Methadone in Anesthesia Care

KIMBERLY WESTRA DNP, MSN, MBA

Methadone “Polamidon”

- Methadone was developed in 1937 in Germany by scientists looking for a synthetic opioid that could be created with readily available precursors, to solve Germany's opium and morphine shortage during WW2
- September 1941 Bockmühl & Ehrhart filed an application for a patent for a synthetic substance they called “Polamidon” (a name still in regular use in Germany)
- WW2 Treatment for War Injuries

Methadone: The “New Drug” for WW2

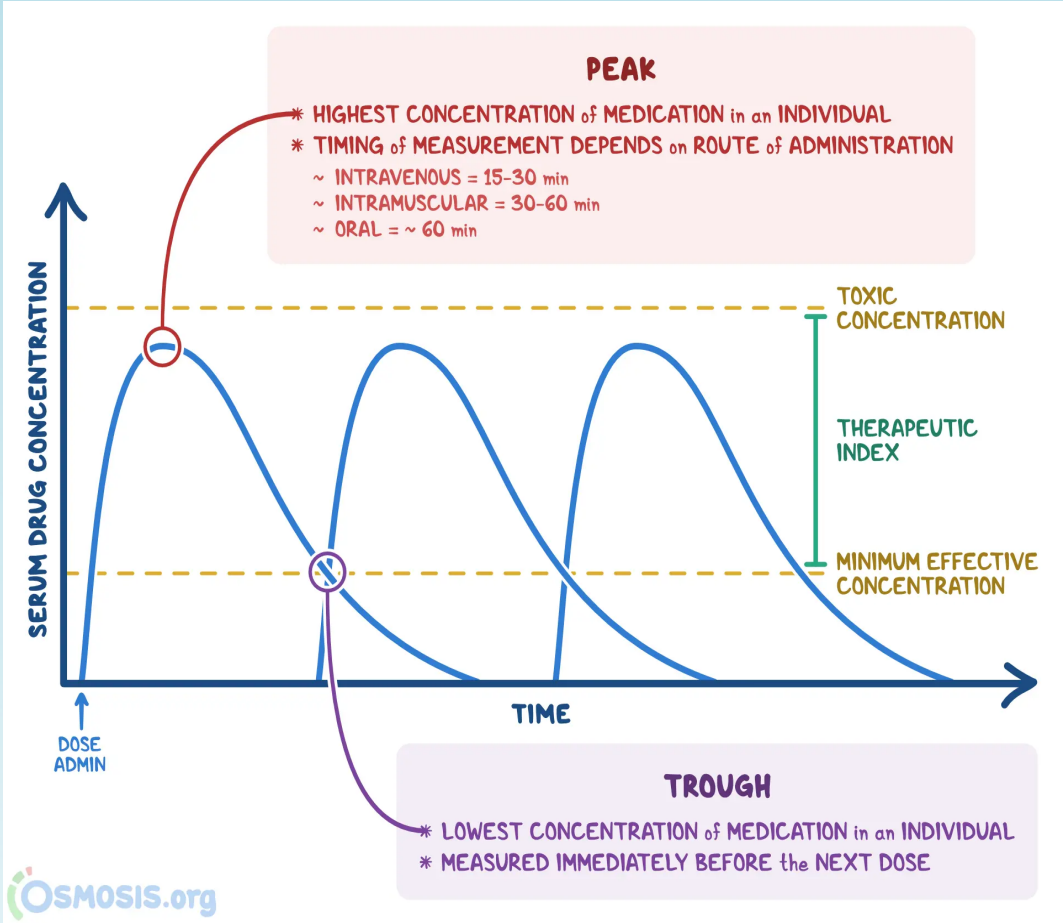
- The “New Drug” structure had little relation to morphine or other "true opiates" such as diamorphine (Heroin), desomorphine (Permonid), nicomorphine (Vilan), codeine, dihydrocodeine, oxymorphone (Opana), hydromorphone (Dilaudid), oxycodone (OxyContin), hydrocodone (Dicodid), and other closely related opium alkaloid derivatives and analogues
- Methadone (Polamidon) was brought to market in 1943 and was widely used by the German army during WWII as a substitute for morphine

Anesthesia Pain Management Trends

- Anesthesia care trend in the past few decades towards multimodal pain management
- Trends towards the use of opioids with shorter half-lives and duration of effect, such as fentanyl and remifentanil
- Following intraoperative care patients are then often transitioned to agents with longer half-lives (hydromorphone, morphine) for postoperative pain management
- The longer acting postoperative opioids are delivered either via intermittent injection or through a patient-controlled analgesia (PCA) device

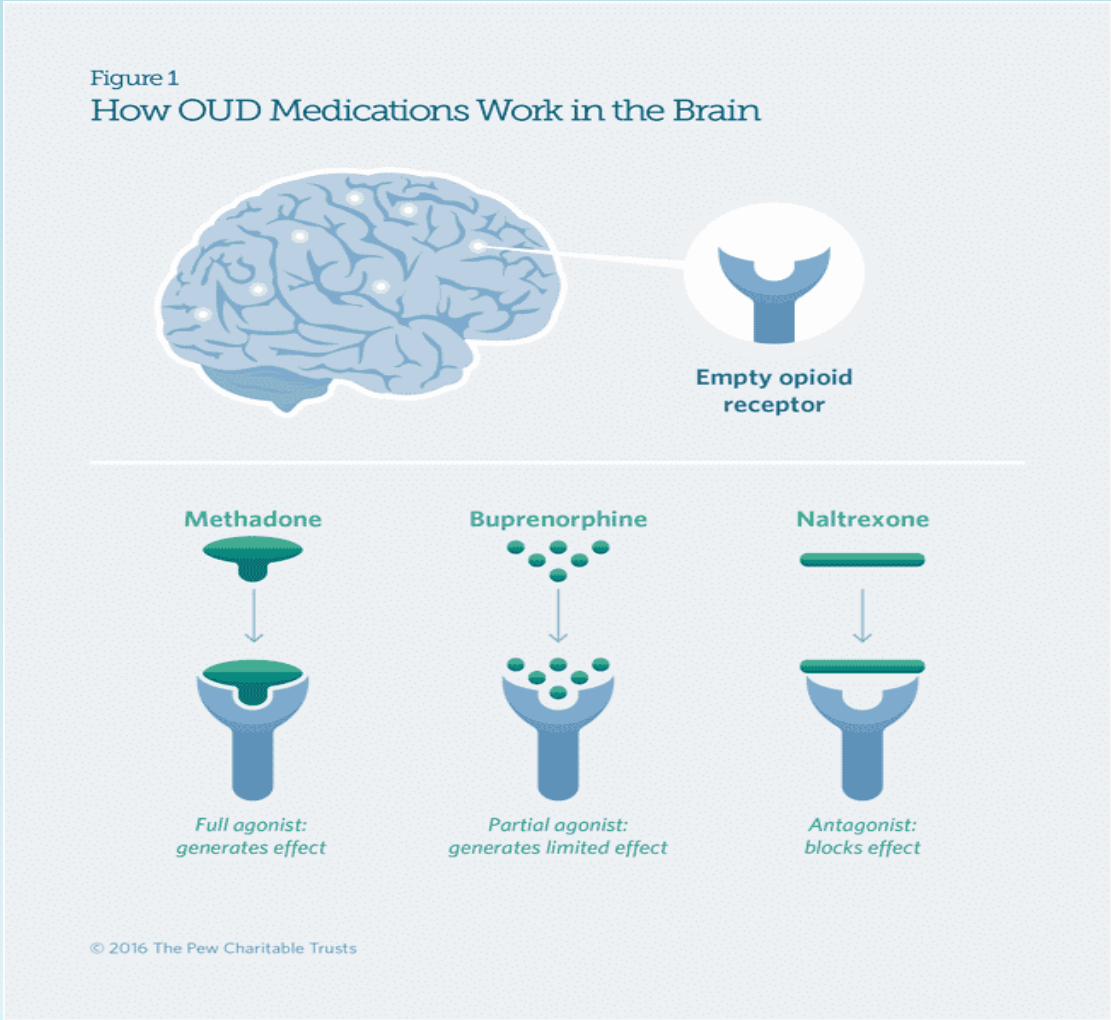
Pain Management Peaks & Valleys

- This approach to pain management results in significant fluctuations in serum opioid concentrations
- The fluctuation in opioid blood levels can inadequate analgesia for example the PCA cycle (pain & activation of the PCA) to overdosage and respiratory depression
- The “Opioid peaks and valleys” of pain control that occur with intermittent narcotic administration may explain why a large percentage of surgical patients report moderate-to-severe pain during postoperative day 1-3



