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KSCP

Safe Kids Kansas

Concussion in Sports: Return to Learn

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OBJECTIVES

- Be able to define concussion and identify key signs and symptoms
- Understand key management principles in the treatment of concussion
- Recognize recent changes in concussion management, including the Kansas State Law signed in 2011
- Know how to access the Kansas Sports Concussion Partnership website as a resource (www.kansasconcussion.org)
- Be aware of the KSCP Return to Learn guidelines
- Understand how concussion affects learning/cognitive processes

CASE EXAMPLE

15 year-old male football player is injured with a concussion in the local high school game on Friday night

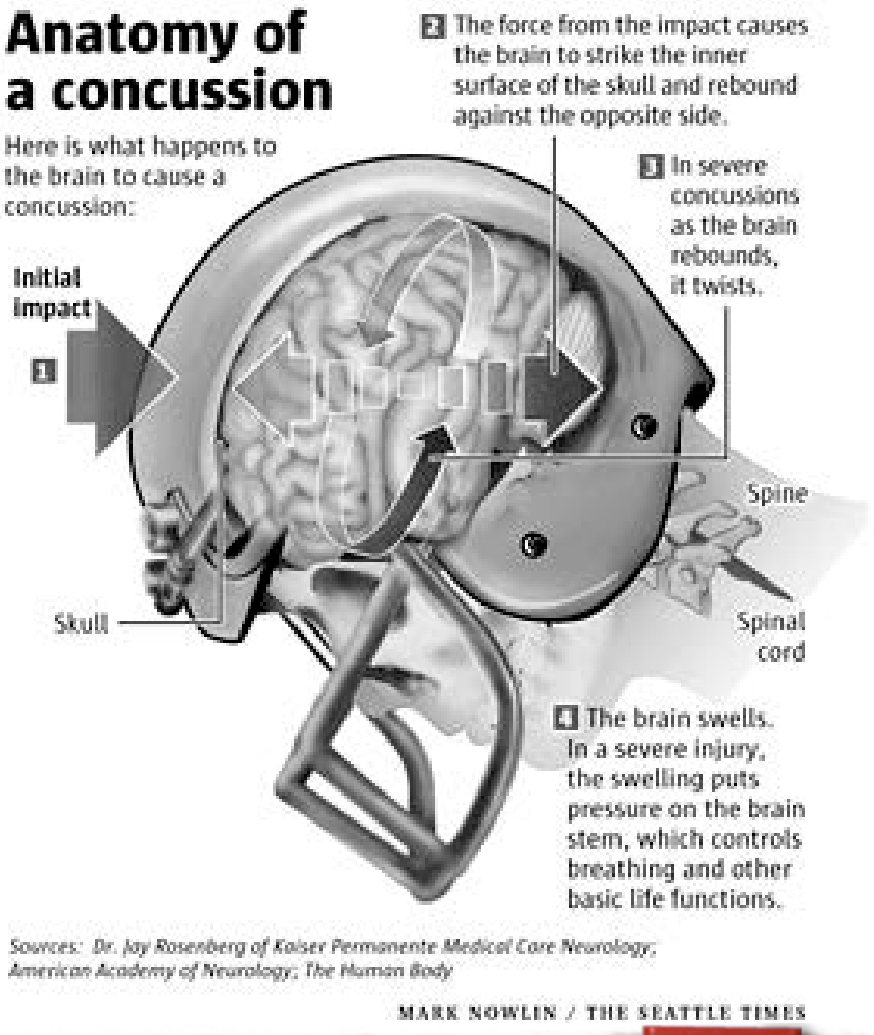
WHAT IS A CONCUSSION?

A ***concussion*** is a traumatic brain injury that alters the way your brain functions

http://www.mayoclinic.com/health/concussion/DS00320

WHAT IS A CONCUSSION?

- “Got my bell rung”
- “Seeing stars”
- Got clocked
- Dinged
- “A little fuzzy”
- “Don’t feel right”



RECOGNITION – SYMPTOMS[1]

- Headache
- Pressure in head
- Nausea or vomiting
- Neck pain
- Balance problems/Dizziness
- Double or blurred vision
- Sensitivity to light or noise
- Feeling sluggish/fatigue
- Feeling “in a fog” or “not right”
- Trouble with concentration or memory
- Confusion
- Feeling sad/nervous/anxious
- Drowsiness or trouble falling asleep

RECOGNITION – SIGNS[1]

