

Appendix 1 Search strategy

Dates: 05-07-2020 and 18-01-2021

Total hits: 6275

Excluded (Duplicates): 1313

Included for primary screening: 4962

Pubmed:

1. "Discectomy"[Mesh] OR "Laminectomy" [Mesh] OR "Spinal fusion" "[Mesh] OR "Spinal diseases" [Mesh] OR "Spine" [Mesh]
2. "Laminectomies" [All Fields] OR "Laminotomy" [All Fields] OR "Laminotomies" [All Fields] OR "Discectomies [All Fields] OR "Discectomy" [All Fields] OR "Discectomies" [All Fields] OR "Fusion, Spinal" [All Fields] OR "Fusions, spinal" [All Fields] OR "spinal fusions" [All Fields] OR "Spondylodesis" [All Fields] OR "Spondylodeses" [All Fields] OR "Spondylosyndesis" [All Fields] OR "Spondylosyndeses" [All Fields] OR "Vertebral Column" [All Fields] OR "Column, Vertebral" [All Fields] OR "Columns, Vertebral" [All Fields] OR "Vertebral Columns" [All Fields] OR "Vertebral Columns" [All Fields] OR "Spinal Columns" [All Fields] OR "Column, spinal" [All Fields] OR "Columns, spinal" [All Fields] OR "Spinal Columns" [All Fields] OR "Vertebra" [All Fields] OR "Vertebrae" [All Fields]
3. 1 OR 2
4. "Analgesics" [Mesh] OR "Analgesia" [Mesh] OR "Anesthetics, Local" [Mesh] OR "Nerve Block" [Mesh] OR "Analgesics, opioid" [Mesh] OR "Pregabalin" [Mesh] OR "Gabapentin" [Mesh] OR "Chlorzoxazone" [Mesh] OR "Magnesium Sulfate" [Mesh] OR "Glucocorticoid(pharma)" [Mesh] OR "Acetaminophen" [Mesh] OR "Ketamine" [Mesh]
5. "Analgesic Drugs" [All Fields] OR "Drugs Analgesic" [All Fields] OR "Anodynes" [All Fields] OR "Analgesic Agents" [All Fields] OR "Agents, Analgesic" [All Fields] OR "Antinociceptive Agents" [All Fields] OR "Analgesias" [All Fields] OR "Local Anesthetics" [All Fields] OR "Conduction-Blocking Anesthetics" [All Fields] OR "Anesthetics, Conduction-Blocking" OR "Conduction Blocking Anesthetics" [All Fields] OR "Anesthetics, conduction blocking" OR "Anesthetics, topical" [All Fields] OR "Block, nerve" [All Fields] OR "Blocks, nerve" [All Fields] OR "Nerve blockade" [All Fields] OR "Nerve blocks" [All Fields] OR "Blockades, nerve" [All Fields] OR "Nerve blockades" [All Fields] OR "Acetaminophen" [All Fields] OR "Hydroxyacetanilide" [All Fields] OR "Paracetamol" [All Fields] OR "Panadol" [All Fields] OR "Acetamidophenol" [All Fields] OR "Parafon" [All Fields] OR "Paraflex" [All Fields] OR "Sulfate, Magnesium" [All Fields] OR "Magnesium sulfate, Heptahydrate" [All Fields] OR "Heptahydrate Magnesium Sulfate" [All Fields] OR "Ketalar" [All Fields] OR "Esketamine" [All Fields] OR "N-methylketamine" [All Fields] OR "S-ketamine" [All Fields] OR "R-ketamine" [All Fields] OR "Ketamine hydrochloride" [All Fields] OR "glucocorticoids" [All Fields]
6. 4 OR 5
7. "Pain, postoperative" [Mesh] OR "Perioperative care" [Mesh] OR "Postoperative period" [Mesh]
8. "Postoperative pain" [All Fields] OR "Postoperative pains" [All Fields] OR "Care, perioperative" [All Fields] OR "Period, postoperative" [All Fields] OR "Periods, postoperative" [All Fields] OR "Postoperative periods" [All Fields]

9. 7 OR 8
10. 3 AND 6 AND 9

Embase:

Dates: 29-6-2020 and 19-01-2021

Total hits: 2458

Excluded: 827 (duplicates)

Included for primary screening: 1631

1. Exp spine surgery
2. Cervical spine surgery or spinal surgery
3. 1 OR 2
4. Exp Analgesic agent/ or Exp Analgesia/ or Exp anesthetic agent/ or Exp nerve block/ or Exp narcotic analgesic agent/ or Exp chlorzoxazone/ or Exp paracetamol/ or Exp non steroid anti-inflammatory agent/ or Exp ketamine/ or Exp Magnesium sulfate
5. Agent analgesic or analgesic or analgesic drug or analgesic evaluation or analgesics or analgesics, non narcotic or analgesic, topical or analgetic or analgetic agent or analgetic drug or anodyne or antalgic agent or non narcotic analgesic or non narcotic analgesic agent or nonnarcotic analgesic or nonnarcotic analgesic agent or pain management or pain relief or sequential analgetic analgesia or surgical analgesia or anaesthetic or anaesthetic agent or anaesthetic drug or anaesthetics or anaesthetics, combined or anaesthetics, dissociative or anaesthetic, general or anesthetic or anesthetic drug or anesthetics or anesthetics, combined or anesthetics, dissociative or anesthetics, general or general anaesthetic or general anaesthetic agent or general anesthetic or general anesthetic agent or preanaesthetics or preanesthetics or autonomic blocker or autonomic blocking or autonomic nerve block or autonomic nerve blocking or block, nerve or conduction block or nerve block anaesthesia or nerve block anesthesia or nerve blockade or nerve blocking or nerve conduction block or neurogenic blockade or sensory nerve block or agent narcotic analgesic or agent narcotic analgesic or anaesthetic analgesic agent or analgesic anaesthetic agent or analgesic anesthetic agent or analgesics, narcotic or analgesics narcotic agonist antagonist or analgesics, narcotic like or analgesics, opioid or anesthetic analgesic agent or narcotic analgesic or narcotic analgesics or narcotic analgetic agent or chlorzoxazone or chlorzoxazone or chlorzaxazone or chlorzoxasone or klorzoxazon or anti inflammatory agents, non steroidal or anti-inflammatory agent, nonsteroid or non steroid anti-inflammatory agent or non steroidal anti inflammatory agent or non steroidal anti-inflammatory drug or non steroidal anti-inflammatory agent or non steroidal anti-inflammatory drug or nonsteroid anti-inflammatory drug or nonsteroid antirheumatic agent or nonsteroidal anti inflammatory drug or nonsteroidal anti inflammatory drugs or nonsteroidal antiinflammatoxy agent or nonsteroidal anti-inflammatory drug or NSAID or Epsom salt or Epsom salts or magnesium sulfate in dextrose 5% or magnesium sulphate or magnesium sulphate in dextrose 5% or mg longoral or sulfamag or sulmetin or sulmetine
6. 4 or 5
7. Exp postoperative pain
8. Pain, postoperative or post operation pain
9. 7 or 8
10. 3 AND 6 AND 9

