Intravenous dexamethasone for prophylaxis of postoperative nausea and vomiting after administration of long-acting neuraxial opioids: a systematic review and meta-analysis

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Summary
Long-acting neuraxial opioids provide excellent analgesia after surgery, but are associated with higher rates of postoperative nausea and vomiting. Dexamethasone effectively prevents postoperative nausea and vomiting after general anaesthesia, but its value in patients receiving long-acting neuraxial opioids is undetermined. Therefore, the objective of this meta-analysis was to assess the prophylactic anti-emetic efficacy of intravenous (i.v.) dexamethasone in this population. The study methodology followed the PRISMA statement guidelines. The primary outcome was the need for rescue anti-emetics during the first 24 postoperative hours, analysed according to the dose of dexamethasone (low-dose 2.5–5.0 mg; intermediate dose 6.0–10.0 mg), timing of administration (beginning or end of surgery) and route of long-acting opioid administration (intrathecal or epidural). Additionally, the rates of complications (restlessness, infection, hyperglycaemia) were sought. Thirteen trials were identified, representing a total of 1111 patients. When compared with placebo, intravenous dexamethasone reduced the need for rescue anti-emetics (risk ratio (95% CI) 0.44 (0.35–0.56); \( I^2 = 43\% \); \( p < 0.00001 \); quality of GRADE evidence: moderate), without differences between dexamethasone doses (\( p \) for sub-group difference = 0.67), timing of administration (\( p \) for sub-group difference = 0.32) or route of long-acting opioid (\( p \) for sub-group difference = 0.10). No patients developed infection or restlessness among trials that sought these complications. No trial measured blood glucose levels. In conclusion, there is enough evidence to state that intravenous dexamethasone provides effective anti-emetic prophylaxis during the first 24 postoperative hours in patients who receive long-acting neuraxial opioids.

Introduction
Long-acting neuraxial opioids prolong the duration of sensory block after spinal anaesthesia and provide excellent analgesia after surgery [1]. However, postoperative nausea and vomiting is a frequent side-effect, affecting more than 50% of patients, which has the potential to significantly worsen postoperative recovery [2]. Intravenous (i.v.) dexamethasone is an effective prophylactic
anti-emetic against postoperative nausea and vomiting after general anaesthesia [3], but its efficacy in patients who receive long-acting neuraxial opioids remains undetermined following conflicting results from several randomised controlled trials [4–7]. A previous meta-analysis, limited to female patients, partially addressed this question, but its conclusion was positive only for epidural morphine and interpretation was limited by publication bias detected in the included trials [8]. The broader question of dexamethasone’s overall prophylactic anti-emetic efficacy remains unanswered.

In order to provide more robust and generalisable evidence, we therefore undertook this systematic review and meta-analysis to assess the prophylactic anti-emetic efficacy of i.v. dexamethasone in patients of either sex receiving any long-acting intrathecal or epidural opioids for any surgical procedure.

Methods
This investigation followed the recommended process described in the ‘Preferred Reporting Items for Systematic Reviews and Meta-Analyses’ (PRISMA) statement [9, 10]. We searched the following electronic databases up to April 2017: MEDLINE, Pubmed, Excerpta Medica database (Embase), the Cochrane Central Register of Controlled Clinical Trials (CENTRAL), Web of Science, and Latin American and Caribbean Center on Health Sciences Information (LILACS). No age or language limits were placed on the literature search, details of which are described in the Supporting Information. The search was, however, limited to randomised controlled trials and humans. Finally, the references of all articles retrieved from the search were manually scrutinised for any relevant trials not identified using the strategy described above, and Google Scholar™ was examined for any additional publications.

We aimed to include male or female patients undergoing any surgical operation under neuraxial anaesthesia only, who received long-acting neuraxial opioids. Only trials comparing i.v. dexamethasone with a control group were included in the present meta-analysis. We excluded trials investigating combinations of anti-emetics [11, 12], or administering dexamethasone neuraxially [13].

