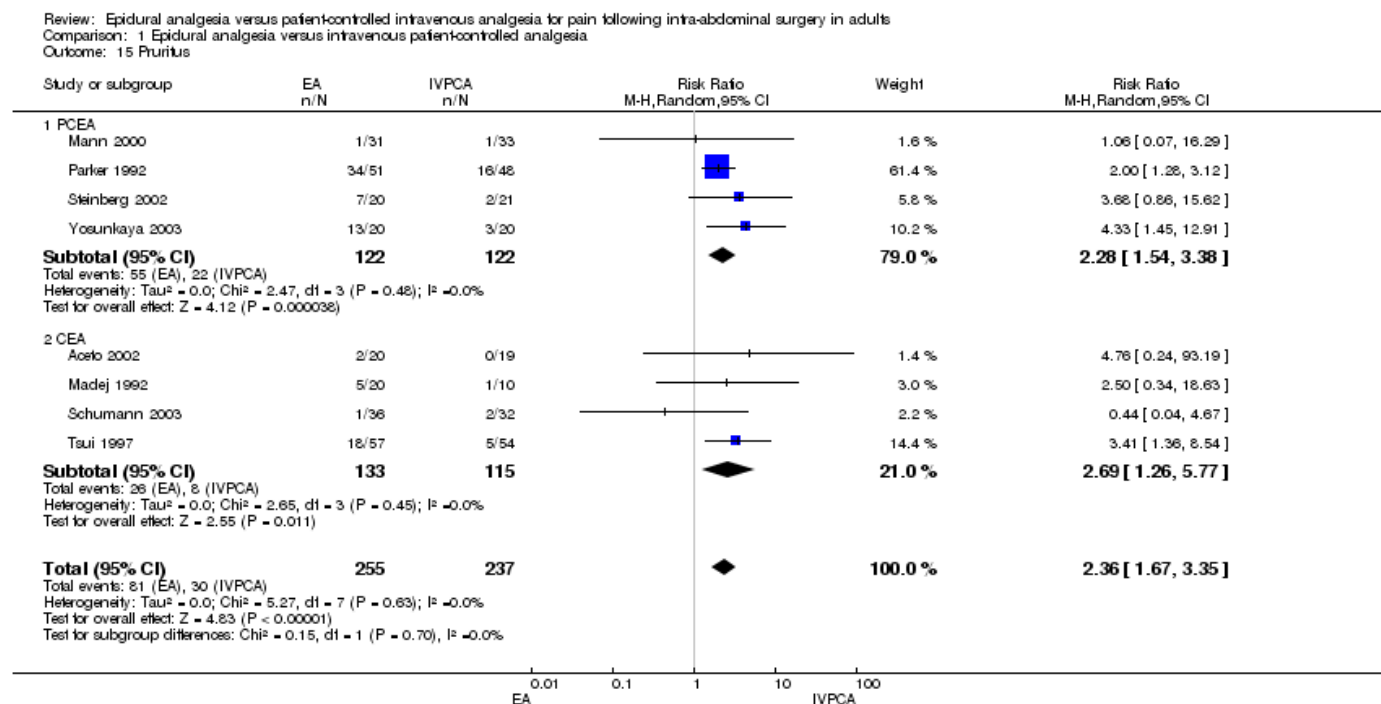


Figure 7

[Open in figure viewer](#)

Forest plot from Cochrane Review

Absolute effect

219 per 1000 people (95% CI 154 to 310) with epidural analgesia compared with 93 per 1000 people with IV PCA (calculated using median event rate).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> **OUTCOME 1.7 Nausea and vomiting**

Narrative result

Ten RCTs with 618 participants found no statistically significant difference between groups. Trials used either a programmable (244 participants) or preprogrammed (374 participants) pump for epidural analgesia. Both subgroups showed no statistically significant difference between groups. Analyses that made assumptions about the outcomes for people with missing data also showed no statistically significant difference between groups.[13]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was no statistically significant difference between groups (RR 0.94, 95% CI 0.69 to 1.27).

