

Standardized concussion/ traumatic brain injury screening protocol for boxers and MMA combatants during and after a fight

In the ring and cage during a fight

If concern for concussion or traumatic brain injury arises during the course of the bout, the ringside physician shall assess the combatant preferably between the rounds. The evaluation will be carried out by the ringside physician during the 1-minute break between rounds or after the 1-minute break but before commencement of the next round by requesting the referee to call a time out. The ringside physician shall assess the combatant with the use of Maddocks questions. Maddocks questions include but are not restricted to:

- a) What venue are we at today?
- b) Who are you fighting today?
- c) What round is it now?
- d) Who did you fight last?

The ringside physician shall conduct a focused neurological evaluation of the combatant in the ring/cage. This evaluation shall include:

- a) Asking the combatant if he/she has any subjective complaints such as headache, dizziness, visual disturbances, nausea, feeling off-balance.
- b) Giving the combatant a two-step command (touch your right ear with your left glove).
- c) Assessment of pupil size symmetry and reactivity (integrity of cranial nerves II and III)
- d) Assessment of extraocular movements (integrity of midbrain and pons by assessment of cranial nerves III, IV and VI)
- e) Assessment of cerebellar function and infratentorial compartment integrity by checking gait and stance (stand still with feet together and/or tandem gait).

The ringside physician should be aware of the NO-GO criteria. If any one of the NO-GO criteria is present, consult with Chief Medical Officer (CMO)/Assistant Chief Medical Officer (ACMO) and consider advising the referee to stop the fight on medical grounds.^{1,2}

The NO GO criteria are the following

1. If the combatant exhibits any period of LOC or unresponsiveness after a KO.
2. If the combatant exhibits confusion (any disorientation or inability to respond appropriately to questions) at time of assessment by ringside physician.
3. If the combatant exhibits amnesia (retrograde / anterograde) when assessed by the ringside physician. The ringside physician shall assess for retrograde and anterograde amnesia in the ring/cage using Maddocks questions including but not limited to:

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- a) What venue are we at today?
- b) Who are you fighting today?
- c) What round is it now?
- d) Who did you fight last?

4. If the combatant voices to the ringside physician or his corner any new and/or persistent subjective symptoms such as headache, nausea, dizziness.

5. If the combatant vomits during the course of the fight (this criterion should not be used in isolation to stop a fight on medical grounds).

6. If the combatant has an abnormal neurological examination (ataxia, impaired balance, pupil size asymmetry and/or reactivity) when assessed by the ringside physician.

7. If the combatant has a convulsive seizure also at times referred to as an impact seizure (seizure occurring at the time the fighter's head makes impact with the ring/cage canvas).

In the post-fight examination area/locker room after the fight is over

The ringside physician shall assess for the presence or absence of concussion/ traumatic brain injury with the aid of a multimodal concussion screening and assessment battery including but not limited to:

a) Glasgow Coma Scale Score (best motor response, best verbal response and eye-opening). CGS score less than 13 is mandatory transfer to the emergency department (ED) of the designated Level I Trauma Center via on-site ambulance for urgent CT scan head to rule out acute traumatic brain injury.

b) Detailed neurological examination including higher mental function testing, cranial nerve II to XII testing, pronator drift testing, assessment of motor function, finger to nose testing, tandem gait assessment and Romberg's test.

c) Standardized Assessment of Concussion (SAC) test-check orientation, immediate memory, concentration, delayed recall (see attached SAC form).

d) Balance Error Scoring System (BESS) test-double leg stance, single leg stance and tandem leg stance (see attached BESS testing procedure).^{3,4}

Management of a concussed combatant is on a case by case basis with majority of combatants discharged from the venue with a medical suspension. Duration of the suspension may vary from 30 to 90 days with mandatory 90-day suspension and follow up with a neurologist if the concussion occurred by a KO. All combatants discharged home from the venue are instructed to remain in close observation of a family member/coaching staff for the next 24 hours with instructions to report to the nearest emergency department (ED) if any neurological symptom (headache, dizziness, blurred vision, vomiting, impaired balance) or sensorium (lethargy, unresponsiveness) is reported.^{5,6} All discharged combatants are educated about post-concussion symptoms with instructions to seek medical care if these are reported. A combatant may be referred to the ED of the nearest Level I trauma center for an urgent CT scan of the head and further evaluation if deemed appropriate by the ringside physician. Transport in these cases shall take place via on site ambulance.

Disclosure

The author serves as the Chief Medical Officer of the New York State Athletic Commission (NYSAC). The views expressed above are those of the author and do not reflect necessarily the views of the New York State Athletic Commission.

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None.

Conflicts of interest

The authors declare there is no conflict of interest.

References

1. Neidecker J, Sethi NK, Taylor R, et al. Concussion management in combat sports: consensus statement from the Association of Ringside Physicians. *Br J Sports Med.* 2019;53(6):328–333.
2. Erlanger DM. Exposure to sub-concussive head injury in boxing and other sports. *Brain Inj.* 2015;29(2):171–174.
3. Jayarao M, Chin LS, Cantu RC. Boxing-related head injuries. *Phys Sports med.* 2010;38(3):18–26.
4. Galetta KM, Barrett J, Allen M, et al. The King-Devick test as a determinant of head trauma and concussion in boxers and MMA fighters. *Neurology.* 2011;76(17):1456–1462.
5. Potter MR, Snyder AJ, Smith GA. Boxing injuries presenting to U.S. emergency departments, 1990-2008. *Am J Prev Med.* 2011;40(4):462–467.
6. Sawauchi S, Murakami S, Tani S, et al. Acute subdural hematoma caused by professional boxing. *No Shinkei Geka.* 1996;24(10):905–911.