Extracted trial characteristics included: type of surgery; type of surgical anaesthesia (intrathecal or epidural); type, concentration and volume of neuraxial drugs administered; and dose of i.v. dexamethasone (Table 1). The quality of the research methodology of each randomised trial was assessed following the Cochrane Collaboration’s risk of bias tool for randomised controlled trials [14]. Two authors (SG and IU) independently screened, reviewed and scored the items for each trial using this method and extracted data for the analyses. Disagreements over scoring or extracted data were resolved through discussion with a third author (EA). The specific outcomes sought from each article were derived following our standard approach, which we have described in three previous meta-analyses [15–17]. Initially, the planned primary outcome was the rate of postoperative nausea and vomiting at 24 postoperative hours, but this was changed after initial registration. After reading all included articles, the need for rescue anti-emetics during the first 24 postoperative hours was felt to represent a more robust surrogate of postoperative nausea and vomiting, and was more consistently reported. In addition, the reporting of this outcome permitted broader and more precise sub-group analyses, which allowed us to explore the hypotheses described below. Changes in the protocol are described in the section ‘Revision notes’ within the study registration. Secondary outcomes related to postoperative nausea and vomiting were the rates of: postoperative nausea; postoperative vomiting; or nausea and vomiting combined in the post-anaesthetic care unit and during the first 24 postoperative hours. Additional secondary outcomes were the rate of pruritus during the first 24 postoperative hours, and length of hospital stay. Secondary side-effect-related outcomes were rates of postoperative infection, restlessness and hyperglycaemia. The source study text, tables or graphs were used to extract means, SD, SEM, 95%CI, number of events and total number of participants. In situations where different doses were given, data from all groups were extracted. The authors of trials that failed to report the sample size or results as mean (SD) or 95%CI, were contacted up to three times by electronic mail to supply the missing or raw data. If no reply was obtained, the median, interquartile range (IQR) and range were used...
Table 1 Trial characteristics.