- Appears dazed or stunned
- Confusion about assignment/play
- Forgets plays
- Unsure of game/score/opposing team
- Moves clumsily
- Answers questions slowly
- Loses consciousness
- Behavior or personality has changed
- Irritable
- Cannot remember new things
- Cannot remember events prior to hit

IF A STUDENT-ATHLETE HAS ANY OF THESE SIGNS/ SX, THEY LIKELY HAVE A CONCUSSION

EPIDEMIOLOGY

- Between 1.6 and 3.8 million concussions occur each year in the United States[2]
- 80-90% of concussions have resolution of symptoms within 7-10 days[3]
- Young children and teens are more likely to suffer a concussion and take longer to recover than adults[4,5]
- According to a report from July 2011 by KDHE's Bureau of Health Promotion, of the 769 sports related hospital discharges from 2000 to 2009 among children 6 to 18 years old, 28% (n=215) had a traumatic brain injury[6]

A BRIEF OVERVIEW OF CONCUSSION MANAGEMENT

- PREVENT
- RECOGNIZE/EVALUATE
- REST
- FOLLOW-UP and MONITOR
- Once at baseline, functional PROGRESSION back to play
- Final CLEARANCE

PREVENT

- Very little has been scientifically proven to reduce concussion
- The following rule changes have likely decreased the incidence of concussion:
  - Reducing spear tackling, Eliminating helmet-to-helmet hits
- Proper protective equipment, such as helmets, pads, mouthguards, face masks, and neck collars, are only proven to decrease injury to face and skull
  - Risk compensation phenomenon
  - Helmets do not protect against shearing and rotational forces in concussion
- Neck strengthening MAY help decrease severity of concussion (Cantu)
- When a student gets a concussion, it takes a wide variety of people to monitor and ensure safety for the student. Education for athletes, parents, coaches, the general public and health care providers should always be encouraged

RECOGNIZE/EVALUATE

- If a student-athlete has any of the signs or symptoms, a concussion should be suspected.

When in doubt, sit them out.

- Ideally, an athletic trainer or physician will be on the sideline or immediately available to start an evaluation. If not, a determination needs to be made about referral to the ER
- If concussion is suspected, the student is not allowed to return-to-play until cleared by a physician. RTP cannot be on the same day as the injury
- A physician will do a thorough neurological and cognitive history and examination and offer guidance until full recovery occurs. In the meantime, rest is the first and most important treatment tool

REST

Rest from PHYSICAL ACTIVITY

No activity that increases heart rate or tests balance/agility. This includes:

- Running
- Jumping
- Weightlifting
- Swimming
- Biking
- Agility drills
- Sit-ups/push-ups
- Elliptical/Stairclimbers
- Etc.

REST

Rest from MENTAL ACTIVITY

This also can increase blood flow in the brain and prolong symptoms. While still with symptoms, students should avoid:

- Computer screens/social media
- Phone screens/texting
- Television
- Loud movies
- Loud music
- Driving
- May be necessary to miss class if it is worsening symptoms. Could try a reduced schedule, delayed papers or exams, etc.

FOLLOW-UP AND MONITOR

- If not seen on the sideline, see a physician within 48-72 hours
- Under guidance, monitor daily symptoms (athletic trainer, physician, parent, school nurse, coach, school administrator, etc.) – TEAM!
- Return to classroom as symptoms allow in graduated steps if necessary
- Check in with physician about once per week
- Once cleared by a physician, start functional progression back to play

RETURN-TO-PLAY (RTP) PROGRESSION

Once symptoms have resolved, the student is fully participating in the classroom, and examination is normal, the student-athlete can start to work on progression back to his/her sport. Each step will take about 24 hours each.[1]

1. Physical/mental rest until athlete is symptom-free
2. Light aerobic exercise (stationary bike)
3. Sports specific exercise (running drills)
4. Non-contact training drills (light resistance)
5. Full contact practice (after medical clearance)
6. Back to full game competition

*Note that if symptoms return at any point, the athlete returns to previous symptom-free step in the progression

FINAL CLEARANCE

- New Kansas state law requires written clearance to return to practice or games
- Very important that functional, step-wise progression is done. It is not okay to play in a full game the first day the student-athlete feels back to her/himself. The brain has not been tested and the risks are serious of getting repeat and severe head injury
- The functional progression is student-athlete specific. He/she could be back to full sport within 5 days, but could be longer based on the circumstances. Some factors that a physician might take into account include:
  - Age
  - Previous history of concussions
  - Presence of loss of consciousness, seizure activity, or severe symptoms
  - Length of time it took for symptoms to resolve
  - History of ADHD, migraine headaches or other medical conditions