Methadone & Medication Assist Therapy

- Methadone has a number of unique properties compared with other opioid analgesics, which give it an increasing role in the perioperative period
- Methadone one of the most extensively studied drugs in medicine with over 15,000 PubMed citations
- Methadone is primarily recognized and studied as a replacement treatment for heroin addiction
- Alternative Medication Assisted Therapy (MAT)

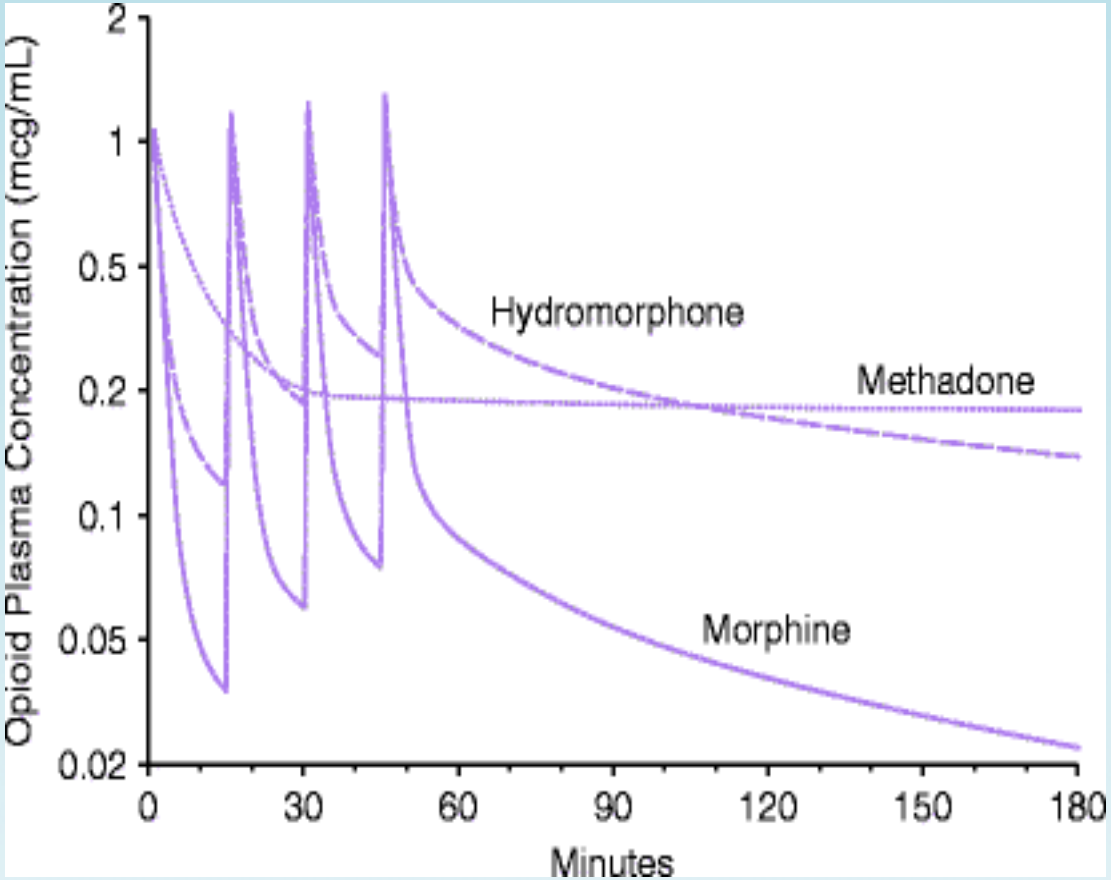


Methadone & Fun Facts

- Dolophine, Symoron, Amidone, Methadose, Physeptone, Metadon, Metadol, Metadol-D, Heptanon and Heptadon
- Oral Methadone $0.25-2.50 depending upon dose (10mg-50mg)
- IV Methadone $445 per 20ml vial (10mg/ml)
- Highly regulated in US for treatment of opioid use disorder (OUD)
- Medication Assisted Treatment MAT also referred to as MMT Methadone Management Therapy

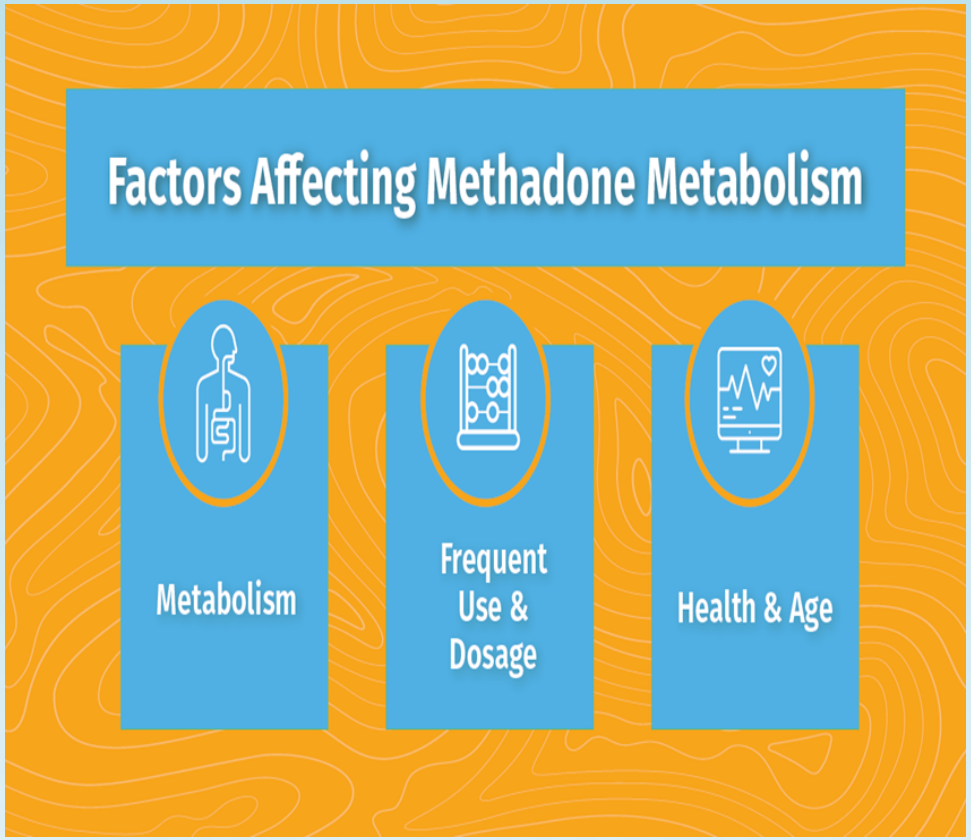
Methadone Basics: Plasma Concentrations

- Methadone is a synthetic opioid properties produce analgesia, sedation, plus suppresses opioid withdrawal symptoms (MAT)
- Methadone has fewer active metabolites than other opioids, so higher doses are less likely to cause delirium, hyperalgesia, or seizures
- Methadone's long half-life (8–60 hours) & slow metabolism thus longer-term analgesia than morphine



Methadone & Perioperative Pain Management

- Postoperative pain continues to be a challenge for anesthesia providers
- Multimodal pain management & implementation of novel analgesic strategies
- Still more than 50% of patients experience moderate-to-severe pain, even after “minor” surgical procedures
- Methadone is associated with Social Stigmatism related to use in MAT therapy for Substance Use Disorder/ Opioid Use Disorder