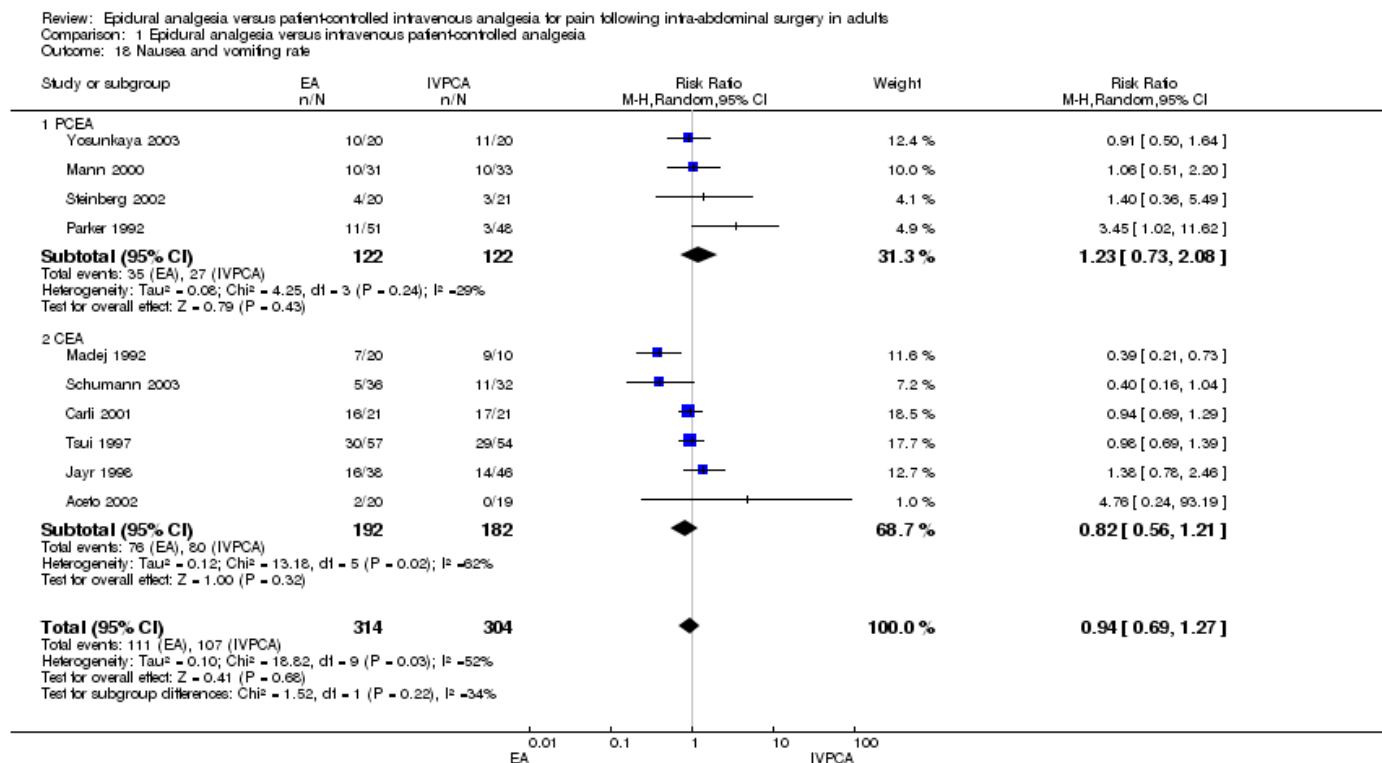


Figure 8

Forest plot from Cochrane Review

[Open in figure viewer](#)

Absolute effect

286 per 1000 people (95% CI 211 to 387) with epidural analgesia compared with 304 per 1000 people with IV PCA (calculated using median event rate).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> OUTCOME 1.8 Sedation

Narrative result

Four RCTs with 223 participants found no statistically significant difference between groups. Trials used either a programmable (136 participants) or preprogrammed (87 participants) pump for epidural analgesia. Both subgroups showed no statistically significant difference between groups. All three analyses were underpowered. Analyses that made assumptions about the outcomes for people with missing data also showed no statistically significant difference between groups.[14]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was no statistically significant difference between groups (RR 0.87, 95% CI 0.40 to 1.87).

