

# Does perioperative $\text{MgSO}_4$ reduce analgesic requirements in children undergoing scoliosis surgery?

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# 3 Part Hypothesis

1. Spinal surgery causes muscle injury
2. Postoperatively, spinal muscle undergoes spasm
3. Spasm leads to severe pain, which is treated with opiate analgesics



**↓ Reduced muscle spasm = ↓ Reduced opiate requirements?**

# Physiology of Magnesium

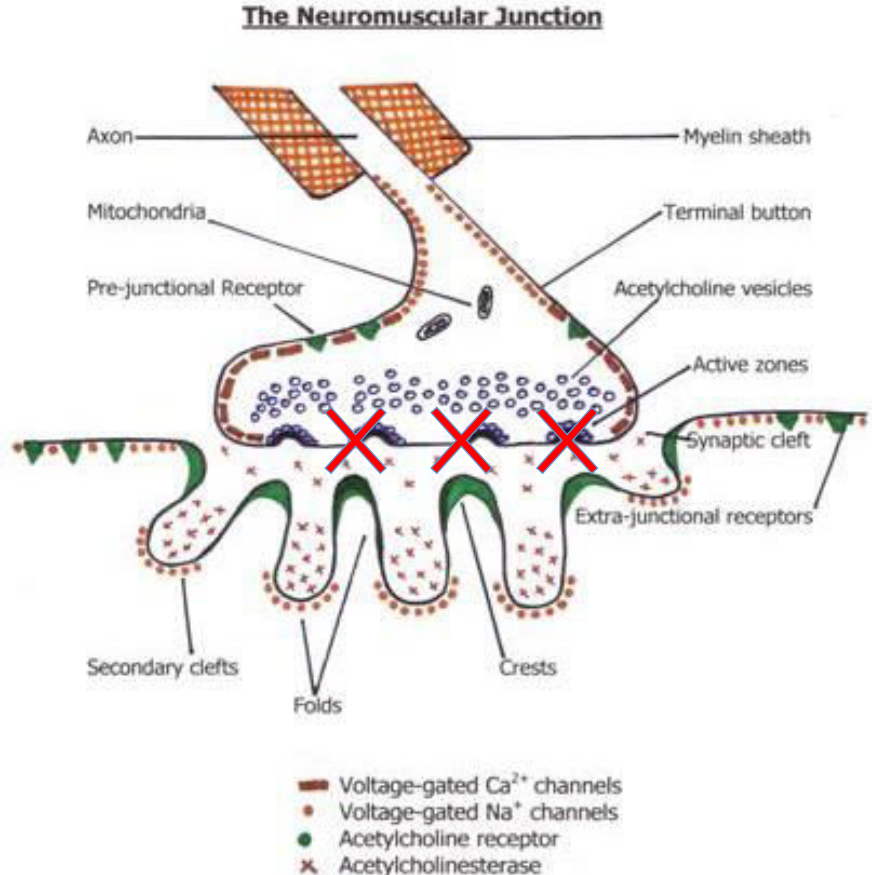
- 2<sup>nd</sup> most common intracellular cation
- Roles include:
  - Cardiomyocyte stability (Torsades des pointes VF arrest)
  - Bronchodilator (status asthmaticus)
  - Reduces uterine tone and contractility (pre-eclampsia and eclampsia)
- Magnesium can reduce muscle tone and has been proven to reduce opiate requirements in surgical patients

## Mechanism of Action

- Intracellular magnesium inhibits  $\text{Ca}^{2+}$  release by blocking ryanodine receptors
- Calcium cannot be released from intracellular stores – ACh isn't released across NMJ
- **NMJ depolarisation rate reduces**

## Anaesthetic Value?

Magnesium during surgery can reduce opioid consumption in the first 24hr postoperatively



# Methods

- Inclusion criteria:
  - 12-18 year olds
  - Posterior scoliosis correction
  - Surgery within the past year
- Exclusion criteria:
  - Patients with learning disability
  - Previous surgery
  - Growing spine procedures

# Methods

- Examined patient notes, recording all intraoperative and post-operative pain relief given and total days stay in hospital
- Stratified patients: MgSO<sub>4</sub> vs no MgSO<sub>4</sub> (different anaesthetic practices during the same time period)
- 2 groups were matched for age, sex, Cobb angles, correction indices and number of levels instrumented
- Standardised opiate analgesics to oral morphine equivalent