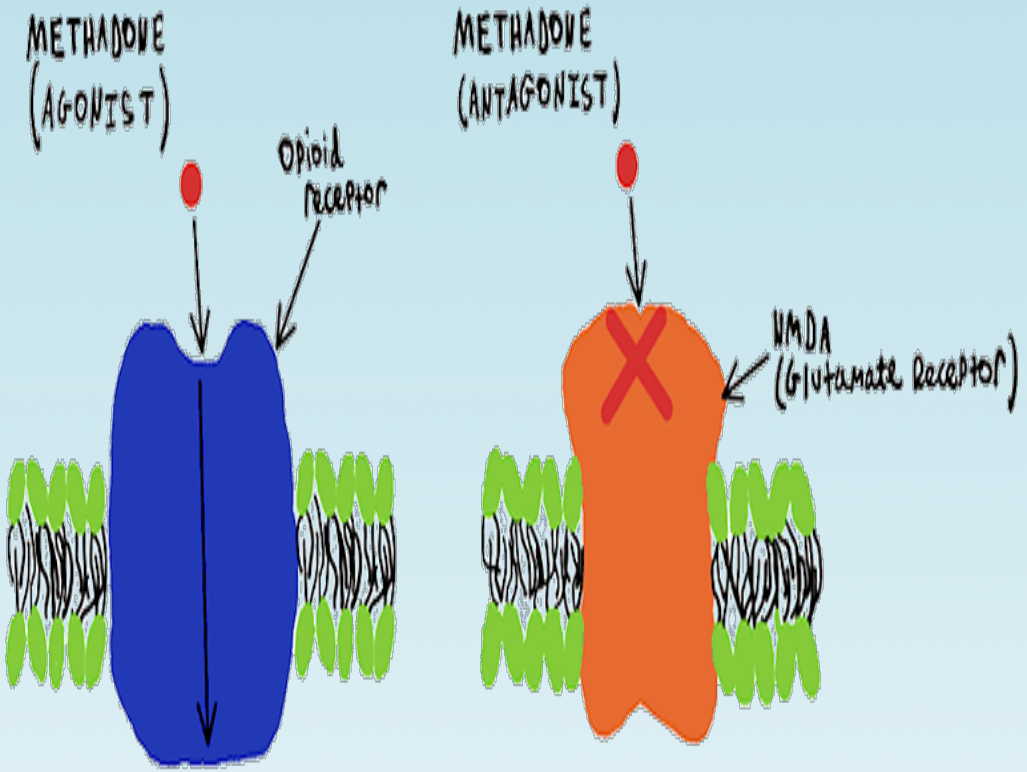


Methadone Role in Anesthesia Care

- Perioperative anesthesia medicine targets use of less intraoperative opioid, diminish postoperative pain & opioid
- Perioperative Medicine must act as **“stewards of opioid use”** prescription: promoting reduction of post discharge opioid prescribing/ scripts
- Methadone use in anesthesia intraoperatively compared with short-duration opioids (fentanyl) results in less pain, less postoperative opioid use & greater patient satisfaction

Methadone & Anesthesia

- Methadone is a potent μ-receptor agonist with the longest elimination half-life of the clinically used opioids
- Methadone is an alternative opioid with a **long half-life that provides stable blood concentrations after a single intraoperative dose**
- Methadone **does not have the fluctuations associated with repeated injections of high clearance agents like morphine or hydromorphone**

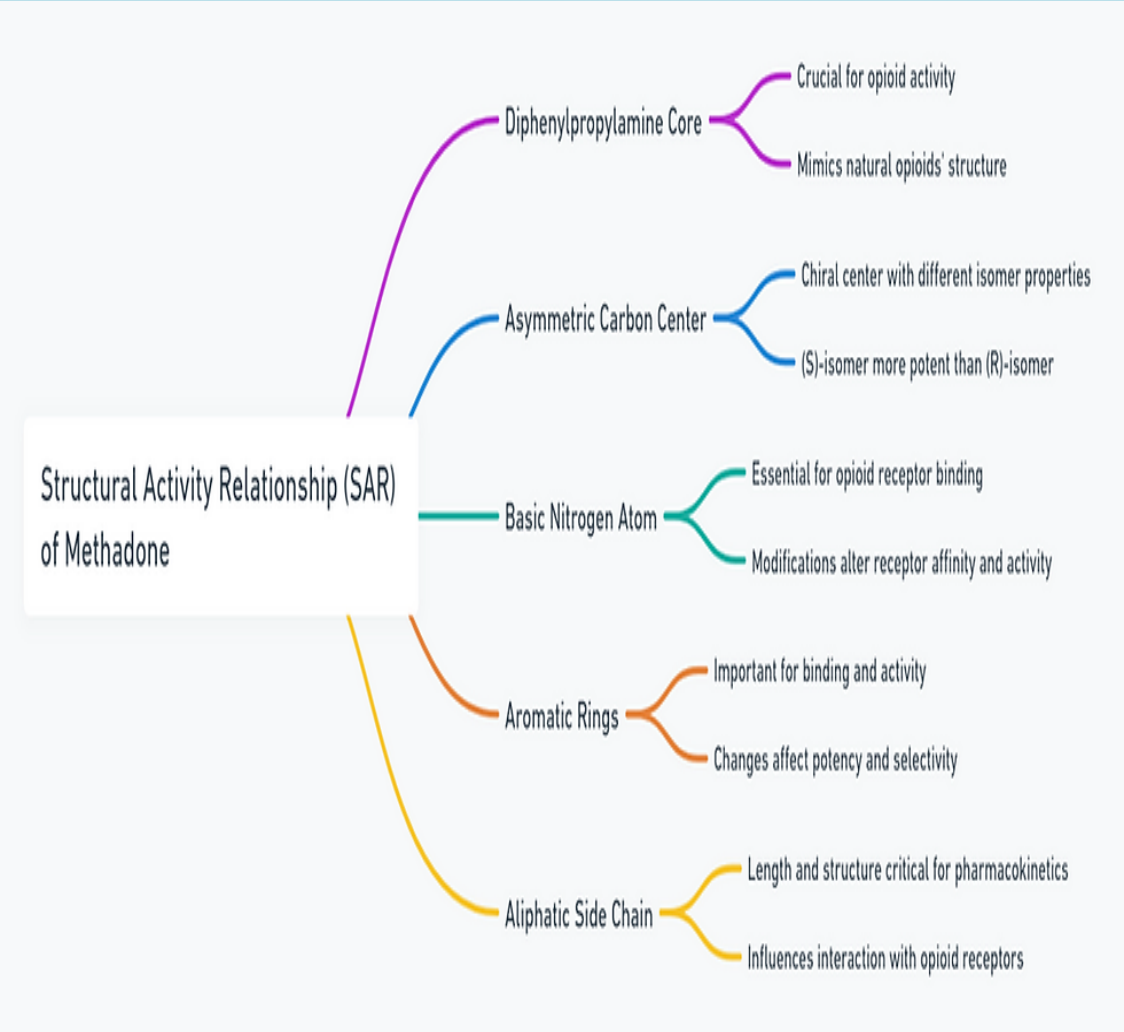


Methadone Characteristics

- Methadone is an opioid that possesses several unique properties that may be advantageous in patients undergoing surgical procedures
- Methadone has a longer elimination half-life
- Methadone **inhibits the reuptake of the neurotransmitters: serotonin and norepinephrine in the brain thus may potentially provide a *mood elevation effect* in the postoperative period**

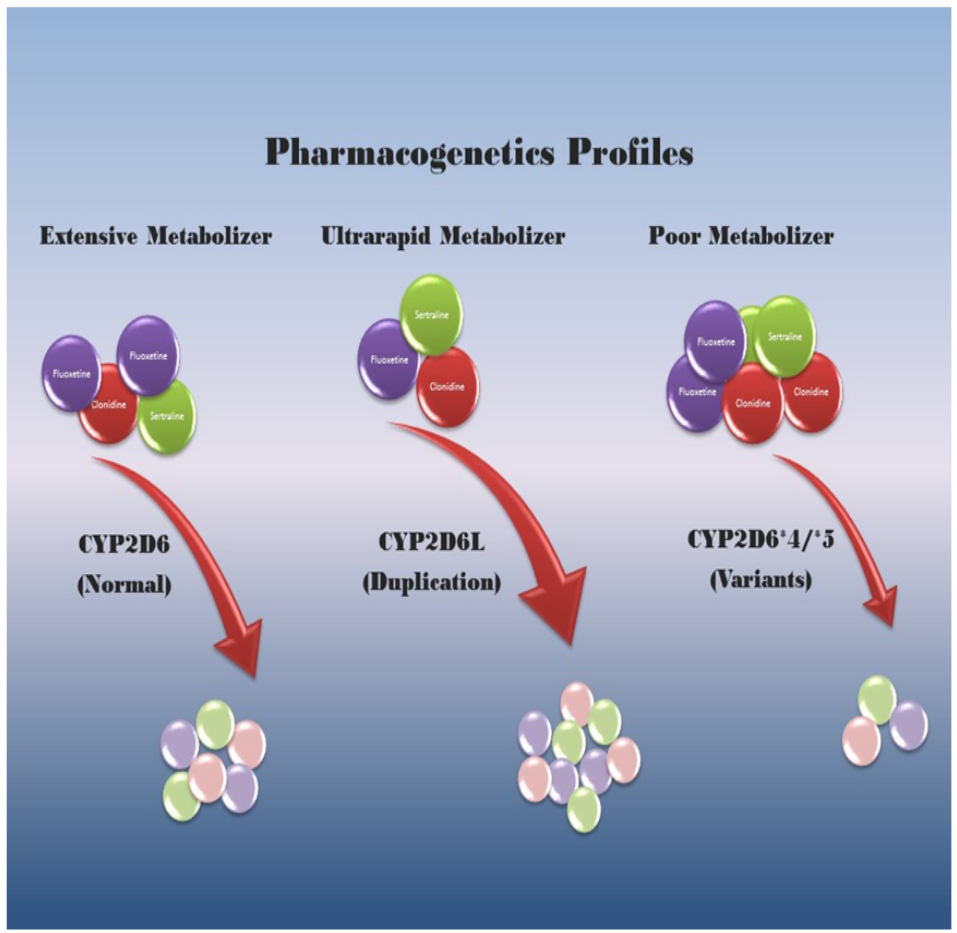
Methadone Basics: Structural Activity

- Methadone IV: rapid onset of effect, with central nervous system effect site concentrations rapidly equilibrating with plasma concentrations in approximately 4 minutes
- Methadone is a potent N-methyl-d-aspartate (NMDA) receptor antagonist
- Methadone dosing should target blood concentrations in excess of the minimal analgesic concentration during the **slowly declining elimination phase yet below the threshold for respiratory depression**