<table>
<thead>
<tr>
<th>Study</th>
<th>Group (n)</th>
<th>Dose of i.v. dexamethasone</th>
<th>Timing of study drug administration</th>
<th>Type of surgery</th>
<th>Surgical anaesthesia</th>
<th>Neuraxial local anaesthetic</th>
<th>Neuraxial opioid, dose, route of administration</th>
<th>Postoperative rescue anti-emetic drug</th>
<th>Primary outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banihashem et al. [4]</td>
<td>Dexamethasone (25), Saline (27)</td>
<td>8 mg</td>
<td>Beginning of surgery</td>
<td>Caesarean section</td>
<td>Spinal</td>
<td>Lidocaine 7.5 mg</td>
<td>Meperidine 25 mg, intrathecally</td>
<td>Not specified</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Cardoso et al. [27]</td>
<td>Dexamethasone (35), Saline (39)</td>
<td>10 mg</td>
<td>Beginning of surgery</td>
<td>Caesarean section</td>
<td>Spinal</td>
<td>Hyperbaric bupivacaine 15 mg</td>
<td>Morphine 60 µg, intrathecally</td>
<td>Not specified</td>
<td>Rate of PONV at 24 postoperative hours</td>
</tr>
<tr>
<td>Ho et al. [5]</td>
<td>Dexamethasone 2.5 mg (43), Dexamethasone 5 mg (42), Dexamethasone 10 mg (44), Saline (43)</td>
<td>2.5 mg, 5 mg, 10 mg</td>
<td>End of surgery</td>
<td>Total abdominal hysterectomy</td>
<td>Epidural</td>
<td>Lidocaine 2% with adrenaline 10 µg.ml⁻¹, 0.3 ml.kg⁻¹</td>
<td>Morphine 3 mg, epidurally</td>
<td>Intravenous ondansetron</td>
<td>Rate of PONV at 24 postoperative hours</td>
</tr>
<tr>
<td>Kadur et al. [28]</td>
<td>Dexamethasone (40), Saline (40)</td>
<td>0.1 mg.kg⁻¹, maximum 8 mg</td>
<td>Beginning of surgery</td>
<td>Lower limb orthopaedic surgery</td>
<td>Spinal</td>
<td>Hyperbaric bupivacaine 15 mg</td>
<td>Meperidine 15 mg, intrathecally</td>
<td>Intravenous ondansetron</td>
<td>Pain scores at 6 postoperative hours</td>
</tr>
<tr>
<td>Movafegh et al. [29]</td>
<td>Dexamethasone (29), Saline (28)</td>
<td>0.1 mg.kg⁻¹, maximum 8 mg</td>
<td>Beginning of surgery</td>
<td>Inguinal herniorrhapry</td>
<td>Spinal</td>
<td>Hyperbaric bupivacaine 15 mg</td>
<td>Meperidine 15 mg, intrathecally</td>
<td>Not specified</td>
<td>Pain scores at 24 postoperative hours</td>
</tr>
<tr>
<td>Nortcliffe et al. [6]</td>
<td>Dexamethasone (30), Saline (30)</td>
<td>8 mg</td>
<td>End of surgery</td>
<td>Caesarean section</td>
<td>Combined spinal epidural</td>
<td>Hyperbaric bupivacaine 10 mg, intrathecally; intra-operative lidocaine 60-100 mg epidurally as needed</td>
<td>Fentanyl 10 µg and morphine 0.2 mg, both intrathecally</td>
<td>Intramuscular prochlorperazine</td>
<td>Rate of PONV at 24 postoperative hours</td>
</tr>
<tr>
<td>Tzeng et al. [7]</td>
<td>Dexamethasone (38), Saline (37)</td>
<td>8 mg</td>
<td>End of surgery</td>
<td>Caesarean section</td>
<td>Epidural</td>
<td>Lidocaine 2% with adrenaline 10 µg.ml⁻¹, 15-18 ml</td>
<td>Morphine 3 mg, epidurally</td>
<td>Intravenous metoclopramide</td>
<td>Need for rescue anti-emetics at 24 postoperative hours</td>
</tr>
<tr>
<td>Tzeng et al. [30]</td>
<td>Dexamethasone (38), Saline (38)</td>
<td>5 mg</td>
<td>End of surgery</td>
<td>Total abdominal hysterectomy</td>
<td>Epidural</td>
<td>Lidocaine 2% with adrenaline 10 µg.ml⁻¹, 0.3 ml.kg⁻¹</td>
<td>Morphine 3 mg, epidurally</td>
<td>Intravenous ondansetron</td>
<td>Rate of PONV at 24 postoperative hours</td>
</tr>
<tr>
<td>Wang et al. [31]</td>
<td>Dexamethasone (38), Saline (38)</td>
<td>8 mg</td>
<td>End of surgery</td>
<td>Total abdominal hysterectomy</td>
<td>Epidural</td>
<td>Lidocaine 2% with adrenaline 10 µg.ml⁻¹, 0.3 ml.kg⁻¹</td>
<td>Morphine 3 mg, epidurally</td>
<td>Intravenous metoclopramide</td>
<td>Rate of PONV at 24 postoperative hours</td>
</tr>
<tr>
<td>Wang et al. [32]</td>
<td>Dexamethasone 2.5 mg (44), Dexamethasone 5 mg (44), Dexamethasone 10 mg (43), Saline (44)</td>
<td>2.5 mg, 5 mg, 10 mg</td>
<td>End of surgery</td>
<td>Caesarean section</td>
<td>Epidural</td>
<td>Lidocaine 2% with adrenaline 10 µg.ml⁻¹, 0.3 ml.kg⁻¹</td>
<td>Morphine 3 mg, epidurally</td>
<td>Intravenous ondansetron</td>
<td>Rate of PONV at 24 postoperative hours</td>
</tr>
<tr>
<td>Wang et al. [33]</td>
<td>Dexamethasone (39), Saline (37)</td>
<td>5 mg</td>
<td>End of surgery</td>
<td>Total abdominal hysterectomy</td>
<td>Epidural</td>
<td>Lidocaine 2% with adrenaline 10 µg.ml⁻¹, 0.3 ml.kg⁻¹</td>
<td>Morphine 3 mg, epidurally</td>
<td>Intravenous droperidol</td>
<td>Rate of PONV at 24 postoperative hours</td>
</tr>
<tr>
<td>Wu et al. [35]</td>
<td>Dexamethasone (42), Saline (42)</td>
<td>10 mg</td>
<td>End of surgery</td>
<td>Lower abdominal surgery</td>
<td>Epidural</td>
<td>Unspecified</td>
<td>Morphine 2 mg, epidurally</td>
<td>Not specified</td>
<td>Unspecified</td>
</tr>
<tr>
<td>Wu et al. [34]</td>
<td>Dexamethasone (30), Saline (30)</td>
<td>8 mg</td>
<td>Beginning of surgery</td>
<td>Caesarean section</td>
<td>Spinal</td>
<td>Hyperbaric bupivacaine 10 mg</td>
<td>Morphine 0.2 mg, epidurally</td>
<td>Intravenous ondansetron</td>
<td>Rate of PONV at 24 postoperative hours</td>
</tr>
</tbody>
</table>

