A systematic review of treatments for mild traumatic brain injury
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CRD summary
This review assessed interventions for mild traumatic brain injury in adults. The authors concluded that there were few rigorous studies available, but there is evidence for the effectiveness of patient education interventions. This was a well-conducted review and the cautious conclusion is likely to be reliable.

Authors' objectives
To assess the effectiveness of interventions for mild traumatic brain injury (MTBI) in adults.

Searching
MEDLINE, EMBASE, HealthSTAR, EBM Reviews (including the Cochrane Library), PsycINFO and CINAHL (from 1982) were searched from 1980 to 2003; the search terms were reported. Sixteen relevant journals were handsearched, references of potentially relevant articles were checked, and a linked search for papers by the authors of included studies was conducted in Web of Science. Researchers in the field were also contacted. Only published studies reported in English were eligible for inclusion in the review.

Study selection
Studies of any intervention for MTBI performed within 5 years of the occurrence of the injury were eligible for inclusion. Eligible studies included adults aged 16 to 65 years who were defined by the authors of the study as having MTBI. Studies with a mixed population were included in the review if subgroup analyses by level of severity of the traumatic brain injury were reported. Case series and case studies were excluded from the review; all other study designs were eligible for inclusion. Inclusion criteria for the outcomes were not specified. Four types of interventions were evaluated in the included studies: pharmacotherapy, cognitive rehabilitation, patient education and others. The patients in the included studies were recruited from acute care and rehabilitation hospitals, specialty medical clinics and the community. The numbers of men and women were approximately equal, and ages ranged from 19 to 62 years. Time from injury to treatment ranged from at hospital discharge to 4.5 years post-injury. Injuries were received from a wide range of sources; the principal causes of MTBI in the included studies were motor vehicle accidents and falls, with assault, sport and recreational injuries, industrial accidents and domestic incidents also represented. The majority of studies used broad definitions of MTBI, with a variety of criteria employed. The included studies were randomised controlled trials (RCTs), controlled clinical trials (CCTs) and pre-test post-test designs with one or two groups. A wide range of outcomes were assessed: headaches, depression, cognitive performance, psychological distress, psychosocial functioning, functional disability and general post concussion syndrome (PCS).

Two reviewers independently assessed studies for inclusion in the review. Any disagreements were referred to a third reviewer.

Assessment of study quality
The validity of the included studies was assessed using an assessment tool designed by the Public Health, Research and Education Development programme. This assessed variables such as selection bias, confounding, blinding, treatment of withdrawals and drop-outs, and intervention integrity analysis. The studies were graded as strong, moderate or weak on each criterion, using a scoring key, and an overall score was calculated on the basis of these ratings.

Two reviewers independently performed the validity assessment. Any disagreements were resolved through discussion with the review team.

Data extraction
It appears that two reviewers independently extracted the data using a standardised form developed for the review.
Methods of synthesis
The results of each study were summarised individually and some differences between the studies in methodology, populations and interventions were discussed.

Results of the review
Twenty studies (n=2,147) were included in the review: 8 RCTs, 1 CCT and 11 pre-test post-test studies.

Four studies were graded 'strong' in the validity assessment, four were considered 'moderate' and twelve were 'weak'.

Pharmacotherapy (8 studies including 1 RCT).

The single small RCT (n=17) assessed the effect of desmopressin acetate versus placebo on mental performance and reported a minor improvement in information processing rate and immediate recall (p<0.05 in each case). Other studies found mixed results for amitriptyline or sertraline on a variety of outcomes. A single study evaluated dihydroergotamine and found positive results on memory, sleep and dizziness.

Cognitive rehabilitation (3 studies).

Three pre-test, post-test studies reported positive outcomes of cognitive rehabilitation programmes for a variety of neuropsychological and functional outcomes.

Patient education (7 studies including 6 RCTs).

Two studies assessed minimal versus intensive education programmes. One found no difference at follow-up on symptomatology and functioning between patients in the single session group and those given a longer intervention course (improvements, p<0.001 for all patients). The second study found that CBT with an educational component was superior to education-based supportive counselling in patients with post-traumatic stress disorder (p<0.05). Five studies assessed an education intervention compared with normal hospital care, of which four (including 3 RCTs) found results statistically significantly in favour of the educational intervention on a variety of outcomes; the fifth study found no difference between the groups. A range of outcomes were assessed, however, and there were conflicting results with respect to the impact on symptoms, social and functional ability, and PCS.

Other interventions (2 studies including 1 RCT).

The RCT found evidence of short-term effectiveness for manual therapy compared with cold packs on post-traumatic headache (p<0.05) at 5 weeks. A pre-test-post-test study found beneficial effects of an outdoor challenge experience course on the patients' psychosocial functioning.

Authors' conclusions
There are few rigorous studies evaluating the treatment of MTBI. However, there is evidence to support the effectiveness of patient education interventions.

CRD commentary
The review question and the inclusion criteria were clearly if broadly defined. The authors searched a number of relevant databases and a wide range of additional sources, although the restriction to published studies reported in English might have increased the possibility that some relevant studies were not included in the review. The authors used appropriate measures to reduce bias and error throughout the review process and carried out a validity assessment using appropriate criteria, which was used to inform the evidence synthesis. The decision to employ a narrative synthesis appears appropriate in the light of the clinical and methodological heterogeneity between the studies, however, there was little attempt to synthesis the findings from different studies. The review used rigorous methodology and was well-reported, thus the cautious conclusions are likely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that education and support benefit patients with MTBI.
Research: The authors stated that further studies should, at a minimum, use a proper comparison group and ideally use a randomised design. Such studies should attempt to select participants from the community rather than hospital settings, and should focus on interventions currently being employed, in particular pharmacotherapies such as amitriptyline.

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