RECENTLY UPDATED GUIDELINES

- Older guidelines – Colorado, Cantu, AAN – No longer up-to-date
- NFL and NCAA- 2009
  - New guidelines that eliminated same day return-to-play (RTP)
  - The NCAA added a pre-season educational component for athletes
- KSHSAA, FHSA – 2010 – “When in doubt, sit them out”
  - Officials can ask an athlete to leave the field to be evaluated
  - Eliminates same day RTP
- Kansas State Law – 2011 (Head Injury Prevention Act)
  - Need signed waiver prior to competition
  - They must see a MD/DO for clearance before they can play again
- New Return-to-Learn guidelines – 2010-2012
  - The Children’s Hospital of Pennsylvania (www.chop.edu)
  - National Athletic Trainers’ Association[7]
  - Kansas State Concussion Partnership

SCHOOL SPORTS HEAD INJURY PREVENTION ACT

New Kansas law went into effect July 1, 2011, and applies to students in junior high, middle school or high school.

Highlights of the law include:

- Data Collection:

  KSBE, in cooperation with KSHSAA, will compile information on the nature and risk of concussion and head injury including the dangers and risks associated with the continuation of playing or practicing after a person suffers a concussion or head injury

- Awareness:

  Any student participating in athletics must have on file with the school a Concussion and Head Injury Information Release Form signed by both a parent/guardian and the student. This form must be on file before the student participates in their first practice of the school year.

KANSAS LEGISLATURE

SCHOOL SPORTS HEAD INJURY PREVENTION ACT

- Return to Play Guidelines:
  - If concussion is suspected, the athlete should be immediately removed from the sport competition or practice session
  - Any athlete suspected of a concussion may not return to a sport competition or practice session until evaluated by an MD/DO and receiving a written clearance to return to play

KANSAS LEGISLATURE

KANSAS SPORTS CONCUSSION PARTNERSHIP

- Began in January 2011
- A statewide partnership to educate and work with athletes, coaches, parents, athletic trainers and physicians to better recognize and manage concussions
- Those currently involved:
  - Physicians, neuropsychologists, and athletic trainers from Hays Medical Center, KU Medical Center, KUSM-W, Newton Medical Center, Via Christi Health, Wesley Medical Center
  - Medical Society of Sedgwick County
  - Kansas Medical Society and Alliance
  - Safe Kids Kansas/KDHE
  - KSHSAA
  - USD 259

KSCP ACTIVITIES

- Development of web resource www.kansasconcussion.org
- Distribution of concussion poster to
  - KSHSAA schools
  - Local health departments
  - Family physicians and pediatricians.
- Development of Return-to-Learn guidelines
- Development of a toolkit for physicians
- Promotion of resources through multiple venues:
  - Advertising
  - Materials distribution
  - Conference presentations

Kansas Sports Concussion Partnership - Windows Internet Explorer

http://kansasconcussion.org/

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1. ALWAYS remove athletes immediately after suspecting a concussion. Do NOT allow return to play the same day with a concussion.

KansasSportsConcussionPartnership

KSCP

Game plan for the education, recognition, and management of sports related head injuries.

- Concussion Facts
- Learn More
- About KSCP
- Feedback

Education Guides

- Athletes
- Parents

» Recognition | » Management | » Return to play

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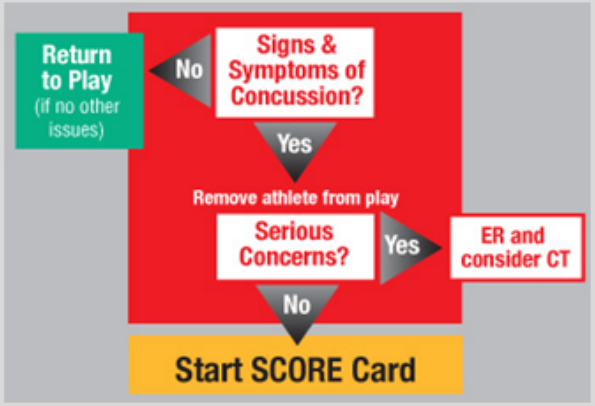
Recognition



When a concussion is suspected, the first consideration should always be the athlete's safety. An athlete must STOP playing immediately to preserve the brain's functions and prevent further damage.

Coaches, athletic trainers, physicians or EMT personnel should use the concussion assessment tool — the SCORE Card "1" and "2" — on the sidelines and during the physician exam to evaluate an athlete suspected of a sustaining a head injury.