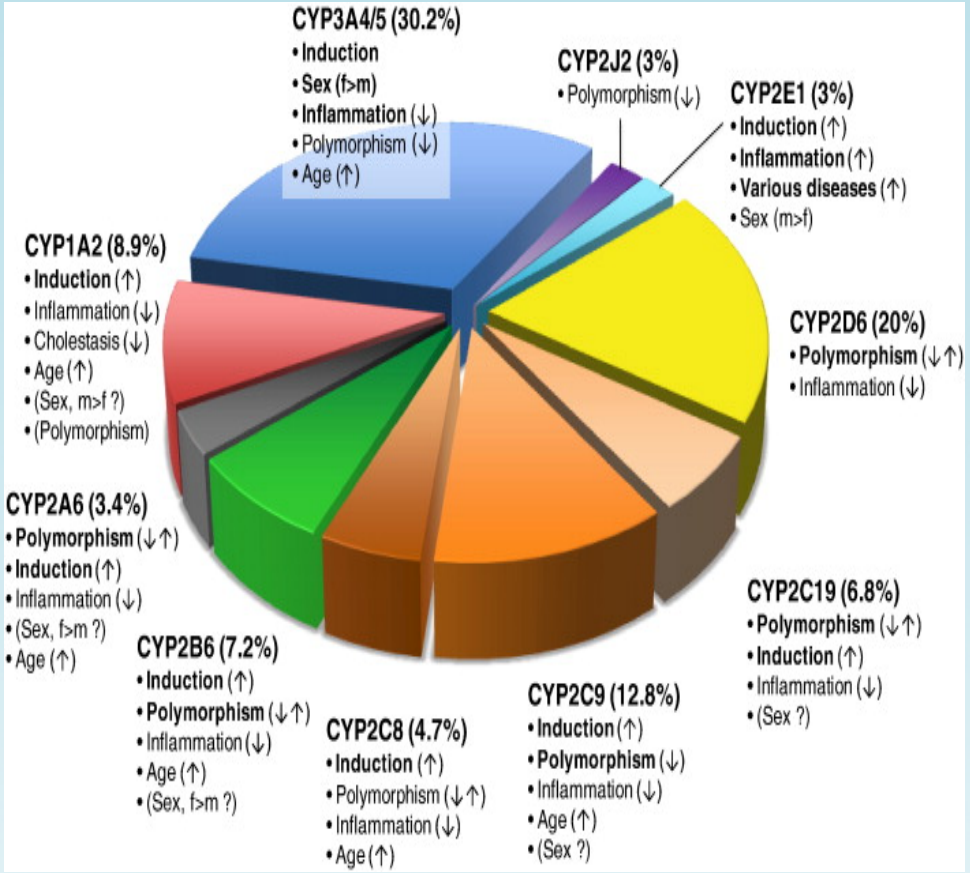
Methadone Metabolism & Pharmacogenetics

- Methadone has a slow metabolism and very high fat solubility, making it longer lasting than morphine-based drugs
- Methadone has a typical elimination half-life of 15 to 60 hours: mean 22 hours
- Methadone metabolism rates vary greatly between individuals: up to a factor of 100 due to CP450 Pharmacogenetics impacting drug metabolism specific to subareas in the CP450 area of liver hepatocytes



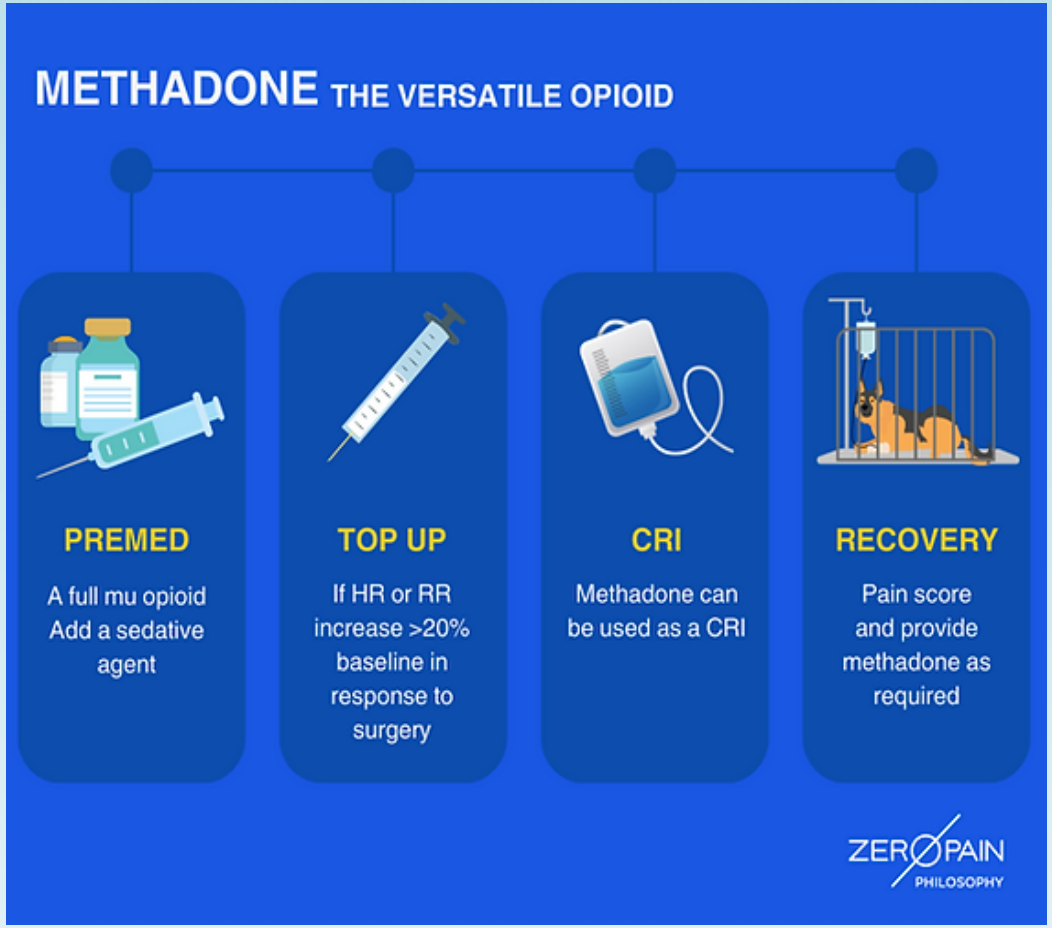
Methadone & Pharmacogenetic Metabolism

- Methadone metabolism can range from: 4 hours up to 130 hours
- Methadone Metabolism variability is apparently genetic variability in the production of the associated cytochrome enzymes CYP3A4, CYP2B6 & CYP2D6: Pharmacogenetics: Slow to Ultrarapid metabolizers
- Metabolism variation can lead to increased risk of side effects & impact safety profile ***
- Methadone dosing adjustments may be needed: dividing doses



Methadone in Anesthesia Care: Varied Settings & Surgical Types

- Several Studies examining Methadone for major surgeries: spine, hip replacement denote trend in results:
- Lower pain scores in PACU in some studies up to 50% reduction
- Lower postoperative narcotic requirements including which was likely due to the prolonged analgesic effects produced by methadone
- Longer time to request for additional pain medication in postoperative phase of care: 24-36 hours



Adjusting perioperative methadone dose for elderly and fragile hip fracture patients (MetaHip-trial) – A statistical analysis plan for an adaptive dose-finding trial

Andreas Kristian Pedersen [a,1], Kevin Heebøll Nygaard [a,b,*,1], Sofie Ronja Petersen [a], Kirsten Specht [c], Thomas Strøm [d], Caroline Margaret Moos [a], Helene Skjøt-Arkil [a,e], Jesper Ougaard Schønnemann [b]

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Abstract

Background

The elderly population is expanding globally. This gives numerous challenges especially regarding hip fracture patients. In the US alone over 300.000 hip fracture patients are treated each year, and a large amount of those develop opoid addiction. Hip fractures require surgical intervention within 24 h and is associated with significant pain even at rest. Postoperative analgesic treatment need to be optimized to ensure adequate pain relief and to prevent subsequent opioid addiction. Previous studies have shown that methadone effectively decreases post-operative opioid consumption but the studies focused on younger patients undergoing elective surgery. This study focus on the use of methadone on the elderly, fragile patients undergoing acute surgery, by first determining the maximal tolerable dose.