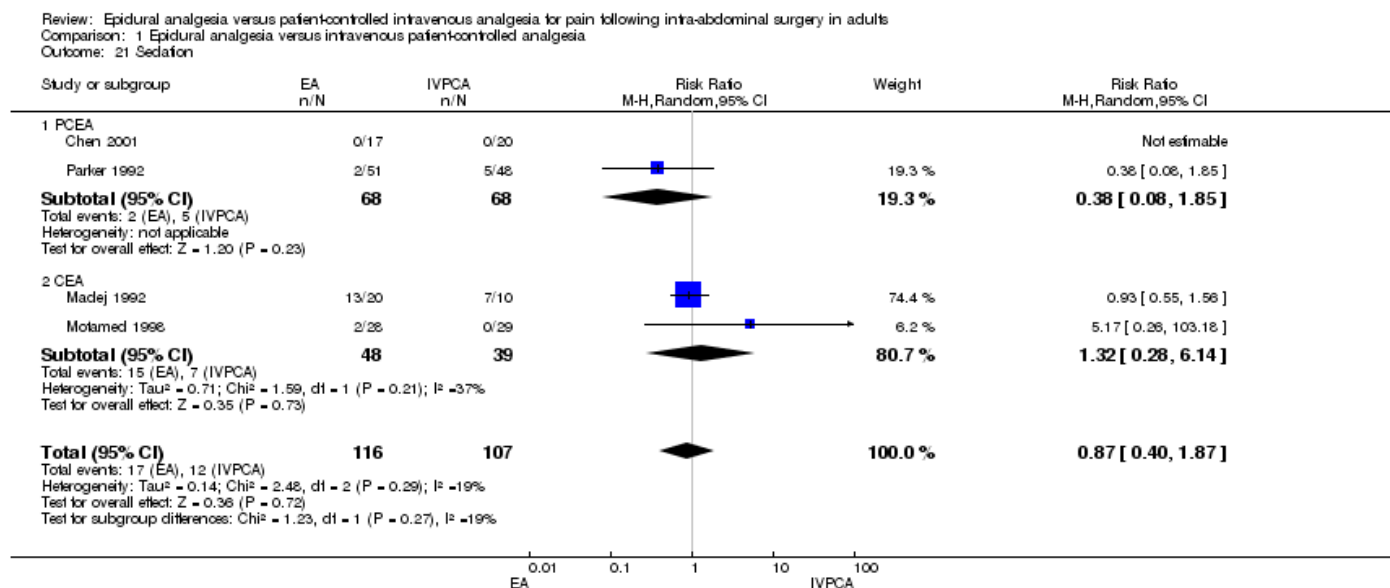


Figure 9

[Open in figure viewer](#)

Forest plot from Cochrane Review

Absolute effect

90 per 1000 people (95% CI 42 to 195) with epidural analgesia compared with 104 per 1000 people with IV PCA (calculated using median event rate).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> **OUTCOME 1.9 Hypoxemia (oxygen saturation < 90%)**

Narrative result

Five RCTs with 328 participants found no statistically significant difference between groups. Trials used either a programmable (64 participants) or preprogrammed (264 participants) pump for epidural analgesia. Both subgroups showed no statistically significant difference between groups. All three analyses were underpowered.[15]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was no statistically significant difference between groups (RR 1.29, 95% CI 0.71 to 2.37).