i.v., intravenous; PONV, postoperative nausea and vomiting.
for mean (SD), as follows: the mean was estimated as equivalent to the median, and the SD was approximated by the IQR divided by 1.35, or the range divided by four [18]. Finally, we rated the quality of evidence for each outcome following the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) Working Group system [19].

Meta-analyses were performed with the assistance of Review Manager software (RevMan version 5.3.5; Copenhagen, The Nordic Cochrane Centre, The Cochrane Collaboration 2014). This software estimates the weighted mean differences (MD) for continuous data and the risk ratio for categorical data between groups, with an overall estimate of the pooled effect. The coefficient $I^2$ was used to evaluate heterogeneity with predetermined thresholds for low (25–49%), moderate (50–74%) and high (>75%) levels [20]. A random effects model was applied in case of moderate or high heterogeneity; otherwise a fixed effect model was used [21]. Our primary outcome, need for rescue anti-emetics during the first 24 postoperative hours, was analysed according to the dose of dexamethasone (low-dose 2.5–5.0 mg; intermediate dose 6.0–10.0 mg), timing of administration (beginning or end of surgery) and route of long-acting opioid injection (intrathecal or

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**Figure 1** PRISMA flow diagram showing literature search results.
epidural) to account for heterogeneity. A sub-group anal-
ysis was performed to assess the impact of the total dose
of i.v. dexamethasone on the need for rescue anti-emetics
during the first 24 postoperative hours, using the JMP 9
statistical package (SAS Institute, Cary, NC, USA). The
likelihood of publication bias was assessed by drawing a
funnel plot [22] and confirmed with Duval and Tweedie's
trim and fill test [23]. This assessment was performed
using Comprehensive Meta-analysis Version 2 software
(Biostat, Englewood, NJ, USA). Finally, a trial sequential
analysis was executed on primary outcomes to confirm
whether firm evidence was reached or not (TSA software
version 0.9.5.5 Beta; Copenhagen Trial Unit, Center for
Clinical Intervention Research, Rigshospitalet, Copen-
hagen, Denmark) [24–26]. As the trial sequential analysis
approach was initially designed for trials with low risk of
bias and does not adjust for risk of bias, we repeated the
analysis after excluding trials where most of the seven
domains within the Cochrane Collaboration’s Risk of
Bias Tool were rated as being at ‘high’ or ‘unclear’ risk of
bias. Results are presented as relative risk (RR) or MD
(95%CI). A two-sided p < 0.05 was considered signi-
ificant.

Results
From the literature search strategy, 379 citations were
identified, 13 of which met the inclusion criteria, repre-
senting a total of 1111 patients (Fig. 1) [4–7, 27–35].
According to our assessment following the Cochrane
Collaboration Risk of Bias Tool (Fig. 2), the majority of
trials had a moderate to high risk of bias. Disagreements
between authors either over bias scoring or extracted
data occurred for four articles and were resolved after
discussion with the third author [4, 27, 28, 32]. Attempts
were made to contact three authors [6, 27, 34] but none
provided the additional data requested.

Table 1 presents the trial characteristics of six trials
which included patients scheduled for caesarean section
[4, 6, 7, 27, 32, 34] and in four trials, patients were
scheduled for total abdominal hysterectomy [5, 30, 31,
33]. The three remaining trials included patients who
underwent lower limb surgery [28], inguinal herniorrho-
phy [29] and lower abdominal surgery [35]. Five groups
of authors administered i.v. dexamethasone at the begin-
ing of surgery [4, 27–29, 34] and eight at the end [5–7,
30–33, 35]. Low (2.5–5 mg) and intermediate (6–10 mg)
doses were injected in 4 [5, 30, 32, 33] and 11
trials [4–7, 27–29, 31, 32, 34, 35], respectively; two trials
investigated several doses of dexamethasone [5, 32].
Three trials used intrathecal morphine [27, 34], three
injected intrathecal meperidine [4–7, 28, 34, 35], and seven stud-
ied the epidural route [5, 7, 30–33, 35].

