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The July-August 2002 issue of

A Pediatric Perspective titled
"Coach, Can I Go In Again"
has been updated.

Please follow this link to the article,

"Managing Traumatic Brain Injury:
Best Practices Have Changed"

by Mark Gormley, Jr., M.D., and Leslie Larson, R.N., C.N.P.

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Several factors, such as the grade of the concussion, must be considered before an athlete returns to sports after a concussion. Grading the concussion is a helpful tool in managing the injury. Grades depend on the number of previous concussions, duration of post-traumatic amnesia, loss of consciousness and persistence of symptoms.

Concussion Grades

Each of the three grades of concussion presents different symptoms and requires different management.

Grade 1 (Mild)

With grade 1 concussions, the person is unable to maintain a coherent stream of thought and carry out goal-directed movements. There is no loss of consciousness, and concussion symptoms or mental status abnormalities on examination resolve in fewer than 15 minutes. Players may ask the same question repeatedly, such as, "What happened?" Or they may not know simple facts, such as the identity of the opposition.

Grade 2 (Moderate)

There is transient confusion with a grade 2 concussion, and the person may lose consciousness. Concussion symptoms or mental status abnormalities (including amnesia) on examination last more than 15 minutes, and players often cannot open their eyes. If the eyes are open, they appear unable to focus. Players with this grade of concussion typically do not answer to their names and may be limp.

patient's symptoms resolved in two weeks without surgery, but he was advised not to return to football.

Anecdotal

A 300-pound defensive lineman running 15 miles per hour hits a 250-pound fullback running 25 miles per hour with the same force as a car hitting a brick wall at 13 miles per hour (air bag will deploy).

Grade 3 (Severe)

With a grade 3 concussion, there is a loss of consciousness. Sometimes the unconsciousness is brief, lasting only seconds, and sometimes it is prolonged, lasting several minutes.

Frequently Observed Features of Concussion

- Vacant stares (befuddled facial expressions)
- Delayed verbal and motor responses (slow to answer questions or follow instructions)
- Confusion and inability to focus attention (easily distracted and unable to follow through with normal activities)
- Disorientation (walking in the wrong direction or unaware of time, date and place)
- Slurred or incoherent speech (making disjointed or incomprehensible statements)
- Gross observable incoordination (stumbling or inability to walk tandem/straight line)
- Emotions out of proportion to circumstances (distracted or crying for no apparent reason)
- Memory deficits (athlete repeatedly asks a question that has already been answered or is unable to recall a list of three words or three objects after five minutes)
- Any period of loss of consciousness (paralytic coma or unresponsiveness)

Treatment Recommendations for a First Concussion

Grade 1

- Remove from contest
- Examine immediately and at 5-minute intervals for mental status abnormalities or post-concussion symptoms at rest and with exertion
- Allow return to contest if mental status abnormalities or post-concussion symptoms clear within 15 minutes

Grade 2

- Remove from contest and prohibit return that day
- Examine on-site frequently for signs of evolving intracranial pathology
- Re-examine the athlete the following day (examination should be done by a trained medical professional)
- Have a physician perform a neurologic exam to clear the athlete for return to play after one full asymptomatic week (at rest and with exertion)

Grade 3

- Transport the athlete from the field to the nearest emergency department by ambulance if still

unconscious or if worrisome signs are detected (with cervical spine immobilization, if indicated)

- Have a physician perform a thorough neurologic evaluation immediately, including appropriate neuro-imaging procedures when indicated
- Admit to hospital if any signs of pathology are detected, or if the mental status of the athlete remains abnormal
- Return to play only after approval by a physician

When to Return to Play

Grade of Concussion	Return to Play Only After Being Asymptomatic With Normal Neurological Assessment at Rest and With Exercise
Grade 1 Concussion	15 minutes or less
Second or Subsequent Grade 1 Concussion(s)	1 week
Grade 2 Concussion	1 week
Second or Subsequent Grade 2 Concussion(s)	2 weeks
Grade 3 — Brief Loss of Consciousness (Seconds)	1 week
Grade 3 — Prolonged Loss of Consciousness (Minutes)	2 weeks
Second or Subsequent Grade 3 Concussion(s)	1 month or longer, based on decision of evaluating physician

Second-Impact Syndrome

Second-impact syndrome refers to events that may occur if a second concussion occurs while an athlete is still experiencing symptoms and recovering from a previous concussion. The second impact, which can occur days or weeks after the first concussion, is more likely to cause brain swelling and other widespread damage, and it can be fatal.