Central

Dates: 03-07-2020 and 18-01-2021

Total hits: 15181

Excluded: 1575 (duplicates)

Included for primary screening: 13606

1. MeSH descriptor [spinal diseases] OR MeSH descriptor [spinal fusion] OR MeSH descriptor [Discectomy] OR MeSH descriptor [spine]
2. Disease Spinal or Diseases Spinal or Spinal Disease Fusions, Spinal or Spinal Fusions or Fusion, Spinal or Spondylosyndeses or Spondylosyndesis or Spondylodesis or Spondylodeses Discectomies or Discectomy or Discectomies Vertebral Columns or Spinal Column or Columns, Spinal or Vertebral Column or Spinal Columns or Column, Vertebral or Column, Spinal or Columns, Vertebral or Vertebra or Vertebrae
3. 1 OR 2
4. MeSH descriptor [analgesia] OR MeSH descriptor [Anesthetics] OR MeSH descriptor [Analgesics, opioid] OR MeSH descriptor [Analgesics, non-opioid] OR MeSH descriptor [nerve block] OR MeSH descriptor [Anti-inflammatory Agents, Non-steroidal] OR MeSH descriptor [Acetaminophen] OR MeSH descriptor [Chlorzoxazone]
5. Analgesia, Acupuncture or Analgesia and Anesthesia or Patient Controlled Analgesia or Patient-Controlled Analgesia or Analgesia, Patient Controlled or Epidural Analgesia or Analgesia, Interpleural or Interpleural Analgesias or Analgesias, Interpleural or Intrapleural Analgesia or Analgesia, Intrapleural or Anesthetic Agents or Agents, Anesthetic or Anesthetic Drugs or Drugs, Anesthetic or Anesthetic Effects or Effects, Anesthetic or Effect, Anesthetic or Anesthetic Effect or General Anesthetics or Intravenous Anesthetics or Combined Anesthetics or Anesthetics, Topical or Local Anesthetics or Anesthetics, Conduction Blocking or Anesthetics, Conduction-Blocking or Conduction Blocking Anesthetics or Conduction-Blocking Anesthetics or Opioids or Opioid Mixed Agonist-Antagonists or Agonist-Antagonists, Opioid Mixed or Opioid Mixed Agonist Antagonists or Mixed Agonist-Antagonists, Opioid or Opioid Analgesics or Opioid Agonists, Full or Full Agonists, Opioid or Agonists, Opioid Full or Opioid Full Agonists or Full Opioid Agonists or Agonists, Full Opioid or Opioid Partial Agonists or Agonists, Opioid Partial or Partial Opioid Agonists or Opioid Agonists, Partial or Agonists, Partial Opioid or Partial Agonists, Opioid or Non-Narcotic Analgesics or Analgesics, Non Narcotic or Analgesics, Non-Opioid or Non Opioid Analgesics or Non-Opioid Analgesics or Nonopioid Analgesics or Nonnarcotic Analgesics or Analgesics, Nonnarcotic or Analgesics, Nonopioid or Opioid Mixed Agonist-Antagonists or Agonist-Antagonists, Opioid Mixed or Opioid Mixed Agonist Antagonists or Mixed Agonist-Antagonists, Opioid or Opioid Agonists, Full or Full Agonists, Opioid or Agonists, Opioid Full or Opioid Full Agonists or Full Opioid Agonists or Agonists, Full Opioid or Opioid Partial Agonists or Agonists, Opioid Partial or Partial Opioid Agonists or Opioid Agonists, Partial or Agonists, Partial Opioid or Partial Agonists, Opioid or Opioid Analgesics or Opioids or Antinociceptive Agents or Analgesic Agents or Analgesic Drugs; Drugs, Analgesic or Agents, Analgesic or Anodynes or Non Steroidal Anti Inflammatory Agents or Non-Steroidal Anti-Inflammatory Agents or Nonsteroidal Anti-Inflammatory Agents or Nonsteroidal Anti Inflammatory Agents or Antiinflammatory Agents, Non

Steroidal or Anti Inflammatory Agents, Nonsteroidal or Aspirin-Like Agents or Aspirin Like Agents or Anti-Inflammatory Analgesics or Analgesics, Anti-Inflammatory or Nonsteroidal Antiinflammatory Agents or Antiinflammatory Agents, Nonsteroidal or NSAIDs or Percutaneous Electrical Nerve Stimulation or Percutaneous Electric Nerve Stimulation or Transcutaneous Electrical Nerve Stimulation or Electrical Stimulation, Transcutaneous or Transcutaneous Electrical Stimulation or Transcutaneous Nerve Stimulation or Nerve Stimulation, Transcutaneous or Stimulation, Transcutaneous Nerve or Electric Stimulation, Transcutaneous or Transcutaneous Electric Stimulation or Stimulation, Transcutaneous Electric or Electrical Neuromodulation, Percutaneous or Neuromodulations, Percutaneous Electrical or Neuromodulation Therapy, Percutaneous or Neuromodulation, Percutaneous Electrical or Percutaneous Electrical Neuromodulation or Electrical Neuromodulations, Percutaneous or Therapy, Percutaneous Neuromodulation or Percutaneous Electrical Neuromodulations or Percutaneous Neuromodulation Therapy or Percutaneous Neuromodulation Therapies or Electrostimulation, Analgesic Cutaneous or Cutaneous Electrostimulation, Analgesic or Analgesic Cutaneous Electrostimulation or Transdermal Electrostimulation or Electrostimulation, Transdermal or TENS or Electroanalgesia or Electroanalgesias or Nerve Blocks, Sympathetic or Blocks, Sympathetic Nerve or Sympathetic Nerve Blocks or Nerve Block, Sympathetic or Sympathetic Nerve Block or Block, Sympathetic Nerve or Autonomic Nerve Blocks or Blocks, Autonomic Nerve or Block, Autonomic Nerve or Nerve Block, Autonomic or Nerve Blocks, Autonomic or Datril or Acetaco or Acetamidophenol or APAP or p-Acetamidophenol or Paracetamol or N-Acetyl-p-aminophenol or p-Hydroxyacetanilide or Acetaminophen or Hydroxyacetanilide or Panadol or Acephen or Algotropyl or Acamol or Tylenol or Paraflex or Parafon or Parafon Forte or Neurontin or Convalis or Lyrica or Sulfate, Magnesium or Heptahydrate Magnesium Sulfate or Magnesium Sulfate, Heptahydrate

6. 4 OR 5
7. MeSH descriptive [Postoperative period] or MeSH descriptive [pain, postoperative]
8. Periods, Postoperative or Postoperative Periods or Period, Postoperative or Postoperative Pain or Postoperative Pains or Intraoperative Periods or Period, Intraoperative or Periods, Intraoperative or Postoperative Procedures or Procedures, Postoperative or Procedure, Postoperative or Postoperative Procedure or Care, Postoperative
9. 7 OR 8
10. 3 AND 6 AND 9

Google Scholar supplemented the search. The first 500 hits were taken into consideration.

