PEDIATRIC ANESTHESIA

Intraoperative Methadone

Intraoperative teaching · CA-3

THE QUESTION

Where the evidence disagrees

This topic was selected because an evidence synthesis beats a textbook on it: the trials disagree, or the guidance has moved recently.

THE EVIDENCE

What each source contributes, and how strong it is

Study design first — a cohort and a randomised trial do not carry the same weight.

Design	Year	Journal	What it found
Meta-analysis	2020	Pain	Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15
Meta-analysis	2019	Anesthesia and analgesia	Across 13 trials, intraoperative methadone lowered pain at rest and on movement at
Randomised trial	2011	Anesthesia and analgesia	A single 0.2 mg/kg methadone bolus before incision in multilevel spine surgery
Cohort	2026	British journal of anaesthesia	A single induction dose of intravenous methadone did not prolong the QTc
Review	2023	Drugs	Intravenous methadone produces effective postoperative analgesia and lowers opioid
Meta-analysis	2026	Anesthesia and analgesia	A single intraoperative dose of methadone "e0.2 mg/kg results in less postoperative

6 resolved citations behind this deck; every point above traces to one of them.

WHERE THE GUIDANCE SITS

What the guidelines and pooled evidence say

3 findings, each on the slide that follows.

PAIN 2020

Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15

Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15 mg oral morphine equivalents and improved analgesia satisfaction,…

ANESTHESIA AND ANALGESIA 2019

Across 13 trials, intraoperative methadone lowered pain at rest and on movement at

Across 13 trials, intraoperative methadone lowered pain at rest and on movement at 24, 48 and 72 hours and cut opioid consumption, with sequential…

ANESTHESIA AND ANALGESIA 2026

A single intraoperative dose of methadone "e0.2 mg/kg results in less postoperative

A single intraoperative dose of methadone "e0.2 mg/kg results in less postoperative pain and opioid consumption compared to short-acting IV opioids in…

WHERE THE GUIDANCE SITS

Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15

Meta-analysis · Pain

Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15 mg oral morphine equivalents and improved analgesia satisfaction, with no difference in nausea, sedation or respiratory depression.

Intraoperative Methadone Administration and Postoperative Pain Control: A Systematic Review and Meta-Analysis, Pain 2020 · PMID 31613867

WHERE THE GUIDANCE SITS

Across 13 trials, intraoperative methadone lowered pain at rest and on movement at

Meta-analysis · Anesthesia and analgesia

Across 13 trials, intraoperative methadone lowered pain at rest and on movement at 24, 48 and 72 hours and cut opioid consumption, with sequential analysis indicating no further trials are needed for pain at rest to 48 hours.

Intraoperative Methadone Reduces Pain and Opioid Consumption in Acute Postoperative Pain: A Systematic Review and Meta-Analysis, Anesthesia and analgesia 2019 · PMID 31743194

WHERE THE GUIDANCE SITS

A single intraoperative dose of methadone "e0.2 mg/kg results in less postoperative

Meta-analysis · Anesthesia and analgesia

A single intraoperative dose of methadone "e0.2 mg/kg results in less postoperative pain and opioid consumption compared to short-acting IV opioids in adult cardiac surgery patients.

The Use of Methadone in Adult Cardiac Surgery: A Systematic Review With Narrative Synthesis, Anesthesia and analgesia 2026 · PMID 42085333