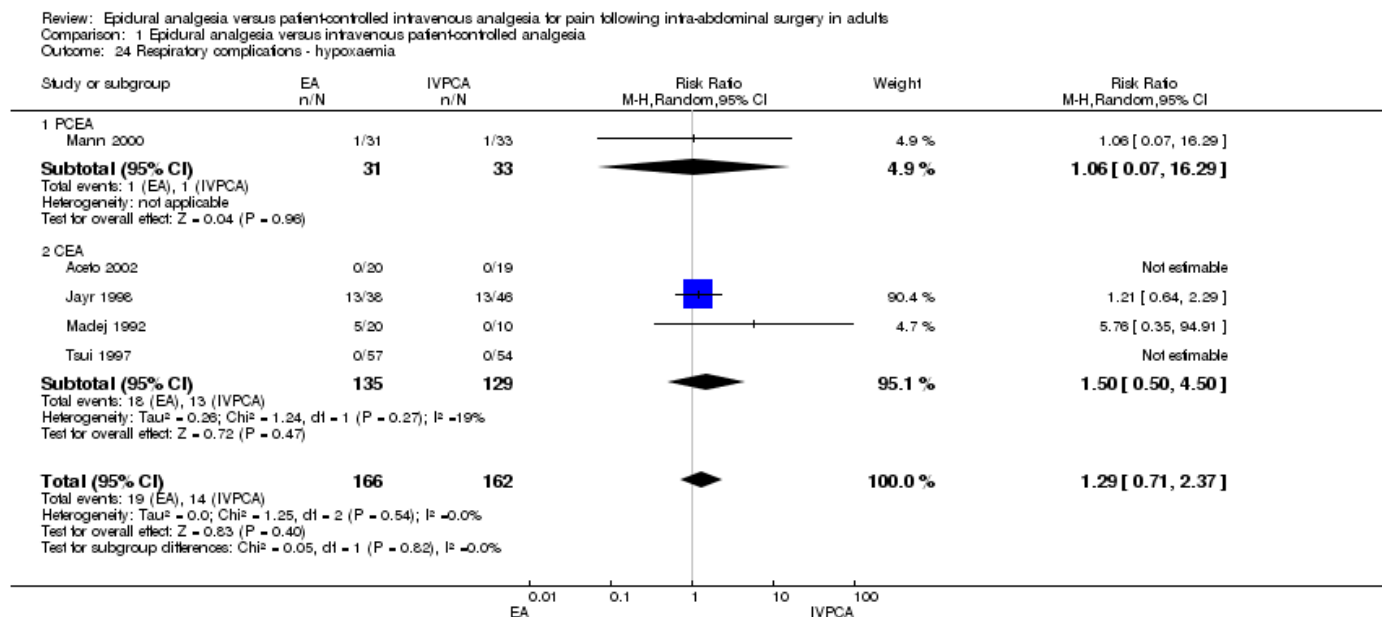


Figure 10

Forest plot from Cochrane Review

[Open in figure viewer](#)

Absolute effect

111 per 1000 people (95% CI 61 to 204) with epidural analgesia compared with 86 per 1000 people with IV PCA (calculated by the CCA editor using mean event rate).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> OUTCOME 1.10 Hypotension requiring treatment

Narrative result

Six RCTs with 479 participants found that more people had hypotension requiring treatment with epidural than with IV PCA. Trials used either a programmable (245 participants) or preprogrammed (234 participants) pump for epidural analgesia. Both subgroups showed a similar result to the main analysis.[16]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. See [Summary of findings from Cochrane Review](#)

Relative effect or mean difference

There was a statistically significant difference between groups, in favor of IV PCA (RR 7.13, 95% CI 2.87 to 17.75).