Google Scholar

Dates: 23-06-2020 and 18.01.21

Total hits: 500

Excluded (duplicates): 185

Included for primary screening: 315

(discectomy OR laminectomy OR spinal fusion OR spinal surgery OR spinal diseases OR spine)
AND (analgesics OR analgesia) AND pain OR pain treatment

No eligible trails were detected from secondary literature

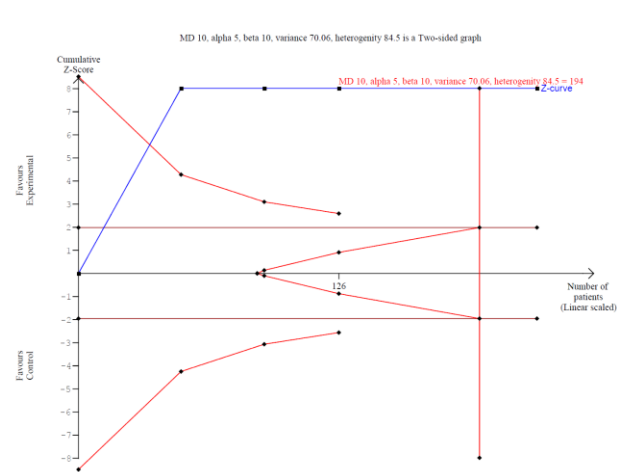
Appendix 2. Opioid conversion

Opioid	Administration	Opioid: Intravenous morphine
1 mg Fentanyl	intravenous	100 mg morphine
1 mg Morphine	oral	0.33 mg morphine
1 mg Oxycodone	intravenous	1.33 mg morphine
1 mg Oxycodone	oral	0.5 mg morphine
1 mg Sufentanil	intravenous	1000 mg morphine
1 mg Tramadol	oral	0.07 mg morphine
1 mg hydromorphone	intravenous	6.7 mg morphine
1 mg piritramide	intravenous	0.75 mg morphine

