

Concussion Guidelines Step 1: Systematic Review of Prevalent Indicators

Supplemental Content 8 Evidence From Single Studies

The information in this section is derived from *single studies*, and thus is not a part of the Conclusions at this time.

Prevalence of signs and symptoms (Key Questions 1 and 2)

Signs Samples from multiple studies reporting signs show a relatively low occurrence of individual signs among subjects sustaining a PCE (See Table, Supplemental Content 10).

Symptoms reported immediately after the event, which *may* be indicators of concussion (based on absolute difference in proportions between PCE and comparator samples of adult athletes) are¹:

- headache (75% prevalent)
- dizziness (60% prevalent)
- blurred vision (75% prevalent)
- nausea (54% prevalent)

Supplemental Content 12 lists the 26 studies included in the analysis, and shows how symptoms were reported in each study. Data from one study¹ were reported in a way that could be used in this report; 12 publications reported symptoms as a single composite score, 7 did not report symptoms, and 6 reported symptoms without comparison groups.

Prevalence of deficits in objective measures of neurologic or cognitive function (Key Questions 1 and 2)

Objective measures that *may* be indicators of concussion (based on reported significant differences in group means between PCE and comparator samples) are deficits in:

- concentration, orientation, immediate memory, delayed recall, and a composite of these measures, immediately after injury,²
- processing speed within 1 day post-injury,³
- verbal memory within 5 days post-injury,⁴ and
- memory composite within 7 days post-injury.⁵

Associations between signs/symptoms and objective measures of neurologic/cognitive function (Key Question 3)

Signs Limited evidence from single studies about the associations between signs and objective measures of cognitive function show:

- amnesia or observed, documented disorientation lasting more than 5 minutes after injury is correlated with deficits in measures of memory at 36 hours, 4 days, and 7 days post-injury,⁵
- loss of consciousness and/or amnesia at the time of the event is correlated with deficits in concentration, orientation, immediate memory, delayed recall, and a composite of these measures taken immediately after injury,² and

- post-traumatic amnesia measured within 24 hours of the event is correlated with deficits in performance on a measure of processing speed taken within 1 day of injury.⁶

Symptoms Limited evidence from a single study about the associations between symptoms and objective measures of cognitive and neurologic function shows⁷:

- Self-report of “feeling mentally foggy” is correlated with deficits in measures of reaction time, both measured at 2 days post-injury,
- Self-report of “difficulty concentrating” is correlated with measures of verbal memory, both measured at 2 days post-injury,
- Self-report of having “difficulty remembering” is correlated with deficits in measures of reaction time and verbal memory, all measured at 2 days post-injury, and
- Self-report of having “balance problems” or “dizziness” is correlated with deficits in measures of balance, all measured at 2 days post-injury.

The information about the association between signs and symptoms of concussion, and objective measures of concussion, must be understood in light of the relatively low occurrence of most signs or symptoms among individuals sustaining a PCE who subsequently demonstrate post-injury neurologic or cognitive deficits. For example, based on evidence from studies included in this review, the prevalence of LOC in samples of individuals who sustained a PCE and were diagnosed with concussion ranges from 1% to 14%; PTA ranges from 2% to 30% (See Table, Supplemental Content 10). However, for those presenting these signs, limited evidence suggests a significant relationship between these signs and deficits in objective measures of neurologic or cognitive function.

REFERENCES

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