Parents, family members, coaches, athletic trainers, friends, teachers and the athletes themselves should be alert to the potential symptoms of a concussion immediately after an injury and during the next few days.

Signs Observed by Others

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http://kansasconcussion.org/management/

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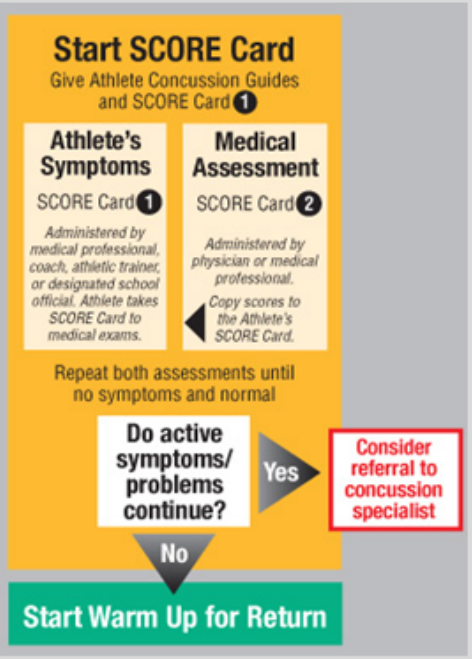

Careful management of a student athlete who sustained a concussion is critical to his/her recovery. Athletes who return to practice or play too soon risk persistent or permanent injury. This is especially true for youths because their brains are still developing.

Kansas Sports Concussion Partnership - Windows Internet Explorer

http://kansasconcussion.org/return-to-play/

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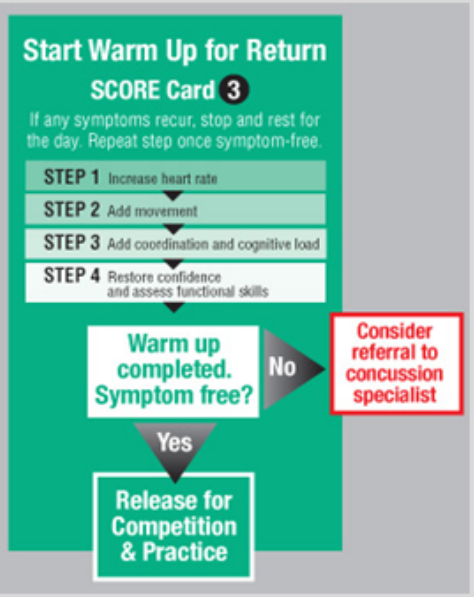
Return To Play



Once a student athlete is **completely** symptom free from his/her injury, it is time to think about returning to play. This is a step-by-step process lasting at least five days and supervised by the coach and/or athletic trainer.

The athlete must be seen by a physician (MD/DO) during this warm up to return to play progression to be legally released for return to competition or practice.

Athlete's Symptoms

SCORE Card

Sports Concussion Observation, Recognition & Evaluation

KSCP

Kansas Sports Concussion Partnership

www.KansasConcussion.org

Name _____ ☐ Male ☐ Female ❶

Date of Birth _____ Date of Injury _____

Sport _____ Position _____

School _____

Primary Care Physician _____

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Kansas Medical Society

☐ Parent/Guardian notified

This SCORE Card must be filled out each time you see a physician for a concussion. Kansas law requires a physician's authorization to get you "back in the game."

	Symptom Evaluation How do you feel now? Score the symptoms: none 0 mild 1 2 moderate 3 4 severe 5 6	1 Exam Date	2 Exam Date	3 Exam Date	4 Exam Date	5 Exam Date	6 Exam Date	7 Exam Date	8 Exam Date	9 Exam Date	10 Exam Date	11 Exam Date	12 Exam Date	13 Exam Date	14 Exam Date
PHYSICAL	1. Headache														
	2. Pressure in head														
	3. Neck pain														
	4. Nausea or vomiting														
	5. Dizziness														
	6. Blurred vision														
	7. Balance problems														
	8. Sensitivity (light)														
	9. Sensitivity (noise)														
	10. Fatigue or low energy														
	11. Don't feel right														
COGNITIVE	12. Feeling slowed down														
	13. Feeling like in a fog														
	14. Difficulty concentrating														
	15. Difficulty remembering														
	16. Confusion														
EMOTIONAL	17. More emotional														
	18. Irritability														
	19 Sadness														
	20. Nervous or anxious														
SLEEP	21. Drowsiness														
	22. Trouble falling asleep														

FOR OFFICE USE ONLY

❶	**Total # of Symptoms** (22 max.)														
	Symptom Severity Score (132 max.)														
❷	**Total # of Balance Errors** (30 max.)														
	Total Cognition Score (24 max.)														