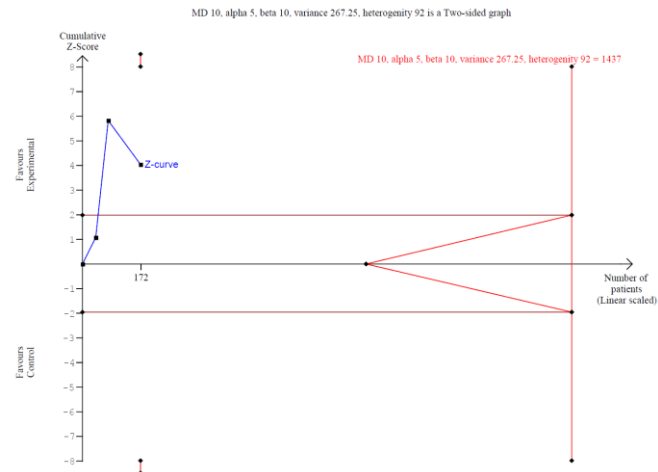
<http://www.globalrph.com/narcotic.cgi>

Appendix 3. Trial Sequential Analysis, NSAID

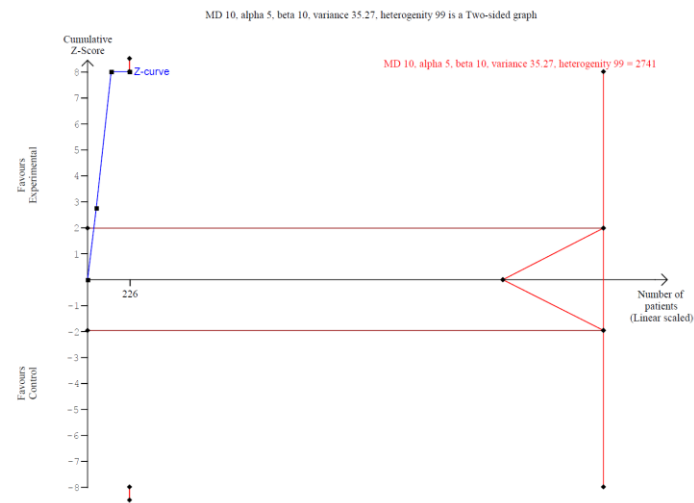
6h pain at rest



24h pain at rest

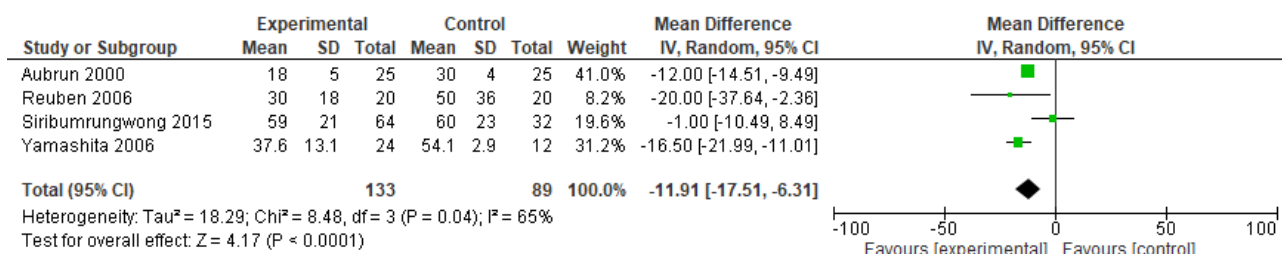


Opioid consumption

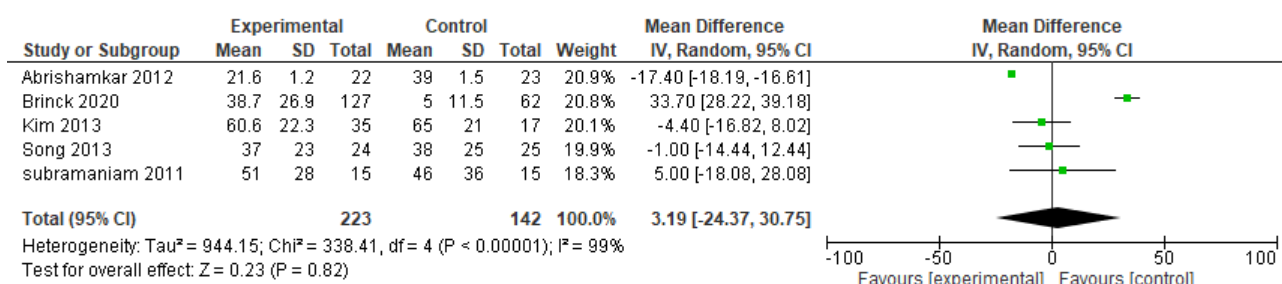


Appendix 4. 6 hr. pain at rest

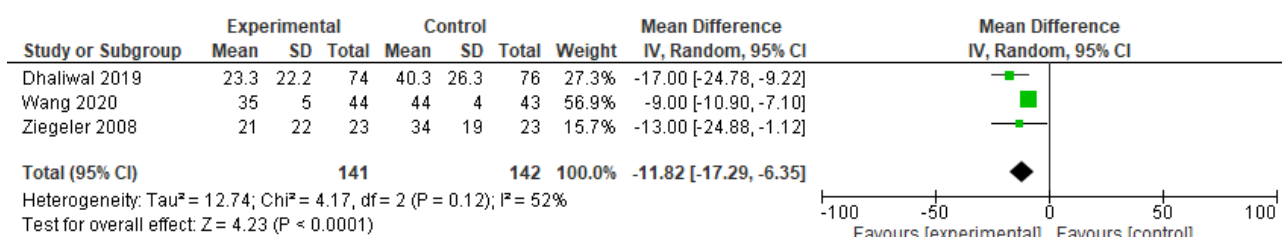