Athletes who sustain one concussion are three times more likely to sustain a second concussion than are players who have not experienced a concussion. Repeat concussions, regardless of the

grade, can increase the risk of post-concussion symptoms such as headaches, memory loss and difficulty concentrating. Chances of these symptoms occurring is even higher if the second injury is sustained too soon, before healing from the first has taken place. The higher the grade of the concussion, the higher the risk of long-term cognitive dysfunction.

Sideline Evaluation

The tests below can be used to determine general cognitive functioning.

Mental Status Testing	
Orientation	<ul style="list-style-type: none"> •Time, place, person and situation (circumstances of injury)
Concentration	<ul style="list-style-type: none"> •Months of the year in reverse order
Memory	<ul style="list-style-type: none"> •Names of teams in prior contest •Recall of three words and three objects at 0 and 5 minutes •Recent newsworthy events •Details of the contests (plays, moves, strategies, etc.)
Physical Tests	Neurological Tests
40-yard sprint Five push-ups Five sit-ups Five knee-bends	Strength Coordination and agility Sensation

Author's Profile

Mark E. Gormley, Jr., M.D.



Mark E. Gormley, Jr., M.D., is a physical medicine and rehabilitation specialist at Gillette Children's Specialty Healthcare in St. Paul, Minn.

Gormley graduated from the University of Louisville School of Medicine in Louisville, Ky., and completed his residency in physical medicine and rehabilitation at Tufts Affiliated Hospitals in Boston. He completed a fellowship at the Department of Physical Medicine and Rehabilitation at the University of Michigan Medical Center in Ann Arbor.

Gormley joined Gillette in 1993 and was appointed chief of staff in 2001 for a two-year term. He is board-certified in physical medicine and rehabilitation and a member of Pediatric Rehabilitation Associates.

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Gillette Children's
Specialty Healthcare

200 East University Avenue
St. Paul, Minnesota 55101
651-291-2848
TDD 651-229-3928
1-800-719-4040
www.gillettechildrens.org

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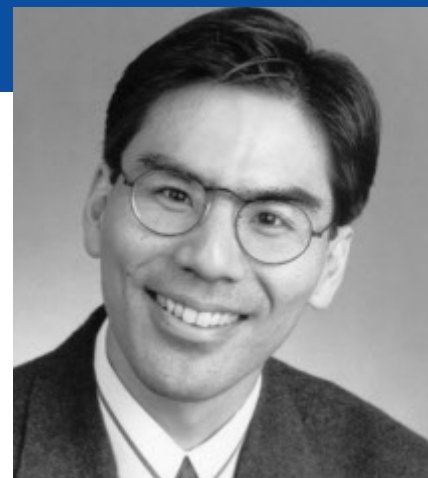
Referral Information

Gillette accepts referrals from physicians, community professionals and outside agencies. Contact the admitting manager at the number listed below. Physicians who are on staff may admit patients through our Admitting department from 7 a.m. to 4:30 p.m. Physicians who are not on staff should contact the admitting manager.

Admitting Manager 651-325-2145	Infant and Toddler Program 651-229-3917
Admitting 651-229-3944	Neuromuscular Program 651-229-1716
Arthritis Program 651-229-3914	Orthopaedic Program 651-229-1758
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Cerebral Palsy Program 651-290-8712	Spine Orthopaedics/ Upper Extremities Program 651-229-3929
Craniofacial Program 651-229-3905	

New at Gillette Marshall Taniguchi, M.D.

Marshall Taniguchi, M.D., a physical medicine and rehabilitation physician, will join Gillette Children's Specialty Healthcare and Pediatric Rehabilitation Associates (PRA) in September. He will be medical director of Rehabilitation at Gillette. In his PRA practice, he will see patients with brain injuries, cerebral palsy, spina bifida, brachial plexus injuries and other conditions at Gillette's St. Paul and West campuses.



Taniguchi received his medical degree from the University of Michigan in Ann Arbor. He completed a residency in physical medicine and rehabilitation at the University of Wisconsin in Madison and completed a fellowship in pediatric rehabilitation at Denver Children's Hospital, Denver, Colo.