This athlete is symptom free and has normal exams. I authorize he/she to start "Warm Up for Return":

Name _____ Date _____ Signature _____

Go to Score Card ❸ to start your "Warm Up for Return."

9/2011

Medical Assessment

SCORE Card

Sports Concussion Observation, Recognition & Evaluation

KSCP

Kansas Sports Concussion Partnership

www.KansasConcussion.org

A project sponsored by Kansas Medical Society

Name _____ ☐ Male ☐ Female

Date of Birth _____ Date of Injury _____

Sport _____ Position _____

School _____

Primary Care Physician _____

2

Cognition/Balance Assessment

Exam Date: | 1 | 2 | 3 | 4 | 5

÷ IMMEDIATE MEMORY

Read a list of five words and have athlete repeat back as many words as can be remembered, in any order. Repeat the same list again for the second and third trials. Have athlete repeat back as many words as can be remembered in any order, even if they said the word before. Complete all 3 trials regardless of score on trials 1 & 2. Read the words at a rate of one per second.

	Exam 1	Exam 2	Exam 3	Exam 4	Exam 5
	Elbow	Candle	Baby	Finger	Basket
	Apple	Paper	Monkey	Penny	Hammer
	Carpet	Sugar	Perfume	Blanket	Orange
	Saddle	Sandwich	Sunset	Lemon	Stick
	Bubble	Wagon	Iron	Insect	Plant
Trial I	/5	/5	/5	/5	/5
Trial II	/5	/5	/5	/5	/5
Trial III	/5	/5	/5	/5	/5

Score 1 point for each correct response. 5 points possible for each trial. Total equals sum of all 3 trials. (15 pts. possible)

Immediate Memory Score | /15 | /15 | /15 | /15 | /15

÷ CONCENTRATION

Read a string of digits at a rate of one per second. Have athlete repeat back the list of numbers in reverse order. If correct, score one point and go to next trial with one additional digit. If incorrect, score zero for that trial and subsequent trials.

	Exam 1	Exam 2	Exam 3	Exam 4	Exam 5
Trial I	4-9-3	6-2-9	5-2-6	4-1-5	1-7-3
Trial II	3-8-1-4	3-2-7-9	1-7-9-5	4-9-6-8	6-2-9-5
Trial III	6-2-9-7-1	1-5-2-8-6	3-8-5-2-7	5-1-8-4-3	4-7-2-6-1
Trial IV	7-1-8-4-6-2	5-3-9-1-4-8	8-3-1-9-6-4	7-2-4-8-5-6	6-1-3-7-2-9

Score 1 pt. if entire sequence per trial is correct. (4 pts. possible)

Concentration Score | /4 | /4 | /4 | /4 | /4

BALANCE ERRORS

Remove shoes, roll up your pant legs above the ankle (removing any ankle taping). This test will consist of three, 20-second timed tests from different stances.

Dominant Foot: ☐ Left ☐ Right

Types of Balance Errors:
- Hands lifted off iliac crest
- Opening eyes
- Step, stumble, or fall
- Moving hip into > 30° abduction
- Lifting forefoot or heel
- Remaining out of test position longer than 5 seconds

I. Double Leg Stance: Stand feet together, with hands on hips and eyes closed. Should maintain stability for 20 seconds. Count number of times that person moves out of that position.

II. Single Leg Stance: Stand on *non-dominant* foot (determine dominance by asking, "Which foot would you use to kick a ball?"). The dominant leg should be held off the floor a few inches and maintain stability for 20 seconds with hands on hips and eyes closed. Count number of times that person moves out of that position. If person stumbles out of this position, have them open eyes and return to the start position and continue balancing. Start timing when they are set and have their eyes closed.

III. Tandem Stance: Stand heel-to-toe with the *non-dominant* foot in back. Weight should be evenly distributed across both feet. Should maintain stability for 20 seconds with hands on hip and eyes closed. Count number of times that person moves out of that position. If athlete stumbles out of this position, have them open eyes and return to the start position and continue balancing. Start time when they are set and eyes are closed.

Begin counting errors only after athlete has assumed the proper start position. Score each stance test individually by counting the number of accumulated errors with a maximum of 10 errors per stance. If athlete commits multiple errors simultaneously, only one error is recorded but they must quickly return to the testing position, and counting resumes once they are set. If unable to maintain the stance for a minimum of 5 seconds, assign 10 errors.

