Acute hospital-based spinal cord injuries services

Effectiveness and cost-effectiveness of acute hospital-based spinal cord injuries services: systematic review

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Executive summary

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Executive summary

Objectives

The review aims to examine the following four questions:

1. the effectiveness and cost-effectiveness of spinal fixation surgery
2. immediate versus delayed referral to a spinal injuries unit (SIU)
3. how many people with a new spinal cord injury (SCI) are discharged from hospital without ever being transferred to an SIU
4. the effectiveness and cost-effectiveness of steroids for people with SCI.

Methods

Search strategy

Three separate search strategies were devised to find studies about:

- spinal fixation surgery
- referral, transfer and discharge of spinal cord injured patients
- steroid use for people with SCI.

Inclusion and exclusion criteria

Participants

People of any age with a complete or partial interruption of spinal cord function resulting from trauma.

Interventions

Q1 – surgical spinal fixation compared with any other treatment
Q2 – immediate versus delayed referral to SIU
Q3 – transferral to SIU, non-transferral to SIU
Q4 – steroids versus any other intervention.

Outcomes

All reported clinical outcomes were recorded. Outcomes such as radiological evaluation were given less emphasis.

Study design

Q1a – controlled studies
Q1b – controlled studies
Q2 – controlled studies or large case series
Q3 – any published data
Q4 – randomised controlled trials (RCTs) and systematic reviews.

Two reviewers independently screened all study citations for inclusion. The reference lists of all retrieved studies were scanned for additional studies. Excluded studies are reported.

Data extraction and quality assessment strategy

Quality of studies was assessed, according to criteria set out in NHSCRD's Report 4, and data were extracted by one reviewer and checked by the second. Quality scores were not assigned to studies, but the results of quality assessment are discussed in the text.

Methods of analysis/synthesis

Data from included studies were summarised within each research question category. For dichotomous data, relative risks were calculated with 95% confidence intervals. Pooled relative risks were calculated as appropriate. For continuous data, mean differences with 95% confidence intervals were calculated and, if data were pooled, weighted mean differences were calculated. Statistical heterogeneity was assessed. Where pooling was not sensible, data were summarised narratively, giving prominence to studies with the least biased designs.

Methods for assessing cost-effectiveness

For each of the study questions described above, searches were carried out to identify economic evaluations. Details of each published economic evaluation, together with a critical appraisal of its quality are presented in structured tables. Quality was assessed using a checklist updated from that developed by Drummond and co-workers. This checklist has been supplemented with additional comments on the adequacy of methodology where this is appropriate.

Results

Question 1a. Spinal fixation versus no fixation

Sixty-eight studies were found: many were poorly reported or of poor validity. Most were retrospective observational studies and many included people with spinal injury but without SCI. The decision on whether to operate often ▶

depended on the severity of the injury. In many studies, results of surgery with and without fixation were reported together. Heterogeneity was seen in many results which did not seem to be explained by severity of injury, types of surgery performed, country of study, year of publication or sample size.

It is unclear whether fixation surgery is associated with neurological improvement. Neurological deterioration did not differ between groups. There was significantly less mortality in the fixation group. Fixation surgery was more likely to be associated with device failure (which is not surprising) and wound infection, and less likely to be associated with instability of the spine. Data on urinary status and length of stay were equivocal. Fixation was associated with increased functional ability (to walk), shorter time to mobilisation and possibly increased independence in daily living activities.

It is unclear whether early fixation is more likely to lead to neurological improvement, shorter duration of hospitalisation or improved urinary status than late fixation.

Question 1b. Fixation surgery in spinal injury units (SIUs) compared with non-SIU hospitals

Only four studies were found. No significant differences were seen.

Question 2. Delayed referral to a SIU

All 28 studies were retrospective observational studies. In most, study details were poorly reported and there was doubt over the comparability of groups at baseline and on confounding factors. Times of referral and transfer were not reported separately.

