Shivering during caesarean delivery: A narrative review with systematic methodology of incidence, mechanisms and management

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INTRODUCTION

- Shivering is an unpleasant side effect during caesarean delivery (CD) under neuraxial anaesthesia (NA)
- Most studies focus on prevention and treatment
- Labouring (heat stress) and non-labouring (thermoneutral) CD are distinct thermal states
- This review compared the incidence, mechanisms and management of shivering during labouring and non-labouring CD under NA

METHODS

- A literature search of 4 databases (PubMed, EMBASE, Web of Science and Scopus) was conducted in May 2025 (PROSPERO CRD420251116895)
- Primary studies assessing shivering during emergency (labouring) CD and recent systematic reviews (SRs) of prevention and treatment strategies for shivering (labouring and non-labouring) under NA were included
- Data extraction and quality assessment was completed
- Ethics was not required.

RESULTS

- From 203 full texts, 24 studies were included (11 primary, 13 SRs).
- Please see Table 1 for a summary of results.
- Pharmacological management includes opioids, NMDA antagonists, α2-central agonists and 5-HT3 antagonists
- Non-pharmacological approaches include warming.
- Active warming for non-labouring CD was effective with negligible side effects.
- Only intrathecal fentanyl exhibits efficacy for CD with minimal side effects
- Other agents demonstrate mixed evidence and/or potential safety concerns.

	Non-labouring caesarean delivery	Labouring caesarean delivery
Thermal state at onset	Thermoneutral	Heat-stress
Common anaesthetic technique	Spinal	Epidural top-up or spinal
Incidence (range)	8.15%-85% (Elective CD)	7.14%-80% (Emergency CD)
Likely predominant mechanism	Thermoregulatory shivering	Non-thermoregulatory tremor due to a reduction in perceived body temperature, endogenous and exogenous catecholamines
Core temperature trend	Decrease due to heat redistribution from core to peripheries	Normal or elevated
Effective prevention/ treatment	Active warming strategies	Limited evidence; avoid routine warming

Table 1- Summary of shivering incidence, mechanism and management methods

DISCUSSION

- Due to distinct mechanisms management strategies for shivering should differ
- Active warming is effective during non-labouring CD but may be inappropriate during labouring CD due to core temperatures
- Evidence is currently limited by poor study quality
- Future research should group patients by thermal state (labouring vs. non-labouring)
- Continuous core temperature methodology should be used to record the thermal consequences of shivering interventions

CONCLUSION

- Shivering during CD likely arises from different mechanisms depending on whether the patient is labouring or not; thus, management strategies should be individualised
- Active warming is effective during non-labouring CD but may be inappropriate during labouring CD
- Medication may be considered for shivering during labouring CD depending on impact and potential side effects of the agent - any intervention should avoid exacerbating the underlying cause and minimise potential side effects
- Clinicians should employ continuous core temperature monitoring and aim to treat patients according to their thermal state