Stance I: # of Errors (10 max.)

Stance II: # of Errors (10 max.)

Stance III: # of Errors (10 max.)

Transfer total to athlete's SCORE Card. **Total # Balance Errors** (30 max.)

÷ DELAYED RECALL

Repeat back as many words as can be remembered from the group of 5 words in the first question. *Score one point for each word remembered (5 points possible).*

Delayed Recall Score | /5 | /5 | /5 | /5 | /5

÷ TOTAL COGNITION SCORE

Add the three individual (÷) scores. ***Transfer total score to athlete's SCORE Card.*** *(24 total points possible)* TOTAL | /24 | /24 | /24 | /24 | /24

9/2011

Warm Up for Return SCORE Card

Sports Concussion Observation, Recognition & Evaluation

KSCP

Kansas Sports Concussion Partnership

www.KansasConcussion.org

A project sponsored by Kansas Medical Society

Name _____ ☐ Male ☐ Female **3**

Date of Birth _____ Date of Injury _____

Sport _____ Position _____

School _____

Coach/Athletic Trainer: Name _____

Daytime Phone _____

An athlete's return to his/her sport will be a step-by-step process. Once the athlete has no symptoms or signs of concussion and is doing well in school and daily activities, a physician will start the progression back to play. This will be monitored by a coach, athletic trainer or designated school official.

STOP IMMEDIATELY if there is any return of signs/symptoms and report this right away. Go back to rest for the day, refrain from activities including bike riding, skateboarding, playful wrestling, etc. An athlete must be completely symptom-free before starting the progression again.

Once the progression back to play is successfully completed, a physician (MD/DO) will sign the form allowing the athlete to participate in practice and competition again. A parent, coach, physician or school official should be told immediately if the athlete does not feel quite right at any time.

Start "Warm Up for Return"

Authorized by _____ Date _____ ☐ OK to proceed to Step 1

Step 1. Light aerobic exercise, including walking or riding an exercise bike. No weightlifting. *(increase heart rate)*

Coach/Trainer _____ Date _____ ☐ OK to proceed to Step 2

Notes: _____

Step 2. Running in a gym or on the field. No helmet or equipment should be used. *(add movement)*

Coach/Trainer _____ Date _____ ☐ OK to proceed to Step 3

Notes: _____

Step 3. Non-contact training drills and full equipment. Start light resistance training or light weight training. *(add coordination and cognitive load)*

Coach/Trainer _____ Date _____ ☐ OK to proceed to Step 4

Notes: _____

Step 4. Full contact training under the supervision of the coach/athletic trainer. *(restore confidence and assess functional skills)*

Coach/Trainer _____ Date _____ ☐ OK to proceed to Step 5

Notes: _____

Step 5. "Return to Play"