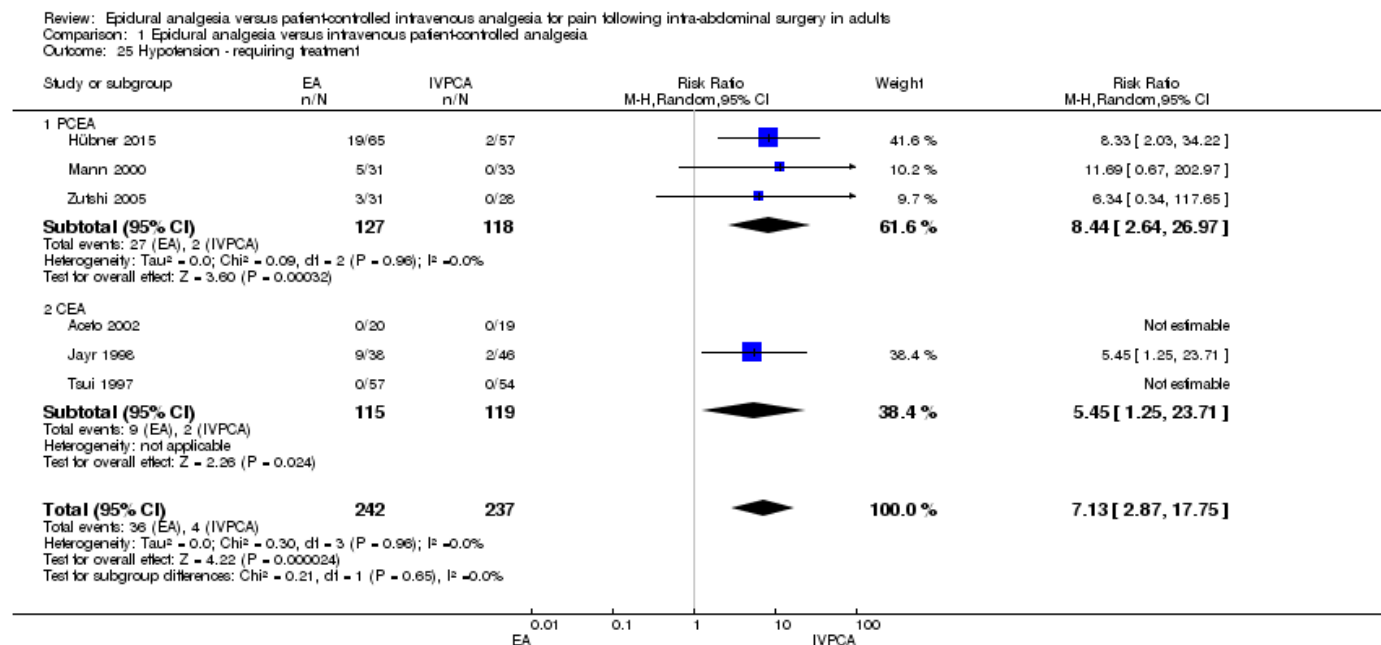


Figure 11

Forest plot from Cochrane Review

[Open in figure viewer](#)

Absolute effect

121 per 1000 people (95% CI 49 to 301) with epidural analgesia compared with 17 per 1000 people with IV PCA (calculated by the CCA editor using mean event rate).

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> **OUTCOME 1.11 Duration of hospital stay**

Narrative result

Three RCTs with 186 participants found that duration of hospital stay was shorter with epidural analgesia than with IV PCA.[17]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was moderate certainty. Reported in the main text of the Cochrane Review

Relative effect or mean difference

There was a statistically significant difference between groups, in favor of EA (mean difference -0.34 days, 95% CI -0.64 to -0.05).

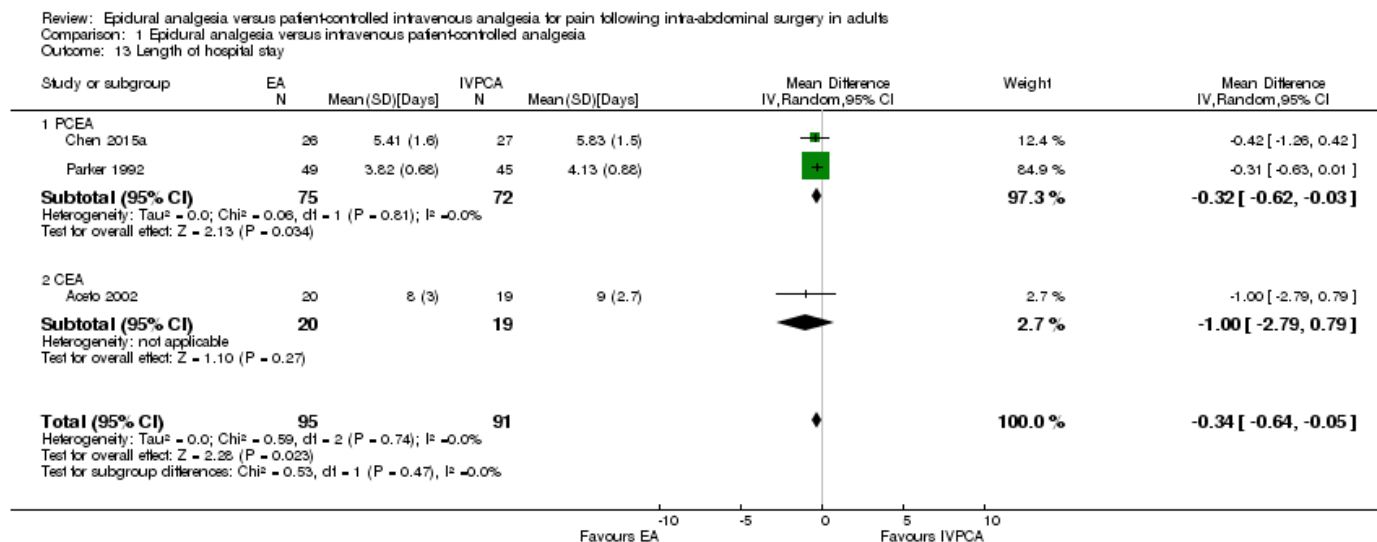


Figure 12

Forest plot from Cochrane Review

[Open in figure viewer](#)