Intravenous dexamethasone significantly reduced
the need for rescue anti-emetics during the first 24
postoperative hours, and there was no difference between low and intermediate doses (Fig. 3). The meta-regression showed no evidence of correlation between the i.v. doses administered or the risk ratio ($r^2 = 0.07$; $p = 0.01$; Fig. 4). A sub-group analysis by timing of administration showed that the risk ratios (95%CI) were 0.27 (0.10–0.74) and 0.46 (0.35–0.56) when dexamethasone was administered at the beginning or the end of surgery, respectively ($p$ for sub-group difference = 0.32). Intravenous dexamethasone was effective regardless of the route of long-acting opioid administration, with the RR (95%CI) for intrathecal being and for epidural 0.61 (0.40–0.91); $I^2 = 79$%; $p = 0.02$] 0.40 (0.30–0.53); $I^2 = 0$%; $p < 0.0001$; $p$ for sub-group difference = 0.10). The trial sequential analysis indicated that firm evidence was reached and that i.v. dexamethasone was superior to placebo (Fig. 5). This was further confirmed through a repeated analysis after removing trials at high risk of bias [5, 28, 32, 33]. With regard to the funnel plot for our primary outcome, the Duval and Tweedie’s trim and fill test revealed the point estimates (95%CI) for the combined studies to be 0.34 (0.25–0.48), suggesting that no studies are missing. The quality of evidence for our primary outcome was moderate according to the GRADE working system.

Table 2 summarises the primary and secondary outcomes, together with the GRADE quality of evidence.
evidence assessments. All data are based on a fixed effect model, except for hospital length of stay. With respect to the GRADE assessments, we rated down by two levels for limitations and rated up for a large effect size, where present. Intravenous dexamethasone significantly reduced the rates of postoperative nausea, postoperative vomiting, and postoperative nausea and vomiting combined, at 24 h postoperatively (see Supporting Information, Table S1), without affecting the length of hospital stay (three trials [5, 30, 32]: MD (95%CI) –0.14 (–0.66 to 0.37); I² = 90; p = 0.59).

Based on eight trials [4, 6, 7, 28, 29, 31, 33, 34], i.v. dexamethasone did not reduce the rate of pruritus at 24 postoperative hours, with a risk ratio (95%CI) of 0.89 (0.76–1.05), I² = 0%, p = 0.17. Among trials that recorded postoperative infections [4, 5, 7, 30, 32, 34] or restlessness at 24 postoperative hours [4, 7, 28, 30, 32, 34], no patients developed these complications and therefore no statistical analysis could be performed. Finally, none of the trials measured blood glucose levels.

**Discussion**

This systematic review and meta-analysis investigated the prophylactic anti-emetic efficacy of i.v. dexamethasone in patients of both sexes receiving any long-acting neuraxial opioids for any surgical procedure. Based on 13 randomised controlled trials, including a total of 1111 patients, our results show that i.v. dexamethasone reduces the need for rescue anti-emetics during the first 24 postoperative hours, along with the rates of postoperative nausea, postoperative vomiting, and postoperative nausea and vomiting combined, at 24 postoperative hours. Dexamethasone has anti-emetic

![Figure 5](image_url)

**Figure 5** Trial sequential analysis on the need for rescue anti-emetics during the first 24 postoperative hours. The cumulative Z-curve (blue) crosses the monitoring boundary curve (red) and reaches the required information size, indicating firm evidence that intravenous dexamethasone is superior to placebo for this outcomes.
Table 2 Summary of findings. Values are number of events/number of patients