NSAID or COX-2-inhibitor



Ketamine

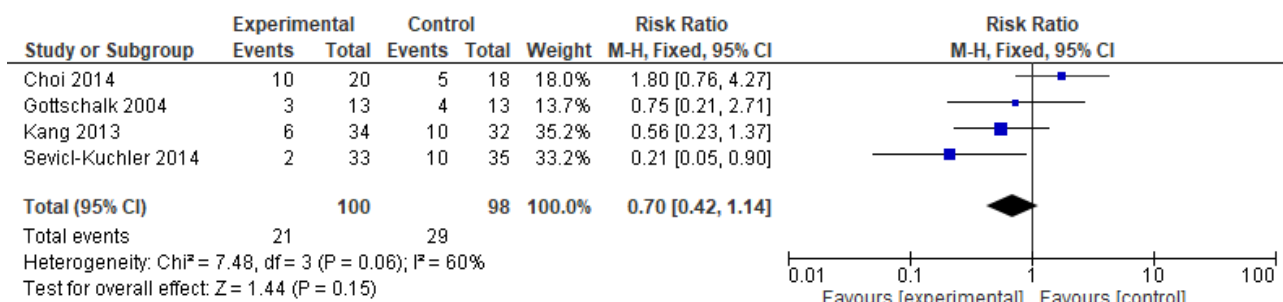


Morphine

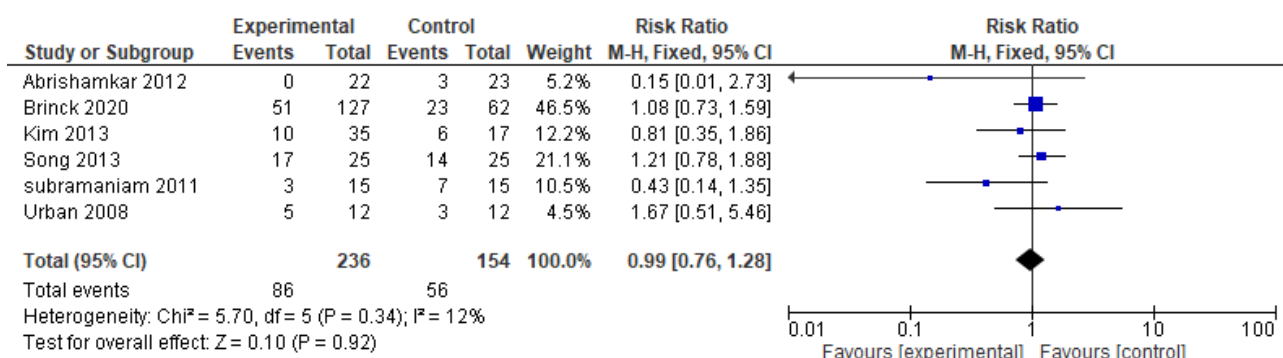


Appendix 5. Postoperative nausea and vomiting

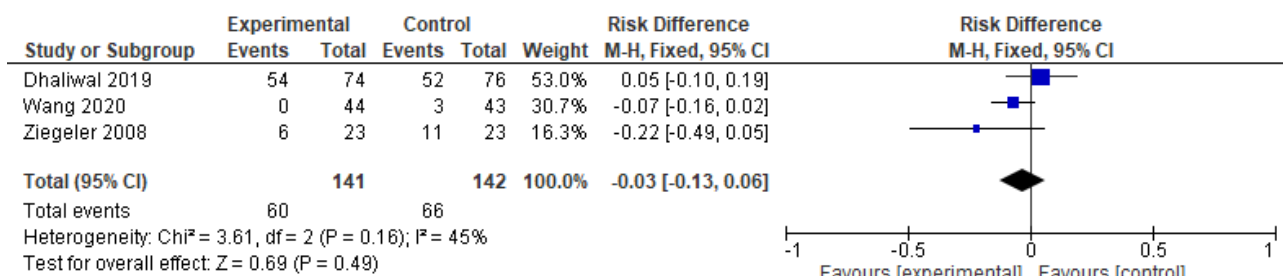
Epidural



Ketamine

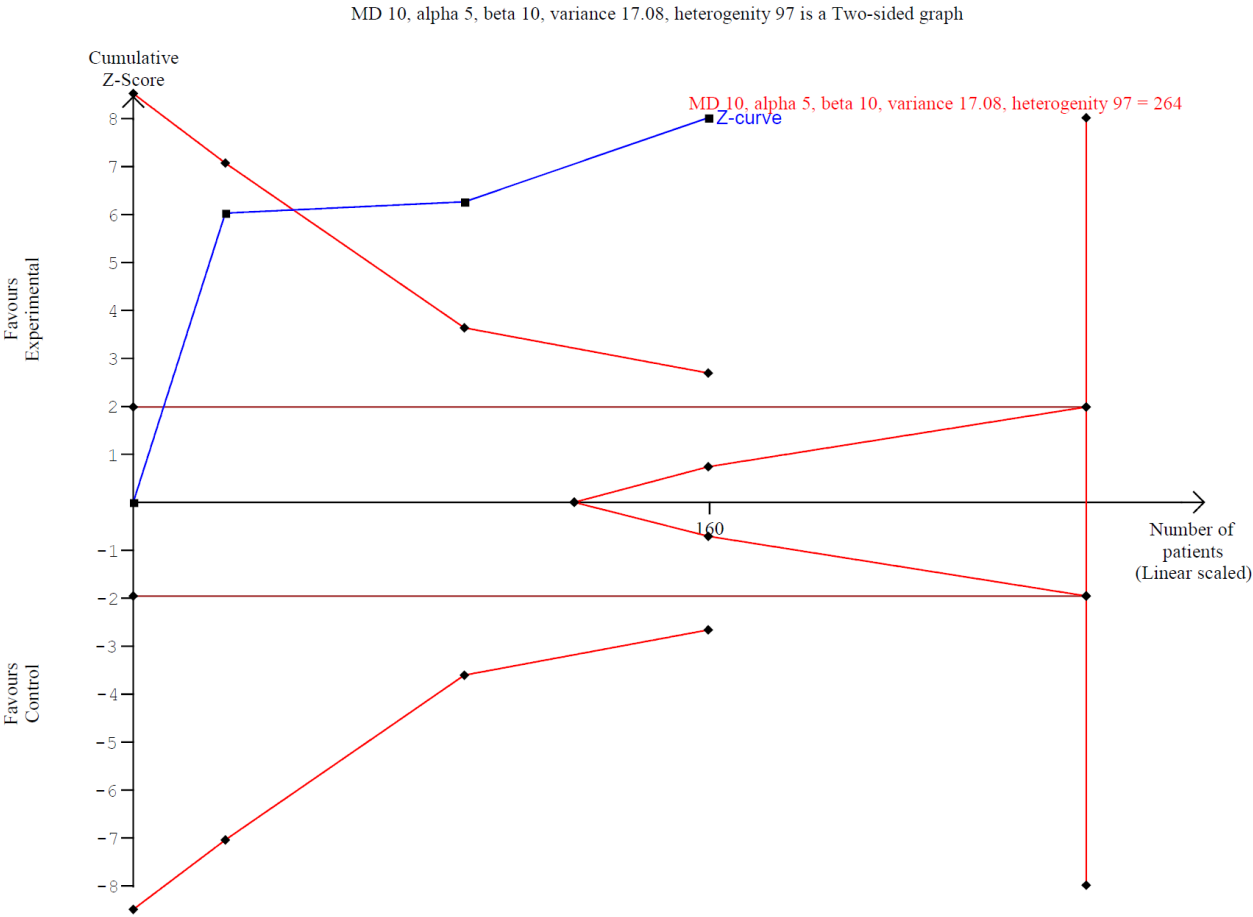


IT Morphine



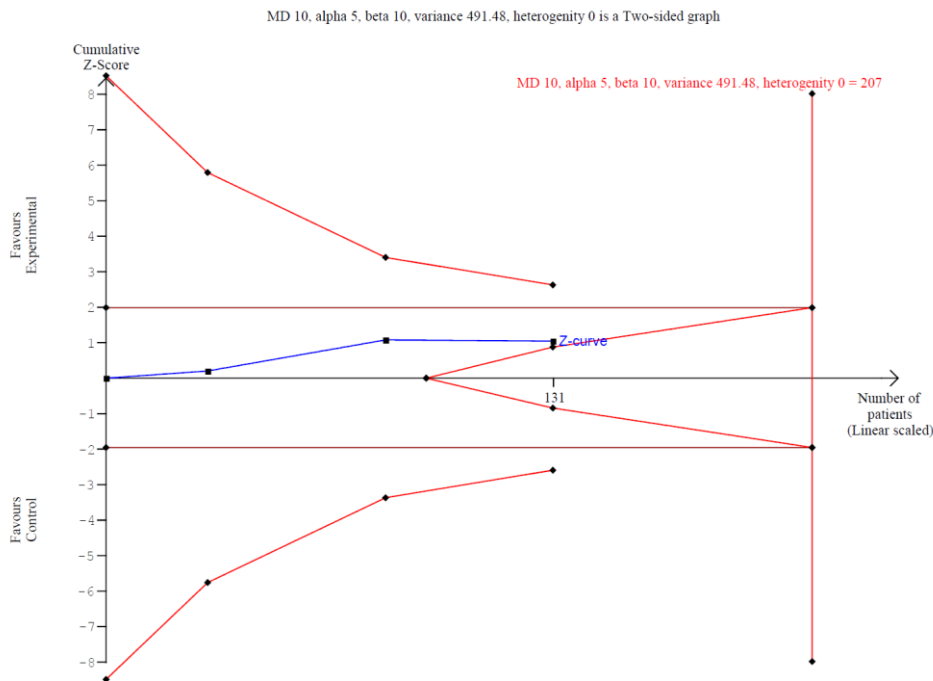
Appendix 6. Trial Sequential analysis, Epidural

