Implantable spinal infusion devices for chronic pain and spasticity: an accelerated systematic review
Simpson B, Middleton P, Maddern G

CRD summary
This review assessed the safety and efficacy of implantable spinal infusion devices to deliver opioids for the treatment of chronic pain and baclofen for the treatment of spasticity. The authors concluded that spinal infusion devices appear safe and effective, though this was based on limited evidence. Given the weak evidence and methodological weaknesses in the review, the findings should be interpreted with caution.

Authors' objectives
To assess the safety and efficacy of implantable spinal infusion devices for treating chronic pain and spasticity.

Searching
MEDLINE, PREMEDLINE, EMBASE, Current Contents and PubMed were searched from inception to April 2003 without any language restriction; the search terms were not reported.

Study selection

Study designs of evaluations included in the review
Randomised controlled trials (RCTs), non-randomised controlled studies and case series were eligible for inclusion.

Specific interventions included in the review
Studies assessing implantable spinal infusion devices were eligible for inclusion. The included studies assessed intrathecal delivery of opioids and baclofen. Studies comparing intrathecal baclofen with intrathecal saline internally were excluded. One study comparing epidural and intrathecal infusion methods was excluded because it did not add to the evidence base available from the case series. The one included comparative study compared an implantable drug delivery system (IDDS) delivering opioids with comprehensive medical management (CMM).

Participants included in the review
Studies of patients with chronic pain or spasticity were eligible for inclusion. The included studies were of diverse patient groups with neuropathic, nociceptive and deaffernation pain or spasticity related to numerous conditions. All the studies screened patients for response to intrathecal medication prior to implantation.

Outcomes assessed in the review
Studies assessing safety or efficacy were eligible for inclusion. The included studies assessed pain, spasticity, functional outcomes, toxicity, quality of life and depression. A range of outcome measures were used, the most common being a visual analogue scale (VAS).

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors stated that the studies were examined for factors that may have introduced bias, although specific criteria were not pre-specified. The authors did not state how the papers were assessed for validity, or how many reviewers performed the validity assessment.

Data extraction
One reviewer extracted the data and a second reviewer checked them.

**Methods of synthesis**
How were the studies combined?
A narrative synthesis of the studies was conducted.

How were differences between studies investigated?
Differences between the studies were reported in tabular format. Studies administering opioids and baclofen were discussed separately.

**Results of the review**
Seven studies were included: one RCT and six case series.

Intrathecal opioids for the treatment of chronic pain (1 RCT and 2 case series).

When using the intention-to-treat analysis from the RCT of 202 patients there was no statistically significant difference between CMM and IDDS for pain relief measured on a VAS, although when using the less conservative 'as treated' data there was a statistically significant greater reduction in pain for the IDDS patients than for the CMM patients. There was also a greater reduction in the composite toxicity score for the IDDS group compared with the CMM group. Estimated cumulative survival was 53.9% with IDDS and 37.2% with CMM. One case series of 30 patients reported statistically significant improvements from baseline to follow-up in pain, while the other case series of 82 patients reported improvements in pain though this was not statistically significant.

The RCT reported no statistically significant differences between IDDS and CMM in the total number of complications. Mortalities were reported, but no deaths were attributed to the therapy. There were some commonly reported drug-related physical side-effects. Device-related complications were reported as occurring infrequently. Catheter complications were frequent, while wound complications occurred infrequently.

Intrathecal baclofen (2 case series).

One case series of 131 patients reported a statistically significant decrease in spasticity, while the other case series of 115 centres reported improvements on a range of functional and other outcomes.

The total number of complications was not reported by either of the two studies. Mortalities were reported but were not attributed to the therapy. There were some commonly reported drug-related physical side-effects. Device-related and catheter-related complications were reported as occurring infrequently.

**Cost information**
The review identified three studies that assessed costs using different approaches to cost analysis. It was concluded that the treatment of chronic pain via intrathecal opioids and spasticity via intrathecal baclofen may be less costly than medical management in the long term.

**Authors' conclusions**
The infusion of opioid agents for the treatment of chronic pain or baclofen for the treatment of spasticity, intrathecally via implantable infusion devices, appeared safe and effective, although this conclusion was based on limited evidence.

**CRD commentary**
The inclusion criteria were poorly defined, therefore the research question was somewhat unclear. Several relevant databases were searched without any language restrictions. However, specific attempts to locate unpublished studies were not made, thus relevant studies might have been missed. Apart from the data extraction, the review methodology was not described clearly; it was therefore unclear whether appropriate measures had been taken to reduce error and
bias. Study quality did not appear to have been systematically assessed, although a limited critical appraisal of the included studies was reported. It was appropriate to combine the studies in a narrative, though the reason why two of the included studies were not mentioned in the synthesis was unclear. The authors' statement that their conclusions are based on limited evidence is appropriate. Given the weak evidence and methodological weaknesses in the review, the findings should be interpreted with caution.

**Implications of the review for practice and research**
The authors did not state any implications for practice or further research.

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