Physician _____ Date _____

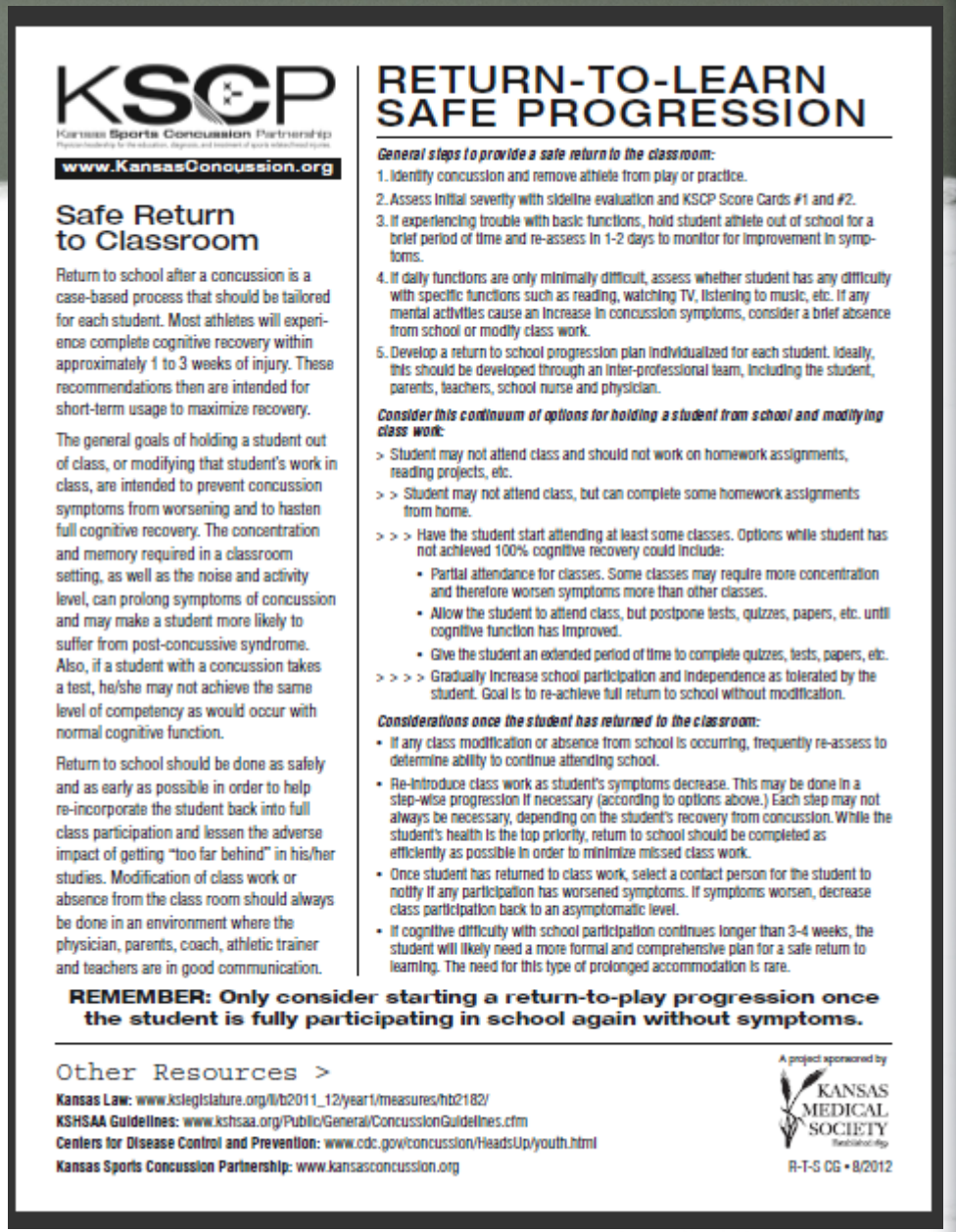
☐ **RELEASED FOR COMPETITION or PRACTICE**

This patient has had an injury to the head. Today there are no signs of concussion; however, symptoms of concussion may develop within days after a head injury. The patient should continue to be observed for any new symptoms.

9/2011

RETURN-TO-LEARN

- Historically, there has been an emphasis on “Return-to-Play” and establishing the safest and quickest way to get back on the field
- In the past couple of years, there has been a new (and much-needed) emphasis on “Return-to-Learn”
- KSCP has new guidelines that help a student safely return to the classroom without causing further injury and minimizing impact on school performance



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www.KansasConcussion.org

Safe Return to Classroom

Return to school after a concussion is a case-based process that should be tailored for each student. Most athletes will experience complete cognitive recovery within approximately 1 to 3 weeks of injury. These recommendations then are intended for short-term usage to maximize recovery.

The general goals of holding a student out of class, or modifying that student's work in class, are intended to prevent concussion symptoms from worsening and to hasten full cognitive recovery. The concentration and memory required in a classroom setting, as well as the noise and activity level, can prolong symptoms of concussion and may make a student more likely to suffer from post-concussive syndrome. Also, if a student with a concussion takes a test, he/she may not achieve the same level of competency as would occur with normal cognitive function.

Return to school should be done as safely and as early as possible in order to help re-incorporate the student back into full class participation and lessen the adverse impact of getting “too far behind” in his/her studies. Modification of class work or absence from the class room should always be done in an environment where the physician, parents, coach, athletic trainer and teachers are in good communication.

RETURN-TO-LEARN SAFE PROGRESSION

General steps to provide a safe return to the classroom:

1. Identify concussion and remove athlete from play or practice.
2. Assess initial severity with sideline evaluation and KSCP Score Cards #1 and #2.
3. If experiencing trouble with basic functions, hold student athlete out of school for a brief period of time and re-assess in 1-2 days to monitor for improvement in symptoms.
4. If daily functions are only minimally difficult, assess whether student has any difficulty with specific functions such as reading, watching TV, listening to music, etc. If any mental activities cause an increase in concussion symptoms, consider a brief absence from school or modify class work.
5. Develop a return to school progression plan individualized for each student. Ideally, this should be developed through an inter-professional team, including the student, parents, teachers, school nurse and physician.

Consider this continuum of options for holding a student from school and modifying class work:

> Student may not attend class and should not work on homework assignments, reading projects, etc.