WHAT THE TRIALS FOUND

A single 0.2 mg/kg methadone bolus before incision in multilevel spine surgery

Randomised trial · Anesthesia and analgesia

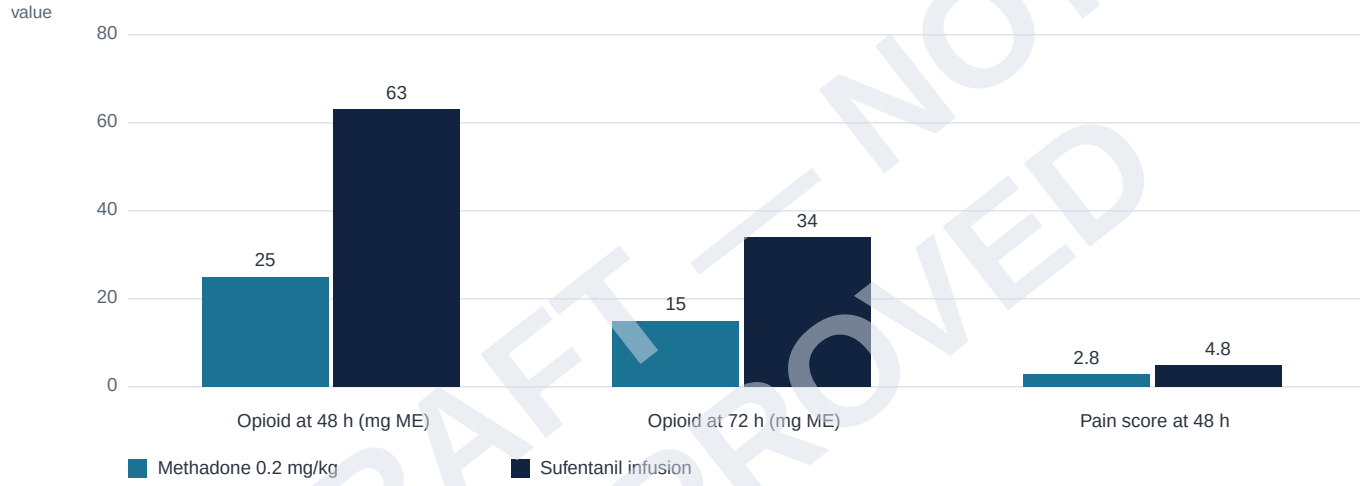
A single 0.2 mg/kg methadone bolus before incision in multilevel spine surgery halved opioid requirement at 48 and 72 hours and halved pain scores at 48 hours versus a sufentanil infusion.

Intraoperative Methadone Improves Postoperative Pain Control in Patients Undergoing Complex Spine Surgery, Anesthesia and analgesia 2011 · PMID 20418538

THE NUMBERS

A single induction dose halved opioid requirement

29 patients, multilevel thoracolumbar fusion.



Half the opioid and half the pain score at 48 hours, from one dose given before incision.

Intraoperative Methadone Improves Postoperative Pain Control in Patients Undergoing Complex Spine Surgery, Anesthesia and analgesia 2011 · PMID 20418538

IN PRACTICE

What the cohorts and reviews add

2 findings, each on the slide that follows.

BRITISH JOURNAL OF ANAESTHESIA 2026

A single induction dose of intravenous methadone did not prolong the QTc

A single induction dose of intravenous methadone did not prolong the QTc: new QTcF above 500 ms occurred in 2.5% with methadone versus 8.3% without,…

DRUGS 2023

Intravenous methadone produces effective postoperative analgesia and lowers opioid

Intravenous methadone produces effective postoperative analgesia and lowers opioid consumption without more adverse effects than other opioids

IN PRACTICE

A single induction dose of intravenous methadone did not prolong the QTc

Cohort · British journal of anaesthesia

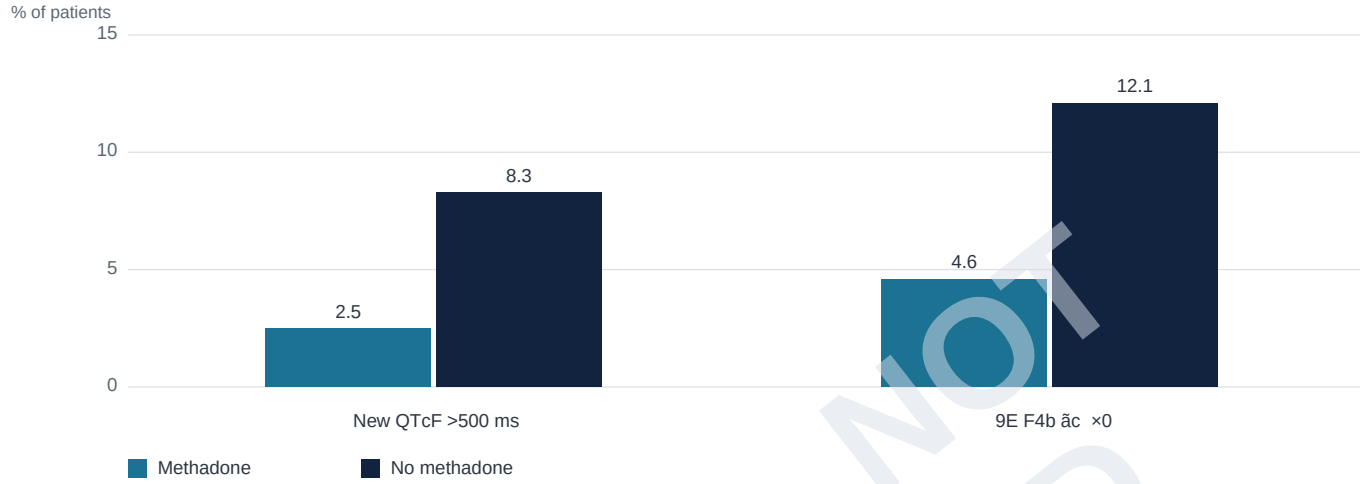
A single induction dose of intravenous methadone did not prolong the QTc: new QTcF above 500 ms occurred in 2.5% with methadone versus 8.3% without, with no correlation between dose and QTcF.