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Intraoperative methadone in same-day ambulatory surgery: A randomized, double-blinded, dose-finding pilot study

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Abstract

Background:

Approximately 50 million US patients undergo ambulatory surgery annually. Postoperative opioid overprescribing is problematic, yet many patients report inadequate pain relief. In major inpatient surgery, intraoperative single-dose methadone produces better analgesia and reduces opioid use compared with conventional repeated dosing of short-duration opioids. This investigation tested the hypothesis that in same-day ambulatory surgery, intraoperative methadone, compared with short-duration opioids, reduces opioid consumption and pain, and determined an effective intraoperative induction dose of methadone for same-day ambulatory surgery.

Methadone in Ambulatory Surgery 2019: Komen & Brunt et al

- Double-blind, dose-escalation protocol randomized 60 patients (2:1) to intraoperative single-dose intravenous methadone (initially 0.1 then 0.15 mg/kg ideal body weight) or conventional as-needed dosing of short-duration opioids (fentanyl, hydromorphone; controls)
- Intraoperative and postoperative opioid consumption, pain & opioid side effects were evaluated before discharge
- Patient home diaries recorded pain, opioid use & opioid side effects daily for 30 days following surgery
- Primary outcome was in-hospital including intraoperative and postoperative opioid use
- Secondary outcomes were 30 days opioid consumption, pain intensity & opioid side effects

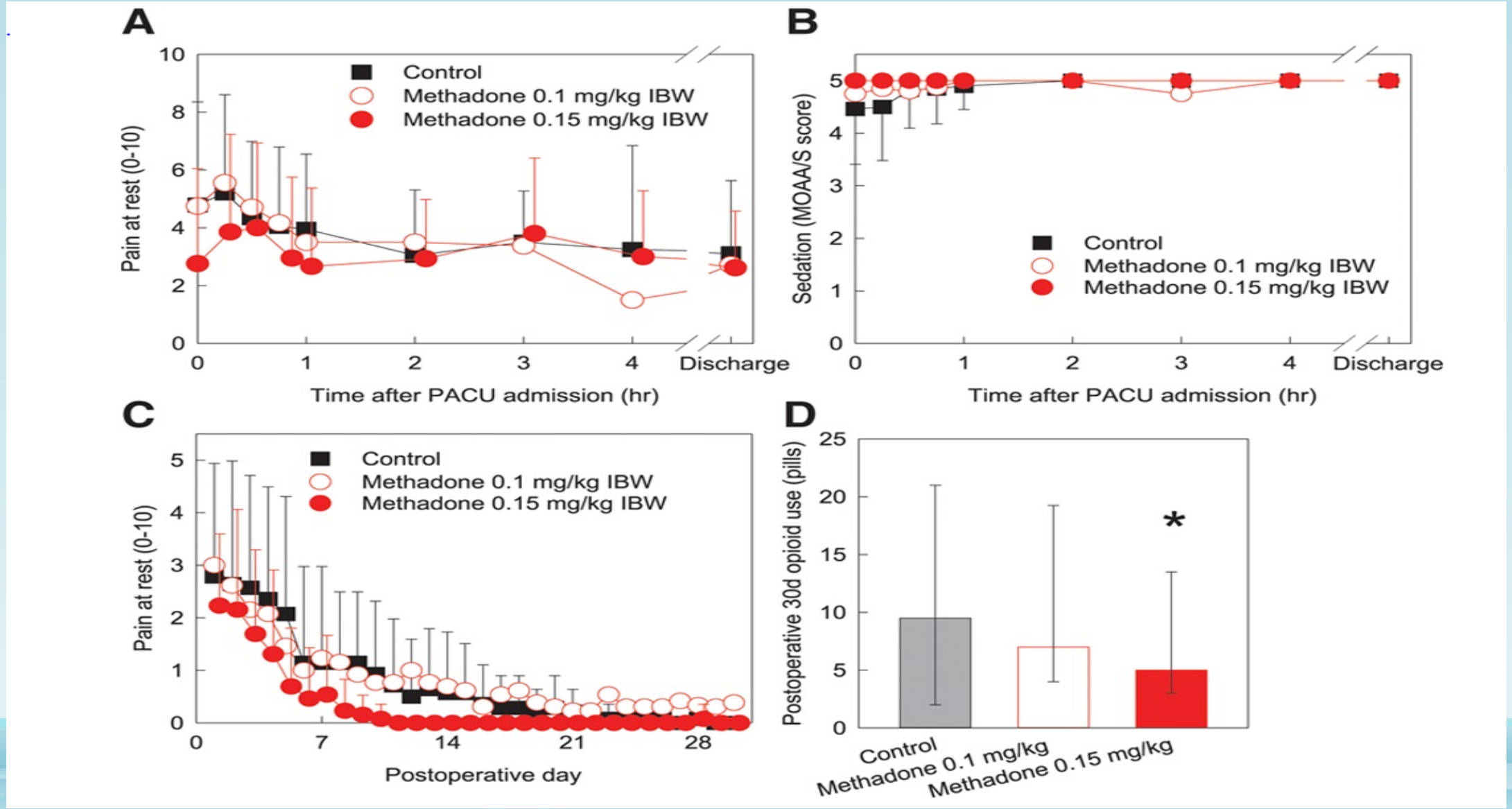
Methadone in Ambulatory Surgery Anesthesia & Analgesia April 2019 Komen & Brunt

	Control (Short-Duration Opioid)	Methadone 0.1 mg/kg IBW	Methadone 0.15 mg/kg IBW
Number of patients	21	18	21
Age (y)	42 ± 13	37 ± 11	40 ± 11
sex (M:F)	3:18	2:16	0:21
Race/ethnicity			
Caucasian	13 (62)	15 (83)	12 (57)
African-America	7 (33)	3 (17)	9 (43)
Asian	1 (5)	0 (0)	0 (0)
Actual weight (kg)	85 ± 16	88 ± 42	86 ± 26
IBW (kg)	60 ± 5	57 ± 6	57 ± 6
ASA physical status, n (%)			
I	1 (5)	0 (0)	0 (0)
II	16 (76)	17 (94)	21 (100)
III	4 (19)	1 (6)	0 (0)
Anesthesia duration (min)	86 ± 21	102 ± 17	84 ± 22
Surgery			
Laparoscopic cholecystectomy	11	11	5
Laparoscopic tubal ligation	6	1	7
Laparoscopic salpingectomy ± oophorectomy	2	6	9
Laparoscopic inguinal hernia repair	2	0	0
Intraoperative methadone (mg)	0	5.5 (5.0–6.0)	8.5 (7.8–9.0)
Ready for PACU discharge (min)	96 ± 50	94 ± 45	128 ± 106

Methadone in Ambulatory Surgery: Anesthesia & Analgesia April 2019: In Hospital Opioid Use

	Control (Short-Duration Opioid)	Methadone 0.1 mg/kg IBW	*P* Value Versus Control	Methadone 0.15 mg/kg IBW	*P* Value Versus Control
Primary outcomes					
Total intraoperative nonmethadone opioid (mg morphine equivalents)	25.0 (23.3–28.3)	0.1 (0.1–0.1)	<.0001	0.1 (0.1–0.1)	<.0001
Total PACU nonmethadone opioid (mg morphine equivalents)	9.3 (1.3–11.0)	5.0 (3.3–8.1)	.60	0.1 (0.1–3.3)	<.0001
Number of patients (%) needing no PACU opioid	5 (24%)	2 (11%)	.42	12 (57%)	.06
Total post-PACU nonmethadone opioid (mg morphine equivalents)	0.0 (0.0–2.9)	0.0 (0.0–0.6)	.19	0.0 (0.0–2.5)	.79
Total day of surgery non-OR (PACU + post-PACU) total nonmethadone opioid (mg morphine equivalents)	10.0 (2.5–14.3)	5.4 (3.3–9.6)	.42	3.3 (0.1–5.8)	.01
Total day of surgery nonmethadone opioid (mg morphine equivalents)	35.3 (25.0–44.0)	7.1 (3.7–10.0)	<.0001	3.3 (0.1–5.8)	<.0001
Total day of surgery opioid (mg morphine equivalents)	35.3 (25.0–44.0)	13.3 (8.9–16.4)	<.0001	12.3 (8.9–14.3)	<.0001

Anesthesia & Analgesia April 2019: Komen et al Postoperative Pain from Hospital to Home



Anesthesia & Analgesia April 2019 Methadone Reducing Postoperative Pain Medication Use

	Control (Short-Duration Opioid) (n = 14)	Methadone 0.1 mg/kg IBW (n = 13)	*P* Value Versus Control	Methadone 0.15 mg/kg IBW (n = 12)	*P* Value Versus Control
Number of opioid pills prescribed	30 (20–45)	30 (30–40)		30 (23–30)	
Total postdischarge opioid pills used	10 (3–20)	7 (4–19)	.087	5 (3–13)	<.001
Number of patients using ≤10 pills	8 (57%)	9 (69%)	.70	9 (75%)	.43
Number of patients using ≤5 pills	4 (29%)	4 (31%)	1.0	7 (58%)	.23
Number of unused opioid pills	26 (7–34)	23 (20–30)	.79	22 (14–29)	.93

Results are based on 30-day postoperative diaries. Not all patients returned the diary.