Evidence suggested an effect in favour of the SIU group for neurological improvement. No differences were seen between early and late referrals. There was no difference in functional outcome between groups. Data on death rates in early versus late referrals and SIU versus non-SIU groups were equivocal.

Rates of most complications did not differ significantly between the two groups. The SIU group were less likely to develop pressure sores. One study showed that patients undergoing early referral experienced fewer overall complications than late referrals. Patients in the early referral group had a lower risk of developing pressure sores; this effect may have been time dependent. Delayed referral patients were more likely to experience a wide variety of complications.

Data from one study showed that patients treated in SIUs were less likely to need assistance with many activities of daily living. The study also found that patients in the SIU cohort spent more hours out of the house per week and were more likely to be in paid employment.

Patients receiving treatment in SIUs were more likely to have experienced shorter lengths of stay in hospital. Evidence suggested that patients undergoing early referral experienced shorter acute hospitalisation times.

Question 3. How many people with a new SCI are discharged from hospital without ever being transferred to an SIU?

No relevant published studies of any design were found. Primary research should be commissioned and published.

Question 4. Steroids

The evidence suggested that treatment with high-dose methylprednisolone within 8 hours of injury resulted in greater motor function recovery (of around four points, measured by standard clinical examination) compared with placebo. However, the practical relevance of this improvement was not stated. No effect was seen when all patients treated with methylprednisolone within 24 hours were compared with those treated with placebo. Greater pinprick sensation was shown in all patients in the methylprednisolone group at 6 months but this beneficial effect was not evident at 1 year. Comparison of a 10-day regimen of high-dose with low-dose methylprednisolone found no differences between groups except that wound infection was higher in the high-dose group.

Economics

No studies were identified that considered both costs and the impact on patient outcomes of a given intervention. We were therefore unable to present any useful cost information which may have helped to improve the decision-making process.

Conclusions

Only retrospective observational studies were found which assessed spinal fixation surgery or delayed referral to SIUs. In most studies ►

there was doubt over the comparability of groups, at baseline and on confounding factors. Although there was evidence to suggest some benefits of fixation surgery and also a benefit of immediate referral to SIUs compared with delayed or no referral, owing to the limitations of the data these should be interpreted with caution.

In general, there was little investigation of the implications of the interventions from the point of view of the patients, relatives or partners. Primary qualitative research should be carried out among users to understand what outcomes are important, and patients should be involved in study design.

Data on effectiveness of spinal fixation surgery is high in quantity but low in quality. Spinal fixation does not appear to offer advantages in terms of neurological improvement, length of hospital stay or urinary status. Spinal fixation patients experienced less mortality, spinal instability or psychological problems. They were more likely to be mobile in a shorter time and independent in activities of daily living than non-fixation groups. They were more likely to experience wound infection, device failure and loss of spine flexibility. Not enough data were found to assess whether surgery is most beneficial when carried out in SIUs. Further research of higher quality is required in this area.

Patients undergoing immediate referral to SIUs may experience better outcomes than patients whose referral is delayed, or who are treated elsewhere. Owing to the questionable comparability of groups in the majority of studies, the evidence to support this conclusion is weak. Well-designed prospective observational studies with appropriately matched controls are needed.

High-dose methylprednisolone steroid therapy may be effective in promoting some degree of neurological recovery if given within 8 hours of injury. There is a need for more RCTs of pharmacological therapy for acute SCI.

We found no published studies of any design which would help to answer the question of how many people with acute SCI are discharged from hospital without ever being transferred to an SIU. Primary research involving audit of selected hospital records or a search of national hospital activity data should be commissioned and published.

The search strategy did not identify any full economic evaluations, that is, no study considered the costs as well as the impact on patient outcomes of a given intervention. Future research should include full economic evaluations, possibly alongside a large RCT, which fully consider the costs and consequences of implementing interventions.

Publication

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