Opioid consumption

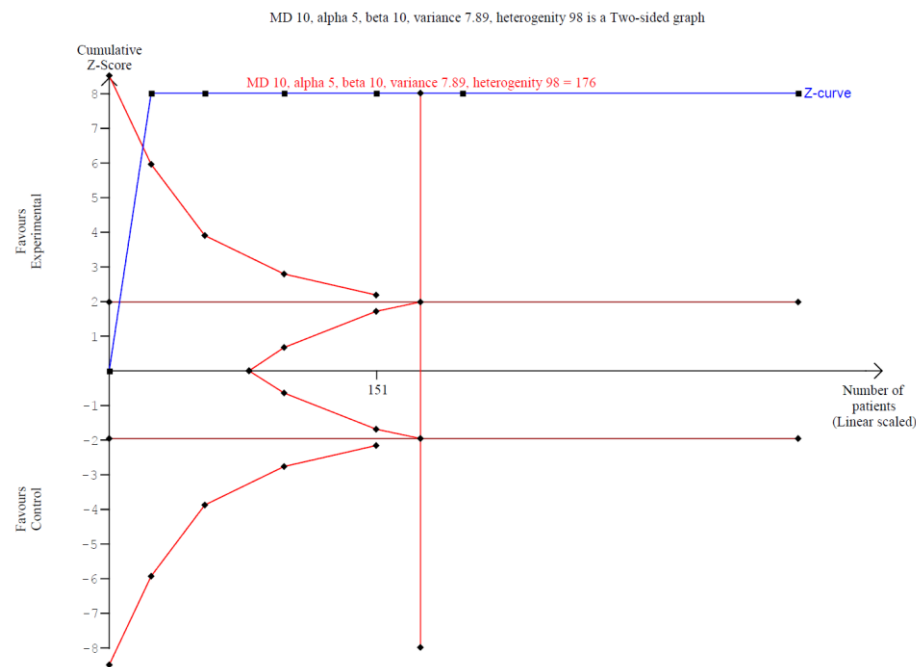


Appendix 7. Trial Sequential Analysis, Ketamine

6h pain during mobilization

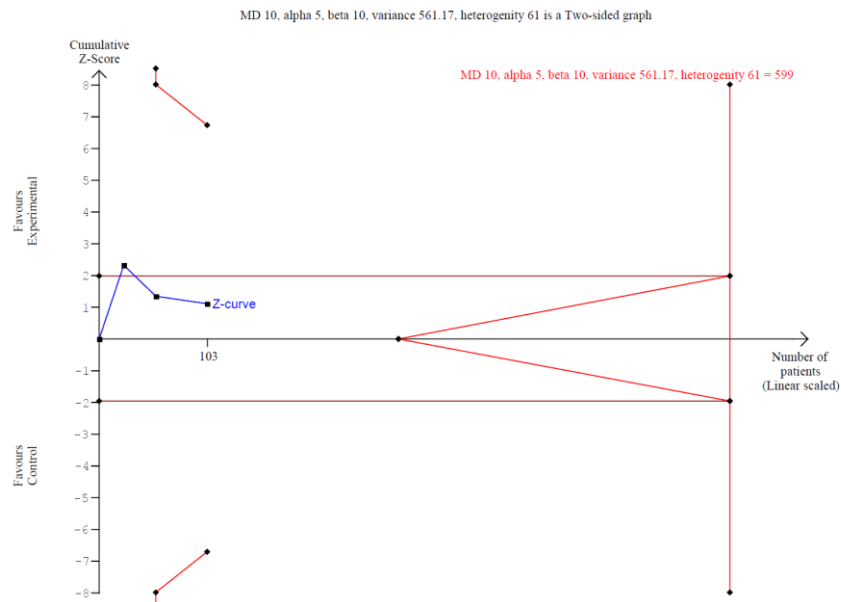


24h pain at rest

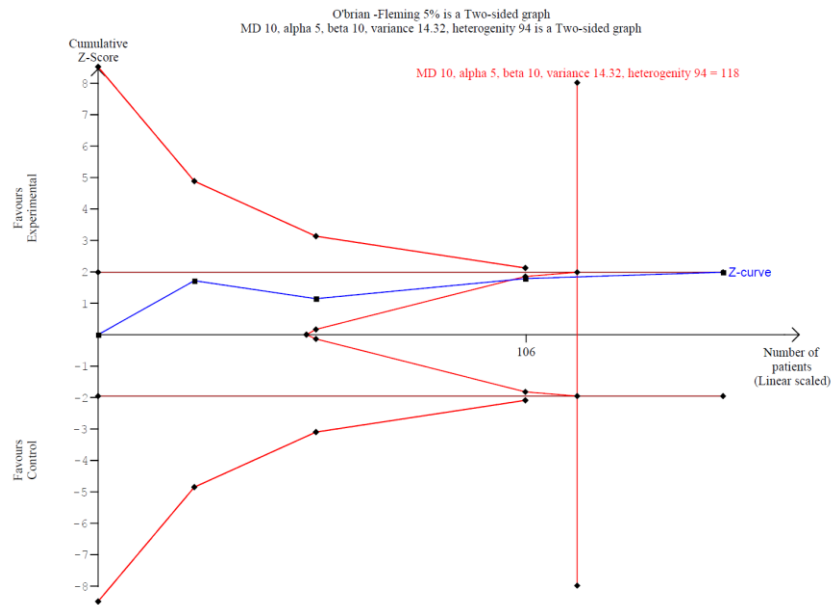


Appendix 7. Trial Sequential Analysis, Ketamine

24h pain during mobilization