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Limitations</th>
<th>RR (95%CI) or MD (95%CI)</th>
<th>p value for overall effect</th>
<th>Quality of evidence (GRADE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need for rescue anti-emetics during the first 24 postoperative hours</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>0.44 (0.35–0.56)</td>
<td>&lt; 0.00001</td>
<td>Moderate quality due to limitations</td>
</tr>
<tr>
<td>Rate of postoperative nausea in post-anaesthetic care unit</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>0.42 (0.25–0.72)</td>
<td>0.001</td>
<td>Low quality due to limitations and imprecision</td>
</tr>
<tr>
<td>Rate of postoperative vomiting in post-anaesthetic care unit</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>0.48 (0.28–0.82)</td>
<td>0.008</td>
<td>Low quality due to limitations and imprecision</td>
</tr>
<tr>
<td>Rate of PONV in post-anaesthetic care unit</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>0.87 (0.50–1.49)</td>
<td>0.61</td>
<td>Very low quality due to limitations and imprecision</td>
</tr>
<tr>
<td>Rate of nausea at 24 postoperative hours</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>0.45 (0.37–0.55)</td>
<td>&lt; 0.00001</td>
<td>Moderate quality due to limitations</td>
</tr>
<tr>
<td>Rate of vomiting at 24 postoperative hours</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>0.43 (0.34–0.54)</td>
<td>&lt; 0.00001</td>
<td>Moderate quality due to limitations</td>
</tr>
<tr>
<td>Rate of PONV at 24 postoperative hours</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>0.42 (0.35–0.51)</td>
<td>&lt; 0.00001</td>
<td>Moderate quality due to limitations</td>
</tr>
<tr>
<td>Rate of pruritus at 24 postoperative hours</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>0.89 (0.76–1.05)</td>
<td>0.17</td>
<td>Low quality due to limitations and imprecision</td>
</tr>
<tr>
<td>Hospital length of stay; days</td>
<td>Blinding of participants, personnel and outcome assessor unclear in most studies</td>
<td>−0.14 (−0.66 to 0.37)</td>
<td>0.59</td>
<td>Low quality due to limitations and imprecision</td>
</tr>
</tbody>
</table>

No trials reported rate of postoperative infection, rate of restlessness or blood glucose. 
PONV, postoperative nausea and vomiting. *value is number of patients
properties regardless of whether it is administered at the beginning or at the end of surgery. It is effective in patients who receive long-acting opioids via the epidural as well as the intrathecal route. Despite the low likelihood of publication bias, we judged the GRADE evidence as moderate because of the unclear blinding of participants, personnel and outcome assessors in most studies.

The sub-group analysis showed that there was no difference between low doses and intermediate doses of dexamethasone; this was further confirmed by meta-regression. In dose-finding studies, two groups of authors have suggested that a ceiling effect is reached with a dose of 5 mg, whereas a dose of 2.5 mg is only partially effective [5, 32]. Nonetheless, as dexamethasone at a dose above 0.1 mg kg⁻¹ confers an anti-inflammatory and an analgesic effect [36], administering an intermediate dose of 6–10 mg to patients receiving long-acting neuraxial opioids seems reasonable. This approach should be balanced against the knowledge that these doses may increase postoperative glucose levels by a mean of 1.3 mmol l⁻¹ and 3.7 mmol l⁻¹ in non-diabetic and diabetic patients, respectively [37].

Several limitations should be considered during interpretation of this meta-analysis. Although we attempted to explore the anti-emetic effect of dexamethasone in the post-anaesthetic care unit, only a limited number of trials sought outcomes related to postoperative nausea and vomiting during this time period. Also, although the coefficient of heterogeneity was low, many included trials suffered from unsatisfactory methodology, with high or unknown risk of selection bias (the absence of proper random sequence generation and allocation concealment) and performance bias (improper blinding of participants and personnel). Despite these concerns, our second trial sequential analysis performed after removing trials with high or unknown risk of bias confirmed the results of the initial analysis, indicating that no additional trials investigating this topic are required.

In conclusion, there is adequate evidence to state that i.v. dexamethasone provides effective anti-emetic prophylaxis during the first 24 postoperative hours in patients who receive long-acting neuraxial opioids, with a negligible risk of complications.

Acknowledgements

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Dexamethasone anti-emetic prophylaxis after neuraxial opioids

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Secondary PONV-related outcomes.
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