# Standardised Opiate Conversion

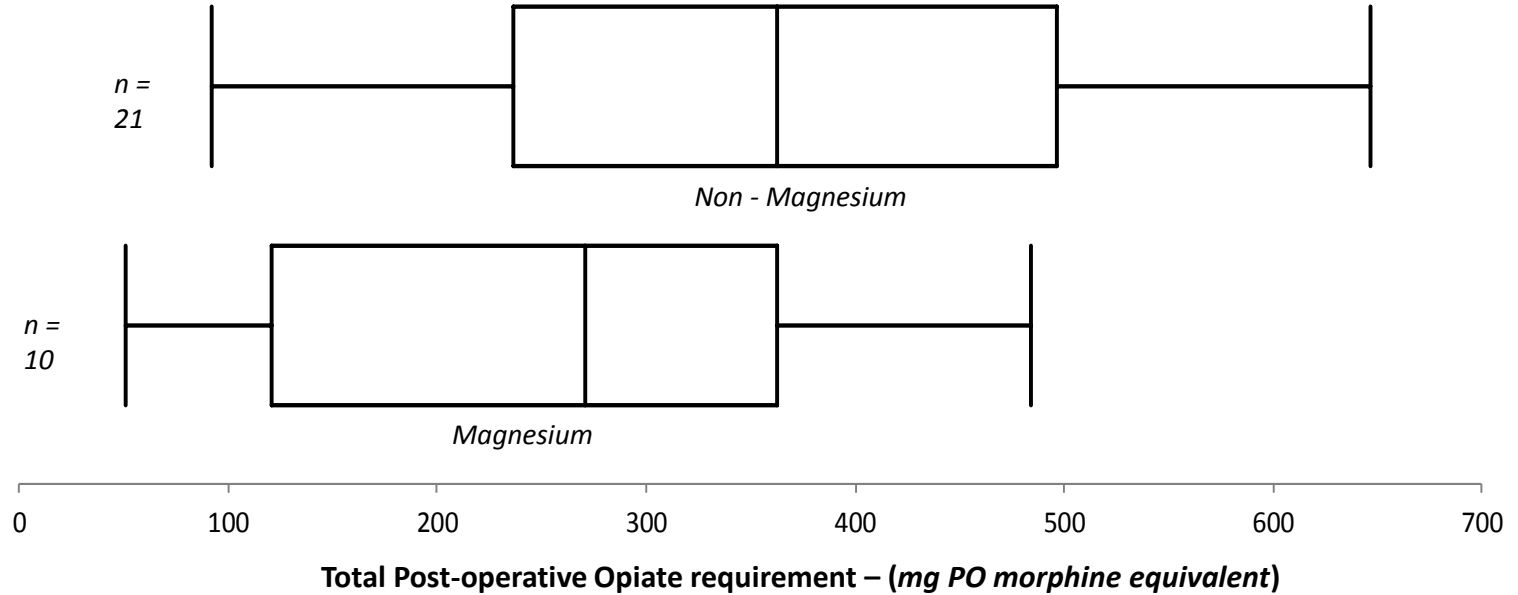
Analgesic	Route	Dose
Codeine	PO	100mg
Diamorphine	IM, IV, SC	3mg
Dihydrocodeine	PO	100mg
<b>Morphine</b>	<b>PO</b>	<b>10mg</b>
Morphine	IM, IV, SC	5mg
Oxycodone	PO	6.6mg
Tramadol	PO	100mg
Zomorph*	PO	10mg

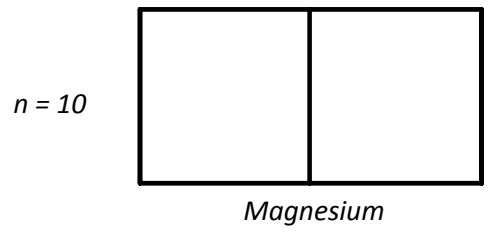
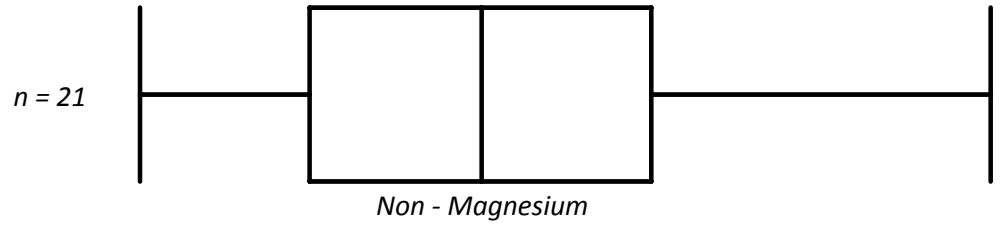
*PO = by mouth; IM = intramuscular, IV = intravenous, SC = subcutaneous*

# Key Findings

	Patients received MgSO4	Patients <u>not</u> receiving MgSO4
Number patients:	10	21
Average post-op opiate requirement (mg PO morphine equivalent)	252.4 mg	371.4 mg
Average length of stay (days)	5	6.2
% patients requiring adjuvant pain medication	30 %	66.6%
Average dose Gabapentin (mg) received	1067 mg	2838 mg







3 4 5 6 7 8 9

**Number of days stay (post-op)**

# To Summarise...

Patients who received IV MgSO<sub>4</sub> post-op:

- ✓ **On average required 120mg less oral morphine post-op**
  - ✓ **Spent 1.2 days less in hospital recovering**
  - ✓ **Required less adjuvant medication**

# Confounding Factors

- Degree of scoliosis correction
- Complications of surgery – e.g. infection
- Patient age
- Dose of MgSO<sub>4</sub> and timing of dose

# Conclusions

- Different analgesic requirements in patients receiving magnesium vs. those who did not.
- Use of magnesium could:
  - Reduce patients' opiate requirements & associated complications
  - Reduce patients' adjuvant analgesic requirements
  - Reduce patients' length of stay

**Any Questions?**