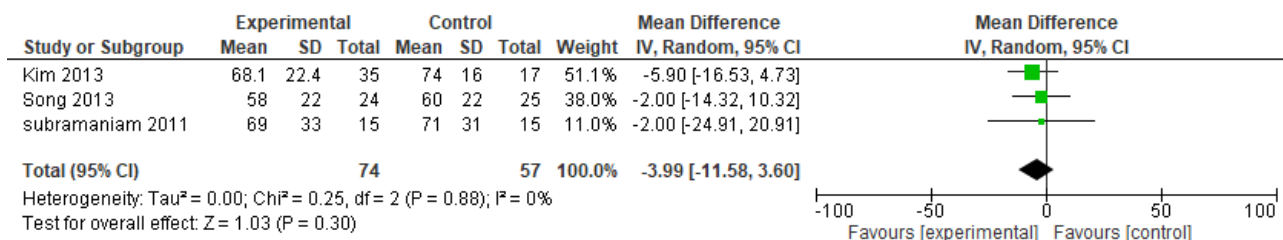


Opioid consumption

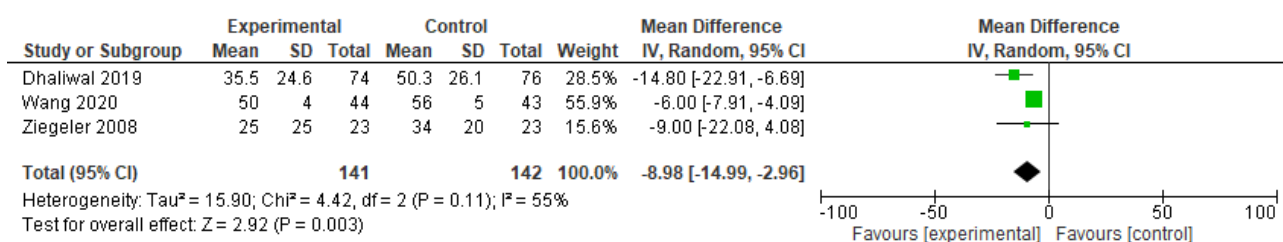


Appendix 8. 6 hr. pain during mobilization

Ketamine

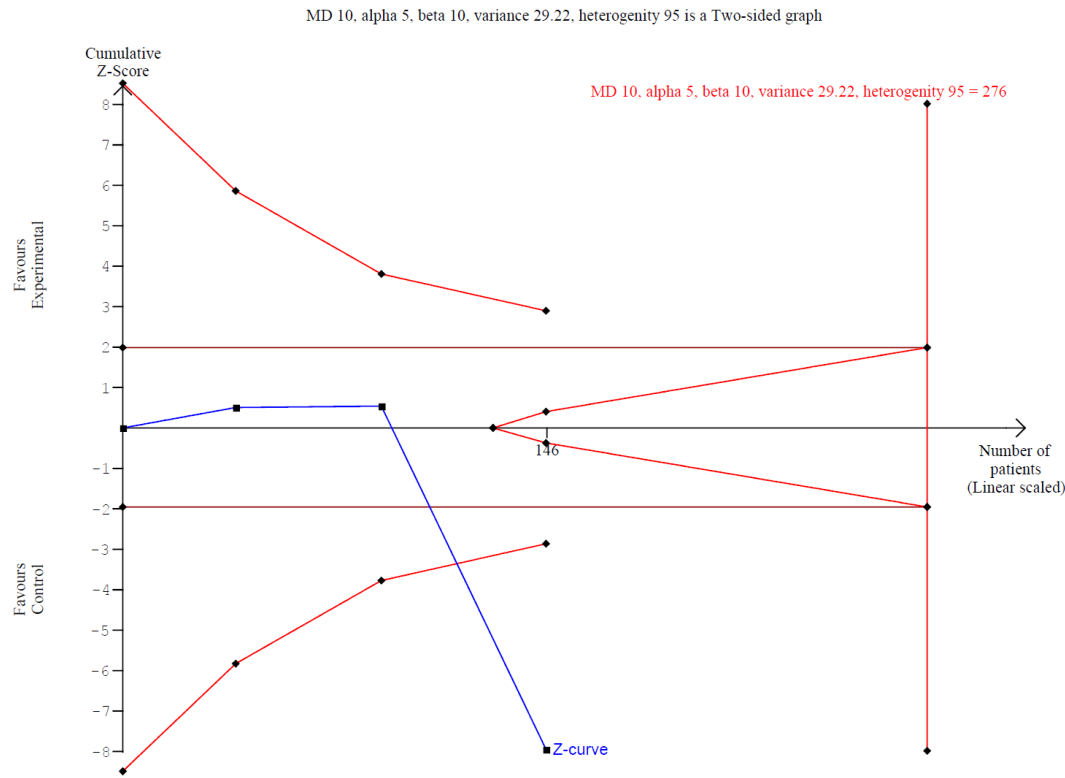


Morphine

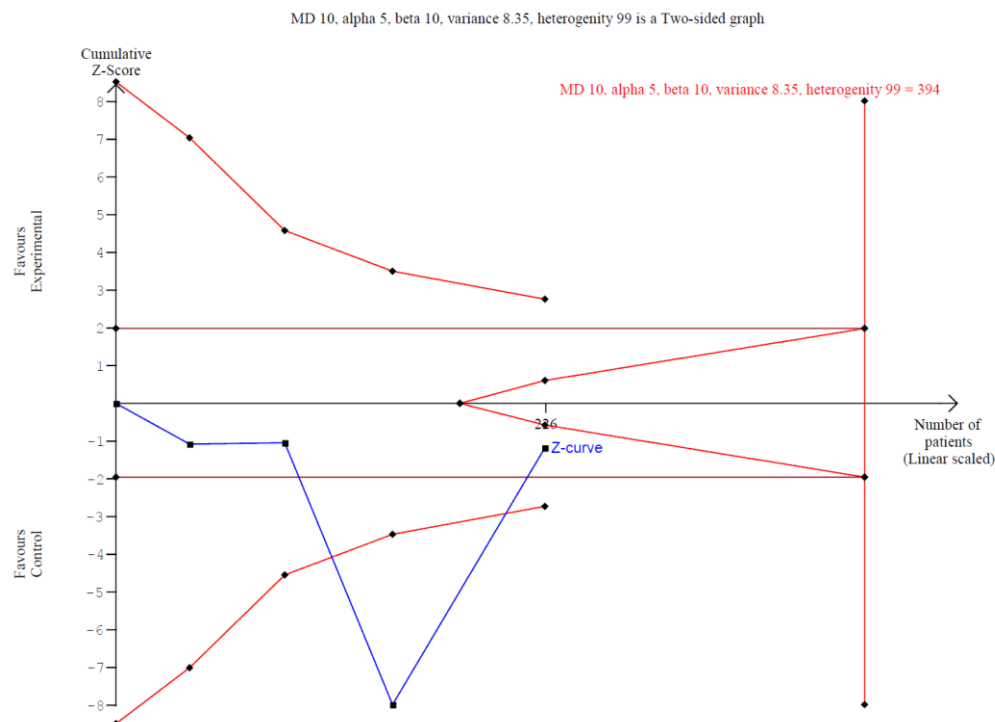


Appendix 9. Trial Sequential Analysis, Wound infiltration

24 hr. pain at rest

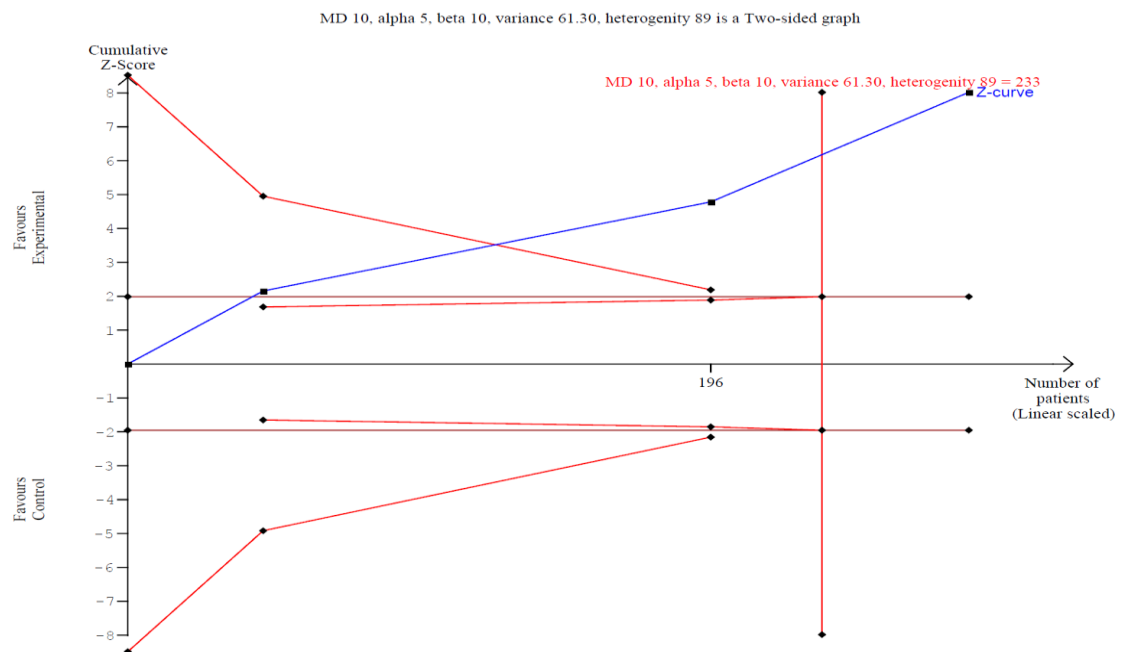