Results are the median (interquartile range).

Abbreviation: IBW, ideal body weight.

Anesthesia & Analgesia 2019 Komen et al: Methadone Side Effects Comparison

Symptom	Control (% of patients)	Methadone 0.10 mg/kg (% of patients)	Methadone 0.15 mg/kg (% of patients)	P value
Nausea	33	33	48	0.67
Vomiting	5	0	10	0.77
Difficulty passing urine	5	11	5	0.67
Difficulty concentrating	19	22	5	0.28
Drowsiness, difficulty staying awake	67	56	48	0.44
Feeling lightheaded or dizzy	33	33	24	0.82
Feeling confused.	5	6	0	0.75
Fatigue	71	67	67	1.00
Itchiness	24	11	19	0.64
Dry mouth	86	72	81	0.66
Headache	19	6	5	0.35

Day of surgery opioid related symptoms (ORSDS, at discharge)

Cardiothoracic Surgeon: August 2024 Goldblatt et al: Methadone for Cardiac Surgery & Reduced Pain

The Cardiothoracic Surgeon

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Review | Open access | Published: 06 May 2024

The influence of preoperative or intraoperative methadone on postcardiac surgery pain and opioid administration: a systematic review and meta-analysis

Joshua Goldblatt, Lachlan Crawford, Jordan Ross, James Edelman & Warren Pavey

The Cardiothoracic Surgeon **32**, Article number: 8 (2024) | Cite this article

1025 Accesses | **1** Citations | Metrics

Abstract

Background

Opioid analgesia remains a cornerstone of the management of perioperative pain in cardiac surgical patients. Emerging evidence suggests that intermediate and long-term postoperative opioid dependence is underappreciated and associated with adverse patient outcomes. Methadone has emerged in the cardiothoracic and non-cardiothoracic anesthesia literature as an option that may provide lasting analgesic benefit and may be associated with a reduction in overall perioperative opioid requirements.

Anesthesia & Analgesia May 2024: Carle et al: Methadone & Respiratory Depression Risks

PERIOPERATIVE MEDICINE

Respiratory Depression Following Intraoperative Methadone: A Retrospective Cohort Study

Carlé, Nicolai BSc[*,†]; Nikolajsen, Lone DMSc[*,†]; Uhrbrand, Camilla G. MD[*,†]

Author Information

Anesthesia & Analgesia ():10.1213/ANE.0000000000007018, May 29, 2024. | **DOI:** 10.1213/ANE.0000000000007018

OPEN

Metrics

Abstract

BACKGROUND:

Methadone is used as a perioperative analgesic in the management of postoperative pain. Despite positive outcomes from randomized trials favoring methadone, concerns about its safety persist, particularly regarding respiratory depression (RD) and excessive sedation. In this study, we compared the incidence of naloxone administration between patients administered intraoperative methadone and those administered intraoperative morphine as a measure of severe RD. Time spent at the postanesthesia care unit (PACU) was used as a proxy variable for excessive sedation.

METHODS:

This was a retrospective cohort study including all patients aged ≥18 years who underwent surgery between March 2019 and March 2023 at Aarhus University Hospital, Denmark. We assessed the association between intraoperative administration of either methadone or morphine and postoperative naloxone administration within the first 24 hours using logistic regression (primary outcome). An analogous linear regression model was used for the secondary outcome of time spent in the PACU after surgery. Patients were weighted using propensity scores to adjust for potential confounding variables.

Anesthesia & Analgesia May 2024: Carle et al: Methadone & Respiratory Depression Methadone versus Morphine

RESULTS:

A total of 14,522 patients were included in the analysis. Among the 2437 patients who received intraoperative methadone, 15 (0.62%) patients received naloxone within the first 24 hours after surgery compared to 68 of 12,0885 (0.56%) who received intraoperative morphine. No statistical difference was observed in the odds of naloxone administration between patients administered methadone or morphine (adjusted odds ratio 95% confidence interval [CI], 1.21 [0.40–2.02]). Patients who were administered intraoperative methadone had a mean PACU length of stay (LOS) of 334 minutes (standard deviation [SD], 382) compared to 195 minutes (SD, 228) for those administered intraoperative morphine. The adjusted PACU LOS of patients administered intraoperative methadone was 26% longer compared to those administered intraoperative morphine (adjusted ratio of the geometric means 95% CI, 1.26 [1.22–1.31]).

CONCLUSIONS:

The incidence of naloxone administration to treat severe RD was low. No difference was observed in the odds of naloxone administration to treat severe RD between patients administered intraoperative methadone or intraoperative morphine. Intraoperative methadone was associated with longer stays at the PACU; however, this result should be interpreted with care. Our findings suggest that intraoperative methadone has a safety profile comparable to that of morphine with regard to severe RD.

Anesthesiology September 2023

Intraoperative Methadone in Next-day Discharge Outpatient Surgery: A Randomized, Double-blinded, Dose-finding Pilot Study

Evan D Kharasch [1], L Michael Brunt [2], Jane Blood [3], Helga Komen [3]

Affiliations + expand

PMID: 37350677 PMCID: PMC10527477 DOI: 10.1097/ALN.0000000000004663

Abstract

Background: Contemporary perioperative practice seeks to use less intraoperative opioid, diminish postoperative pain and opioid use, and enable less postdischarge opioid prescribing. For inpatient surgery, anesthesia with intraoperative methadone, compared with short-duration opioids, results in less pain, less postoperative opioid use, and greater patient satisfaction. This pilot investigation aimed to determine single-dose intraoperative methadone feasibility for next-day discharge outpatient surgery, determine an optimally analgesic and well-tolerated dose, and explore whether methadone would result in less postoperative opioid use compared with conventional short-duration opioids.

Methods: This double-blind, randomized, dose-escalation feasibility and pilot study in next-day discharge surgery compared intraoperative single-dose IV methadone (0.1 then 0.2, 0.25 and 0.3 mg/kg ideal body weight) versus as-needed short-duration opioid (fentanyl, hydromorphone) controls. Perioperative opioid use, pain, and side effects were assessed before discharge. Patients recorded pain, opioid use, and side effects for 30 days postoperatively using take-home diaries. Primary clinical outcome was in-hospital (intraoperative and postoperative) opioid use. Secondary outcomes were 30-day opioid consumption, pain, opioid side effects, and leftover opioid counts.

Results: Median (interquartile range) intraoperative methadone doses were 6 (5 to 7), 11 (10 to 12), 14 (13 to 16), and 18 (15 to 19) mg in 0.1, 0.2, 0.25, and 0.3 mg/kg ideal body weight groups, respectively. Anesthesia with single-dose methadone and propofol or volatile anesthetic was effective. Total in-hospital opioid use (IV milligram morphine equivalents [MME]) was 25 (20 to 37), 20 (13 to 30), 27 (18 to 32), and 25 (20 to 36) mg, respectively, in patients receiving 0.1, 0.2, 0.25 and 0.3 mg/kg methadone, compared to 46 (33 to 59) mg in short-duration opioid controls. Opioid-related side

ANESTHESIOLOGY

Intraoperative Methadone in Next-day Discharge Outpatient Surgery: A Randomized, Double-blinded, Dose-finding Pilot Study

Evan D. Kharasch, M.D., Ph.D., L. Michael Brunt, M.D., Jane Blood, R.N., Helga Komen, M.D.