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

> OUTCOME 1.12 Time to ambulation

Narrative result

Four RCTs with 251 participants reported on time to ambulation; one reported the mean time to ambulation and three the median time. Times to ambulation were similar across groups within each trial.[18]

Quality of the evidence

The reviewers performed a GRADE assessment of the quality of evidence for this outcome at this time point and stated that the evidence was low certainty. [Reported in the main text of the Cochrane Review](#)

Relative effect or mean difference

Results were reported narratively. Results for each individual study were reported. Study 1: mean time to ambulation using programmable epidural pumps and higher-dose hydromorphone was 26 (SD 6) hours or lower-dose hydromorphone was 16 (SD 5) hours versus 20 (SD 7) hours with IV PCA. Study 2: median time to ambulation using programmable epidural pumps was 98 (IQR 72 to 120) hours versus 98 (IQR 84 to 144) hours with IV PCA. Study 3: median time to ambulation using programmable epidural pumps was 24 (range 14.4 to 48) hours versus 26 (IQR range 3.8 to 30) hours with IV PCA. Study 4: median time to ambulation using preprogrammed epidural pumps was 20 (range 15.3 to 27.5) hours versus 21 (range 15 to 48) hours with IV PCA.

Reference

Salicath JH, Yeoh ECY, Bennett MH. Epidural analgesia versus patient-controlled intravenous analgesia for pain following intra-abdominal surgery in adults. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art. No.: CD010434. DOI: 10.1002/14651858.CD010434.pub2. Search date September 2017

✓ Population, Intervention, Comparator

Population

Adults (where reported, average age 27 to 77 years; overall 61% women) with pain following intra-abdominal surgery. Trials recruited people with American Society of Anesthesiologists physical status classification (ASA) of I to II (9 RCTs), I to III (10 RCTs), I to IV (1 RCT), or ASA was not reported (5 RCTs). Surgical procedures were unspecified major abdominal, gynecological, colorectal, upper abdominal, urological, pancreatic and hepatic. 23/25 studies specified using general anesthesia which was similar for the two groups. Trials were conducted in Europe (8 RCTs), North America (10 RCTs), China (4 RCTs), the Middle East (2 RCTs), and Australia (1 RCT)

Intervention

Epidural analgesia: level of epidural catheter was thoracic (16 RCTs), lumbar (2 RCTs) either (2 RCTs), or not reported (5 RCTs). Drugs used included bupivacaine or ropivacaine only (1 RCT), an opioid only (6 RCTs), or both (18 RCTs); opioids used were morphine, fentanyl, hydromorphone, diamorphine, pethidine, alfentanil, or sufentanil. Self-administered with a programmable pump or pump preprogramed. Participants received epidural anesthesia intra- and postoperatively for 12 to 72 hours

Comparator

IV PCA: morphine (19 RCTs), pethidine (1 RCT), hydromorphone (2 RCTs), diamorphine (1 RCT), piritramide (1 RCT), or fentanyl and morphine (1 RCT). Self-administered via an IV drip for 12 to 72 hours. Participants received intraoperative epidural anesthesia in six RCTs

Additional Information

DOI:

<https://doi.org/10.1002/cca.2333> [scolaris.information.information.copy.clipboard](https://doi.org/10.1002/cca.2333)

First Published:

06 December 2018

CCA Associate editor: Jane Burch (PhD), Editor, CEU, London, UK.

CCA Associate editor: Agustín Ciapponi (MD, MSc), Family Physician - Researcher, Hospital Italiano de Buenos Aires- Instituto de Efectividad Clínica y Sanitaria (IECS), Buenos Aires, Argentina.

Contact the CCA team at clinicalanswers@cochrane.org.