Single-Dose Intraoperative Methadone and QTc Interval: A Prospective Observational Cohort Investigation, British journal of anaesthesia 2026 · PMID 42399190

THE NUMBERS

A single induction dose did not prolong QTc more than fentanyl

547 adults, QTcF measured for an hour after induction.



New QTcF above 500 ms was less common with methadone than without it, and there was no correlation between methadone dose and QTcF.

Single-Dose Intraoperative Methadone and QTc Interval: A Prospective Observational Cohort Investigation, British journal of anaesthesia 2026 · PMID 42399190

IN PRACTICE

Intravenous methadone produces effective postoperative analgesia and lowers opioid

Review · Drugs

Intravenous methadone produces effective postoperative analgesia and lowers opioid consumption without more adverse effects than other opioids, and may have potential to prevent persistent postoperative pain.

Intravenous Methadone for Perioperative and Chronic Cancer Pain: A Review of the Literature, Drugs 2023 · PMID 37308798

IN THE ROOM

What this changes about the next case

Colour is the strength of the evidence behind each step, not the urgency.

1. **1**
   Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15 mg oral morphine equivalents and improved analgesia satisfaction, with no difference in nausea, sedation or respiratory depression.
2. **2**
   Across 13 trials, intraoperative methadone lowered pain at rest and on movement at 24, 48 and 72 hours and cut opioid consumption, with sequential analysis indicating no further trials are needed for pain at rest to 48 hours.
3. **3**
   A single intraoperative dose of methadone "e0.2 mg/kg results in less postoperative pain and opioid consumption compared to short-acting IV opioids in adult cardiac surgery patients.
4. **4**
   A single 0.2 mg/kg methadone bolus before incision in multilevel spine surgery halved opioid requirement at 48 and 72 hours and halved pain scores at 48 hours versus a sufentanil infusion.

5

5

A single induction dose of intravenous methadone did not prolong the QTc: new QTcF above 500 ms occurred in 2.5% with methadone versus 8.3% without, with no correlation between dose and QTcF.

KEY TAKEAWAYS

What to carry into the next case

> **Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15**
> Pain 2020

> **Across 13 trials, intraoperative methadone lowered pain at rest and on movement at**
> Anesthesia and analgesia 2019

> **A single 0.2 mg/kg methadone bolus before incision in multilevel spine surgery**
> Anesthesia and analgesia 2011

> **A single induction dose of intravenous methadone did not prolong the QTc**
> British journal of anaesthesia 2026

Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15

QUESTIONS I'LL ASK YOU IN THE ROOM

1. How would you teach this to a CA-1 in two minutes?
2. Where does the evidence for this actually stop?
3. What would you do differently in a resource-limited setting?
4. Defend the alternative you decided against.