Anesthesiology 2023; 139:405–19

EDITOR'S PERSPECTIVE

What We Already Know about This Topic

- Opioids are the mainstay and most efficacious systemic pharmacotherapy for treating moderate to severe intraoperative and postoperative pain, but they have side effects
- Methadone is a highly effective and opioid-sparing perioperative opioid
- Compared with shorter-acting opioids, intraoperative methadone has been reported to decrease not only postoperative pain and opioid use but also chronic pain and opioid use after surgery

What This Article Tells Us That Is New

ABSTRACT

Background: Contemporary perioperative practice seeks to use less intraoperative opioid, diminish postoperative pain and opioid use, and enable less postdischarge opioid prescribing. For inpatient surgery, anesthesia with intraoperative methadone, compared with short-duration opioids, results in less pain, less postoperative opioid use, and greater patient satisfaction. This pilot investigation aimed to determine single-dose intraoperative methadone feasibility for next-day discharge outpatient surgery, determine an optimally analgesic and well-tolerated dose, and explore whether methadone would result in less postoperative opioid use compared with conventional short-duration opioids.

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Conclusions: The most effective and well-tolerated single intraoperative induction dose of methadone for next-day discharge surgery was 0.25 mg/kg ideal body weight (median, 14 mg). Single-dose intraoperative methadone

Anesthesiology 2023: Karasch et al

Intraoperative Methadone in Next-day Discharge Outpatient Surgery

A randomized, double-blinded, dose-finding pilot study in 139 patients undergoing next-day discharge outpatient surgery

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Comparison of total in-hospital opioid use

Intraoperative opioid		IV Morphine mg equivalents Median (IQR)
Methadone	0.1 mg/kg	25 (20-37)
	0.2 mg/kg	20 (13-30)
	0.25 mg/kg	27 (18-32)
	0.3 mg/kg	25 (20-36)
Fentanyl, hydromorphone		46 (33-59)

Methadone group	
↓	Home Pain
↓	Opioid Use Score
⚖	Opioid-related Side Effects

Methadone 0.25 mg/kg was the most effective and well-tolerated single intraoperative induction dose for patients undergoing next-day discharge surgery

Anaesthesia and Intensive Care

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Intraoperative methadone for day-case gynaecological laparoscopy: A double-blind, randomised controlled trial

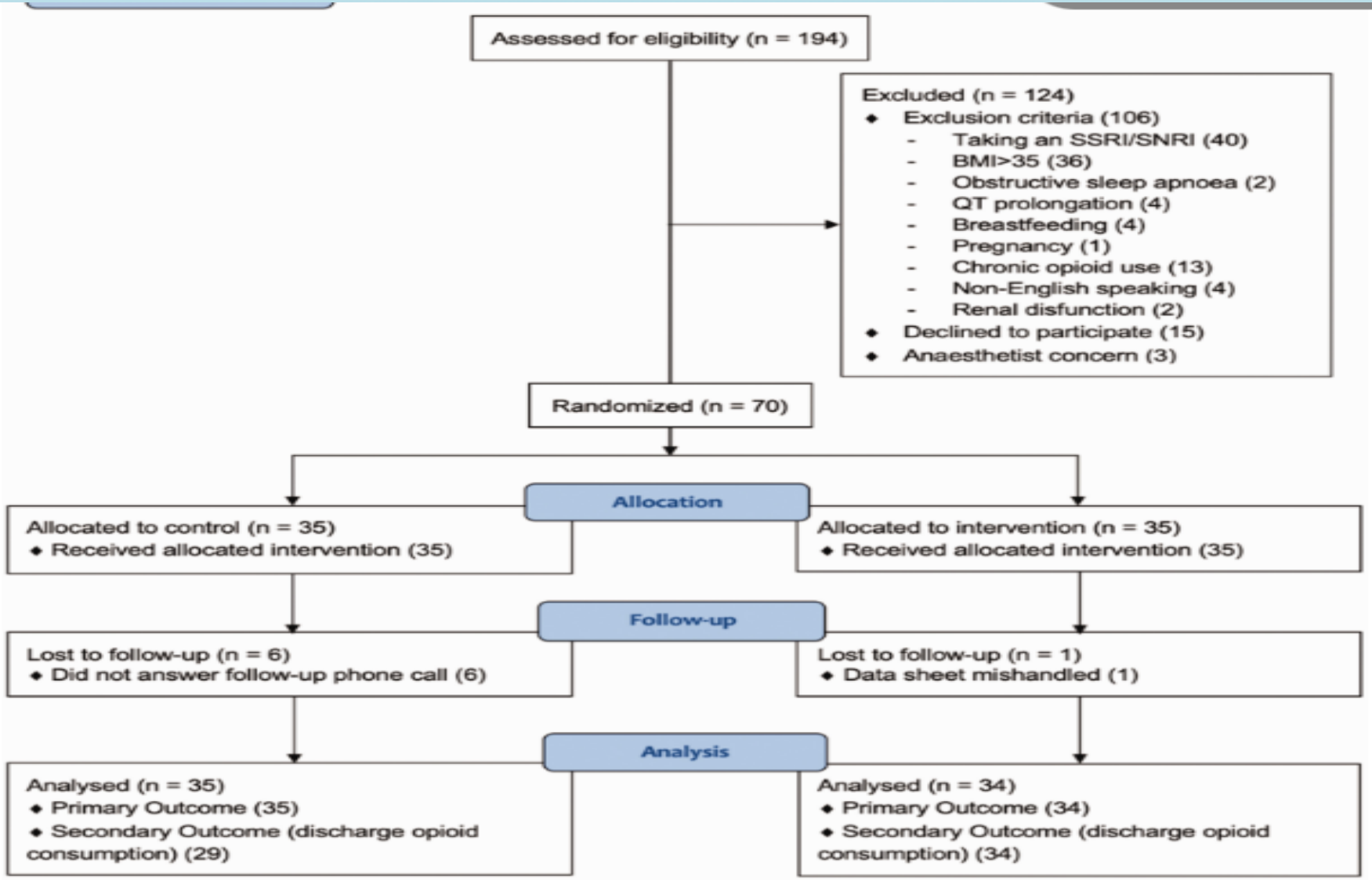
Kyle W Green, Gordana Popovic, and Luke Baitch View all authors and affiliations

Volume 52, Issue 3 | https://doi.org/10.1177/0310057X231214551

Abstract

Optimal pain relief in day-case surgery is imperative to patient comfort and timely discharge from hospital. Short-acting opioids are commonly used for analgesia in modern anaesthesia, allowing rapid recovery after surgery. Plasma concentration fluctuations from repeated dosing of short-acting opioids can cause patients to oscillate between analgesia with potential adverse effects, and inadequate analgesia requiring rescue dosing. Methadone's unique pharmacology may offer effective and sustained analgesia with less opioid consumption, potentially reducing adverse effects. Using a double-blind, randomised controlled trial, we compared post-anaesthesia care unit opioid consumption between day-case gynaecological laparoscopy patients who received either intravenous methadone (10 mg), or short-acting opioids intraoperatively. The primary outcome was post-anaesthesia care unit opioid consumption in oral morphine equivalents. Secondary outcomes included total opioid consumption, discharge opioid consumption, pain scores (0–10) until discharge, adverse effects (respiratory depression, postoperative nausea and vomiting, excess sedation), and rate of admission. Seventy patients were randomly assigned. Patients who received methadone consumed on average 9.44 mg fewer oral morphine equivalents in the post-anaesthesia care unit than the short-acting group (18.02 mg *vs* 27.46 mg, respectively, 95% confidence interval 0.003 to 18.88,

Methadone for Gyn Procedures & Patient Selection Criteria: Anesthesia & Critical Care: Green et al April 2024



Anesthesia & Critical Care April 2024:Green et al Methadone Group: Lower PACU Opioid Consumption in Morphine Equivalents