Opioid consumption

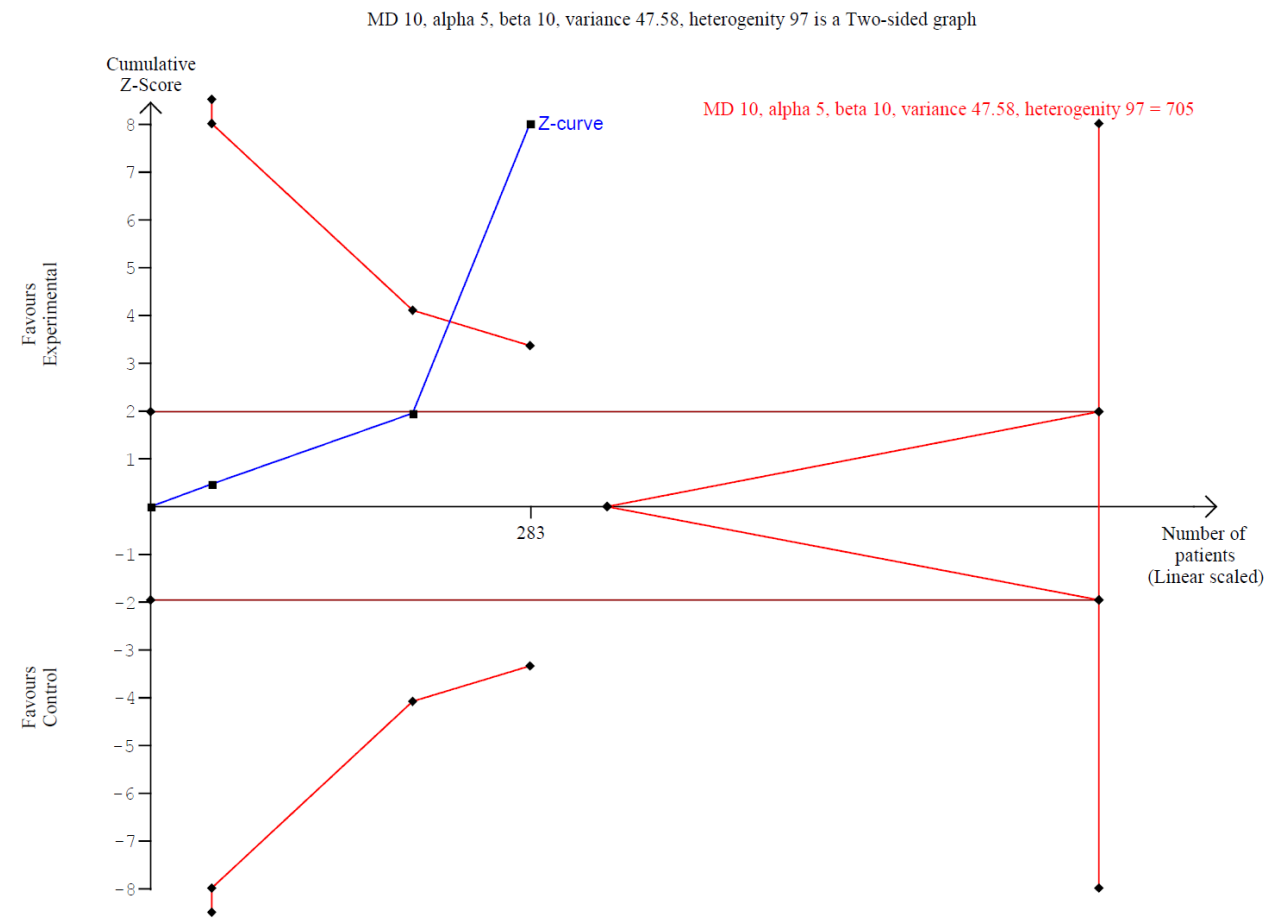


Appendix 10. Trial Sequential Analysis, IT Morphine

6 hr. pain at rest

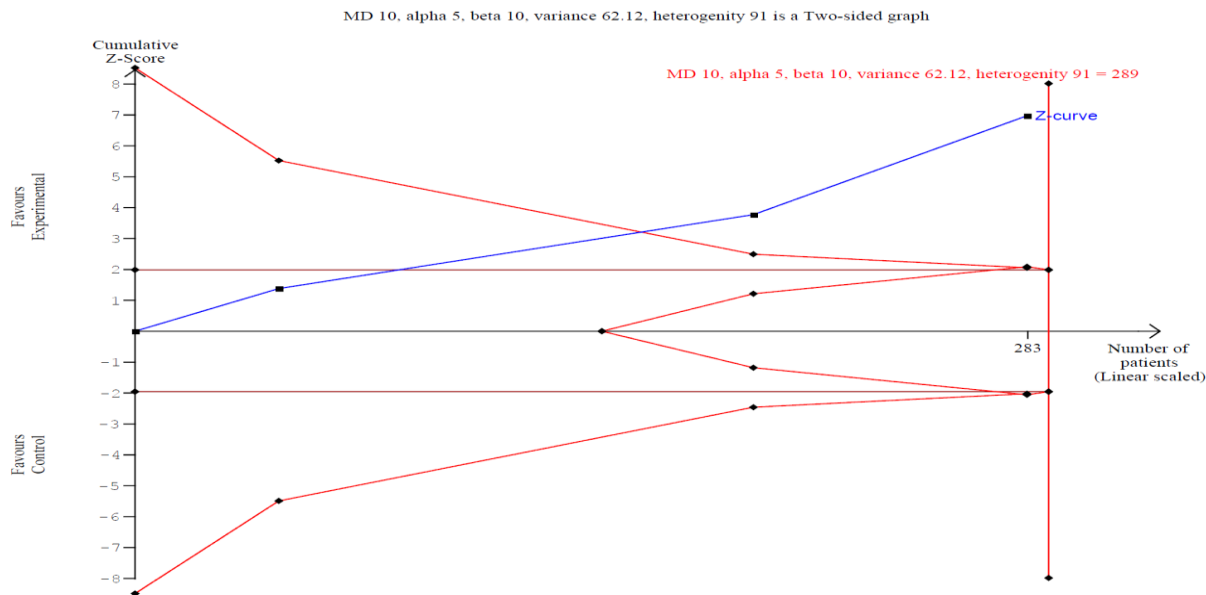


24 hr. pain at rest



Appendix 10. Trial Sequential Analysis, IT Morphine

6 hr. pain during mobilization



24 hr. pain during mobilization