ORAL BOARDS STEM

> *A 55-year-old is having a posterior spinal fusion at four levels. The attending suggests a single intraoperative dose of methadone at induction instead of intermittent hydromorphone.*

BOARD QUESTIONS

1. In the randomised comparison of intraoperative methadone with a sufentanil infusion in patients undergoing complex multilevel spine surgery, state the methadone dose and when it was given, and state what happened to opioid requirement and to pain scores afterwards.
2. A resident is reluctant to give intraoperative methadone because of the sedation and respiratory depression they expect from a long-acting opioid. Using the pooled data from the ten-study meta-analysis of intraoperative methadone, state how large the analgesic benefit actually was and what the pooled data showed about those side effects.
3. Methadone is often avoided intraoperatively over QT concerns. In the prospective observational cohort of single-dose intraoperative methadone, what happened to the QTc, what were the rates of a new QTcF above 500 ms with and without methadone, and was there any relationship between the dose given and the QTcF?
4. A resident cites the 13-trial meta-analysis of intraoperative methadone and says the sequential analysis proves the question is settled and no more research is needed. Name the outcomes and time points the meta-analysis actually reported, then state exactly which single outcome and time window the sequential analysis declared needed no further trials.

ANSWER KEY

1. A single methadone bolus of 0.2 mg/kg was given before incision. Compared with a sufentanil infusion it halved opioid requirement at 48 and 72 hours and halved pain scores at 48 hours.

One 0.2 mg/kg dose before incision is the regimen behind the halved opioid requirement at 48 and 72 hours in this multilevel spine trial.

Intraoperative Methadone Improves Postoperative Pain Control in Patients Undergoing Complex Spine Surgery, Anesthesia and analgesia 2011 · PMID 20418538

2. Pooled across ten studies, methadone reduced 24-hour opioid consumption by only about 15 mg oral morphine equivalents and improved analgesia satisfaction. There was no difference in nausea, sedation or respiratory depression, so the feared side effects did not appear in the pooled data — but the analgesic effect size is modest, about 15 mg of oral morphine equivalents over 24 hours.

The pooled signal is a modest 15 mg oral morphine equivalent reduction with better satisfaction and no excess nausea, sedation or respiratory depression.

Intraoperative Methadone Administration and Postoperative Pain Control: A Systematic Review and Meta-Analysis, Pain 2020 · PMID 31613867

3. A single induction dose of intravenous methadone did not prolong the QTc. A new QTcF above 500 ms occurred in 2.5% of patients who received methadone versus 8.3% of those who did not, and there was no correlation between dose and QTcF. Because this is a prospective observational cohort, it shows no observed QTc prolongation rather than proving methadone is safe in any given patient.

In this observational cohort a single induction dose did not prolong the QTc, and new QTcF above 500 ms was actually less frequent with methadone than without it — 2.5% versus 8.3%.

Single-Dose Intraoperative Methadone and QTc Interval: A Prospective Observational Cohort Investigation, British journal of anaesthesia 2026 · PMID 42399190

4. The meta-analysis reported that across 13 trials intraoperative methadone lowered pain at rest and on movement at 24, 48 and 72 hours and cut opioid consumption. The sequential analysis indicated no further trials are needed only for pain at rest out to 48 hours. That closure statement does not extend to pain on movement, to the 72-hour time point, or to opioid consumption.

The sequential analysis closes exactly one cell of that table — pain at rest to 48 hours — and says nothing about pain on movement, 72 hours, or opioid consumption.

Intraoperative Methadone Reduces Pain and Opioid Consumption in Acute Postoperative Pain: A Systematic Review and Meta-Analysis, Anesthesia and analgesia 2019 · PMID 31743194

Pooled across ten studies, methadone reduced 24-hour opioid consumption by about 15

SOURCES

[1] Intraoperative Methadone Administration and Postoperative Pain Control: A Systematic Review and Meta-Analysis, Pain 2020 · PMID 31613867

[2] Intraoperative Methadone Reduces Pain and Opioid Consumption in Acute Postoperative Pain: A Systematic Review and Meta-Analysis, Anesthesia and analgesia 2019 · PMID 31743194

[3] Intraoperative Methadone Improves Postoperative Pain Control in Patients Undergoing Complex Spine Surgery, Anesthesia and analgesia 2011 · PMID 20418538

[4] Single-Dose Intraoperative Methadone and QTc Interval: A Prospective Observational Cohort Investigation, British journal of anaesthesia 2026 · PMID 42399190

[5] Intravenous Methadone for Perioperative and Chronic Cancer Pain: A Review of the Literature, Drugs 2023 · PMID 37308798

[6] The Use of Methadone in Adult Cardiac Surgery: A Systematic Review With Narrative Synthesis, Anesthesia and analgesia 2026 · PMID 42085333