Most recently, Taniguchi was medical director of Pediatric Rehabilitation at Children's Hospitals and Clinics in Minneapolis. Taniguchi is a member of the American Academy of Physical Medicine and Rehabilitation, the American Academy of Cerebral Palsy and Developmental Medicine, and the American Association of Electrodiagnostic Medicine. He is board-certified by the American Academy of Physical Medicine and Rehabilitation and by the American Board of Electrodiagnostic Medicine.



Keep this card for easy reference on concussions and how to manage such injuries.

Full article printed in the July/August 2002 issue of *Pediatric Perspectives*, a publication of *Gillette Children's Specialty Healthcare*.

Management of Concussion in Sports

Grades of Concussion

Grade 1:

1. Transient confusion (inattention, inability to maintain a coherent stream of thought and carry out goal-directed movements)
2. No loss of consciousness
3. Concussion symptoms or mental status abnormalities on examination resolve in **less than 15 minutes**

Grade 2:

1. Transient confusion
2. No loss of consciousness
3. Concussion symptoms or mental status abnormalities (including amnesia) on examination last **more than 15 minutes**

Grade 3:

1. Any loss of consciousness
 - a. Brief (seconds)
 - b. Prolonged (minutes)

Management Recommendations

Grade 1:

1. Remove from contest
2. Examine immediately and at 5-minute intervals for the development of mental status abnormalities or post-concussive symptoms at rest and with exertion
3. May return to contest if mental status abnormalities or post-concussive symptoms clear within 15 minutes

Grade 2:

1. Remove from contest and disallow return that day
2. Examine on-site frequently for signs of evolving intracranial pathology
3. A trained person should re-examine the athlete the following day
4. A physician should perform a neurologic examination to clear the athlete for return to play after 1 full asymptomatic week at rest and with exertion

Grade 3:

1. Transport the athlete from the field to the nearest emergency department by ambulance if still unconscious or if worrisome signs are detected (with cervical spine immobilization, if indicated)
2. A thorough neurologic evaluation should be performed emergently, including appropriate neuroimaging procedures when indicated
3. Hospital admission is indicated if any signs of pathology are detected, or if the mental status of the athlete remains abnormal

When to Return to Play

Grade of Concussion:	Return to Play Only After Being Asymptomatic with Normal Neurological Assessment at Rest and With Exercise:
Grade 1 Concussion	15 minutes or less
Multiple Grade 1 Concussions	1 week
Grade 2 Concussion	1 week
Multiple Grade 2 Concussions	2 weeks
Grade 3 — Brief Loss of Consciousness (seconds)	1 week
Grade 3 — Prolonged Loss of Consciousness (minutes)	2 weeks
Multiple Grade 3 Concussions	1 month or longer, based on decision of evaluating physician

Features of Concussion Frequently Observed

1. Vacant stares (befuddled facial expressions)
2. Delayed verbal and motor responses (slow to answer questions or follow instructions)
3. Confusion and inability to focus attention (easily distracted and unable to follow through with normal activities)
4. Disorientation (walking in the wrong direction; unaware of time, date and place)
5. Slurred or incoherent speech (making disjointed or incomprehensible statements)
6. Gross observable incoordination (stumbling, inability to walk tandem/straight line)
7. Emotions out of proportion to circumstances (distraught, crying for no apparent reason)
8. Memory deficits (exhibited by the athlete repeatedly asking the same question that has already been answered, or inability to memorize and recall 3 of 3 words or 3 of 3 objects in 5 minutes)
9. Any period of loss of consciousness (paralytic coma or unresponsiveness to arousal)

Sideline Evaluation

Mental Status Testing	
Orientation:	Time, place, person and situation (circumstances of injury).
Concentration:	Digits backward (i.e., 3-1-7, 4-6-8-2, 5-3-0-7-4). Months of the year in reverse order.
Memory:	Names of teams in prior contest. Recall of 3 words and 3 objects at 0 and 5 minutes. Recent newsworthy events. Details of the contests (plays, moves, strategies, etc.).
Exertional Provocative Tests	Neurological Tests
40-yard sprint	Strength
Five push-ups	Coordination and agility
Five sit-ups	Sensation
Five knee-bends	

Any appearance of associated symptoms is abnormal, e.g., headaches, dizziness, nausea, unsteadiness, photophobia, blurred or double vision, emotional lability, or mental status changes.