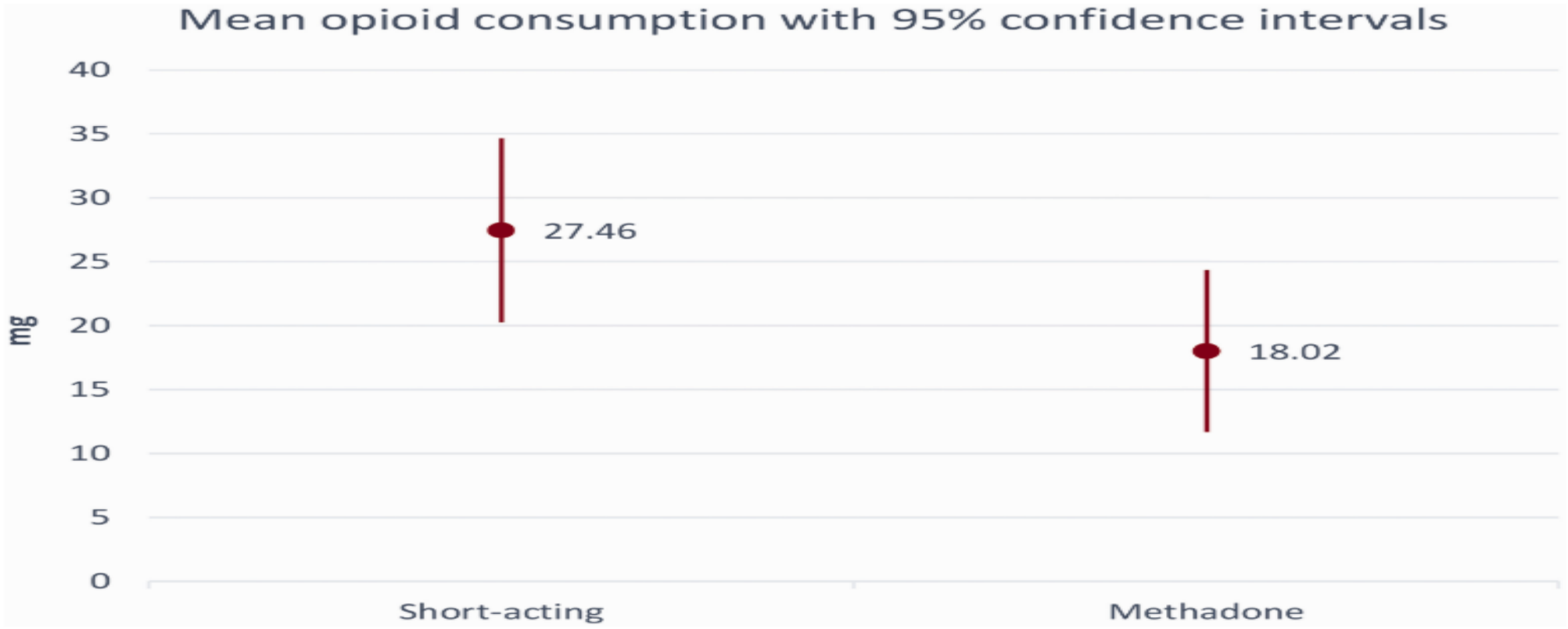


Figure 2. Post-anaesthesia care unit opioid consumption with 95% confidence intervals. Consumption is represented in oral morphine equivalents (in mg).

Anesthesia & Critical Care Green et al April 2024: Anesthesia Induction & Maintenance

	Short-acting	Methadone
Induction agents		
Propofol	27 (77.1%)	25 (73.5%)
Propofol + midazolam	8 (22.9%)	9 (26.5%)
Maintenance		
TIVA	6 (17.1%)	4 (11.8%)
Volatile	29 (82.9%)	30 (88.2%)

Values are numbers (percentage).

TIVA: total intravenous anaesthesia.

Anesthesia & Critical Care Green et al April 2024: Intraoperative Opioids Comparison

	Short-acting	Methadone
Methadone	0 (0%)	34 (100%)
Methadone + fentanyl		1 (2.9%)
Fentanyl	31 (88.6%)	
Fentanyl alone	25 (71.4%)	
Fentanyl + oxycodone	6 (17.1%)	
Oxycodone	10 (28.6%)	
Oxycodone alone	4 (11.4%)	
Tramadol administered	3 (8.6%)	3 (8.8%)
Mean intraoperative opioid dose in OMEs	46.94 ± 18.00	32.54 ± 9.00

Values are numbers (percentage) or mean OMEs in mg.

OMEs: oral morphine equivalents.

Anesthesia & Critical Care: Green et al April 2024:Intraoperative Adjuncts Comparison

	Short-acting	Methadone
Analgesics		
Paracetamol	31 (88.6%)	32 (91.4%)
Parecoxib	28 (80.0%)	29 (85.3%)
Antiemetics		
Dexamethasone	33 (94.3%)	32 (94.1%)
Ondansetron	32 (91.4%)	30 (88.2%)
Droperidol	2 (5.7%)	1 (2.9%)
Metoclopramide	2 (5.7%)	0 (0%)
Other		
Ketamine	1 (2.9%)	0 (0.0%)
Vasopressors or inotropes required	10 (28.6%)	10 (29.4%)
Clonidine	1 (2.9%)	3 (8.8%)
Magnesium	1 (2.9%)	3 (8.8%)
Antibiotics	13 (37.1%)	15 (44.1%)
Pantoprazole preoperatively (20 mg)	18 (51.4%)	19 (55.9%)
Pregabalin preoperatively (150 mg)	9 (25.7%)	12 (35.3%)

Anesthesia & Critical Care April 2024 Green et al: Surgical Time Comparison

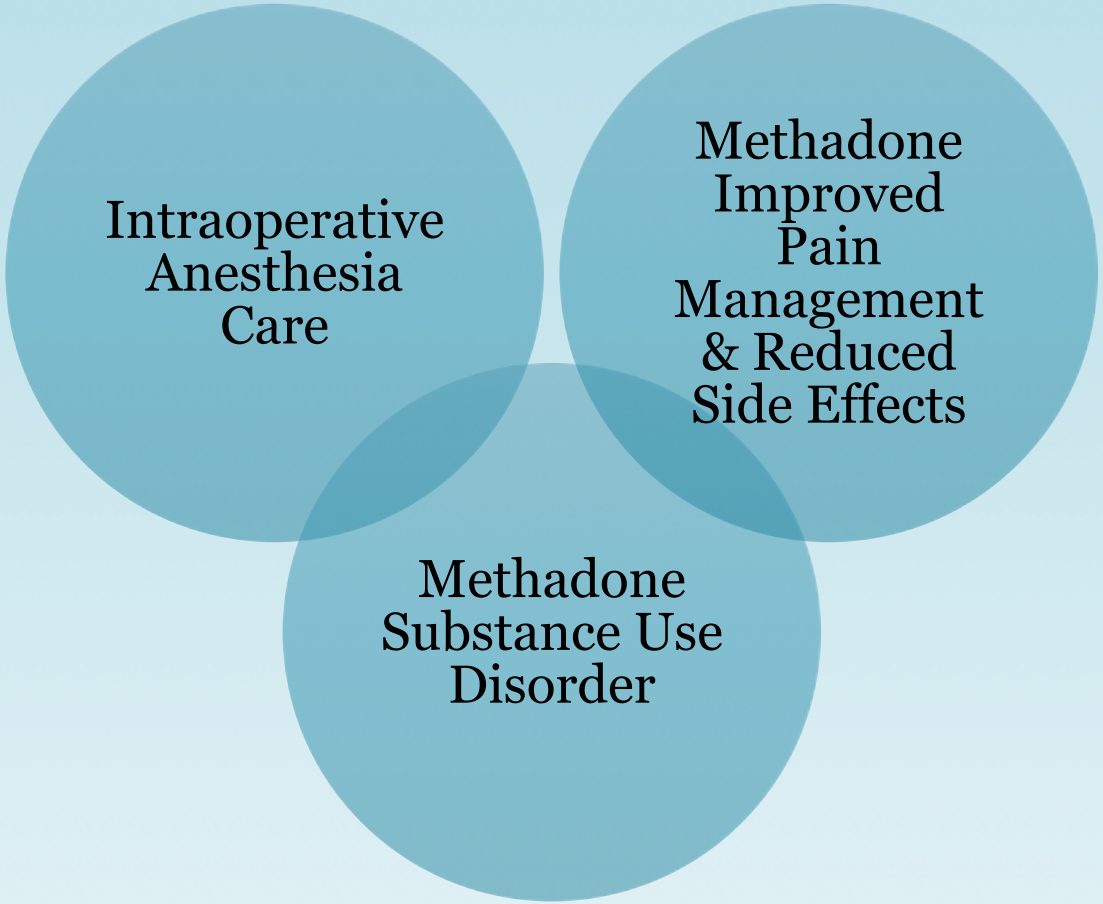
	Short-acting	Methadone
Anaesthesia duration, min	71.26 (28.90)	66.76 (22.49)
Surgical duration, min	51.83 (27.23)	44.38 (21.75)
Re-presentation to hospital or GP for pain	6 (17.2%)	7 (20.6%)

Values are mean (standard deviation) or numbers (percentage).

- Surgical Time and Anesthesia Duration comparison for both Short Acting & Methadone Group
- Multiple Variables Assessed to ensure comparison of double blinded groups evenly balanced
- Averaging Surgical & Anesthesia Times in comparison

Methadone Revisited

- Methadone as a considerations for intraoperative pain management in inpatient & out patient setting
- Methadone to improve patient pain scores
- Methadone for reduced side effects
- Methadone to limit postoperative pain medication needs & less pain medication dispensed: Opioid Stewardship



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