> > Student may not attend class, but can complete some homework assignments from home.

> > > Have the student start attending at least some classes. Options while student has not achieved 100% cognitive recovery could include:

- Partial attendance for classes. Some classes may require more concentration and therefore worsen symptoms more than other classes.
- Allow the student to attend class, but postpone tests, quizzes, papers, etc. until cognitive function has improved.
- Give the student an extended period of time to complete quizzes, tests, papers, etc.

> > > > Gradually increase school participation and independence as tolerated by the student. Goal is to re-achieve full return to school without modification.

Considerations once the student has returned to the classroom:

- If any class modification or absence from school is occurring, frequently re-assess to determine ability to continue attending school.
- Re-introduce class work as student's symptoms decrease. This may be done in a step-wise progression if necessary (according to options above.) Each step may not always be necessary, depending on the student's recovery from concussion. While the student's health is the top priority, return to school should be completed as efficiently as possible in order to minimize missed class work.
- Once student has returned to class work, select a contact person for the student to notify if any participation has worsened symptoms. If symptoms worsen, decrease class participation back to an asymptomatic level.
- If cognitive difficulty with school participation continues longer than 3-4 weeks, the student will likely need a more formal and comprehensive plan for a safe return to learning. The need for this type of prolonged accommodation is rare.

REMEMBER: Only consider starting a return-to-play progression once the student is fully participating in school again without symptoms.

Other Resources >

Kansas Law: www.kslegislature.org/li/b2011_12/year1/measures/htb2182/
KSHSAA Guidelines: www.kshsaa.org/Public/General/ConcussionGuidelines.cfm
Centers for Disease Control and Prevention: www.cdc.gov/concussion/HeadsUp/youth.html
Kansas Sports Concussion Partnership: www.kansasconcussion.org

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R-T-S CG • 8/2012

WHAT ACTUALLY HAPPENS IN THE BRAIN AFTER CONCUSSION?[8]

- Has been very difficult to establish clear pathophysiology
- Potential mechanism: Direct trauma to brain → disrupts neuronal membranes → stretches axons → opens K+ channels → increases extracellular K+ → neuronal depolarization → opens excitatory amino acid channels→ large excitation followed by relative neuronal suppression → called spreading depression → to try to get back to normal, ATP channels are activated and a rapid increase in glucose is needed → glycolysis leads to lactate production → acidosis ensues, membranes are damaged, permeability of blood-brain barrier is affected and you get cerebral edema → oxidative metabolism is also impaired and mitochondria do not function properly → calcium levels are elevated for 2-4 days → glucose levels are impaired for 5-10 days (may last 2-4 weeks) → if persists, can lead to axonal injury, delayed cell death, chronic alterations in neurotransmitters, and axonal disconnection → if this occurs, can have permanent cognitive deficits or death

DOES CONCUSSION IMPACT LEARNING?

- In the short-term: Yes! (most common issue we face)
- In the long-term: The debate is still happening
  - Multiple studies have demonstrated a cognitive impairment after concussion and this can persist into adulthood. Specific long-term impairments include those regarding short-term memory, visual-spatial processing, and object naming[9]
  - Neuropsychological testing has showed persistent deficits with motor cortex function and visual motor processing[10,11]
  - A study in 2006 did neuropsychological testing on 521 soccer players and found no correlation between self-reported number of concussions and cognitive performance[12]
- Two established long-term consequences of concussion:
  - Post-Concussive Syndrome
  - Chronic Traumatic Encephalopathy

POST-CONCUSSIVE SYNDROME[2]

- Loosely defined as prolonged symptoms of concussion (can use 3 weeks to 3 months for definition)
- Two different types:
  1. Mostly symptom-free but symptoms increase under increased times of mental or physical activity (such as while studying for a test or when attempting to return to sport)
     - Typically try to avoid medications and advocate for rest
  2. Persistent and severe symptoms that disrupt daily life. Initial symptoms may improve and then worsen again, signaling that a secondary process may be occurring
     - May need to slowly re-introduce physical activity, use pharmaceutical agents and consider neurocognitive testing

CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)[13]

- Represents the cumulative, long-term neurologic consequences of repetitive concussive and subconcussive blows to the brain
- Also called dementia pugilistica, “punch drunk” syndrome, or chronic traumatic brain injury
- Seen in 17% of boxers and is becoming more recognized in football, soccer, ice hockey and martial arts
- Symptoms worsen with prolonged exposure to sport and with age
- Possible symptoms include parkinsonism, decreased concentration and memory, paranoia, and violence

Owen Thomas

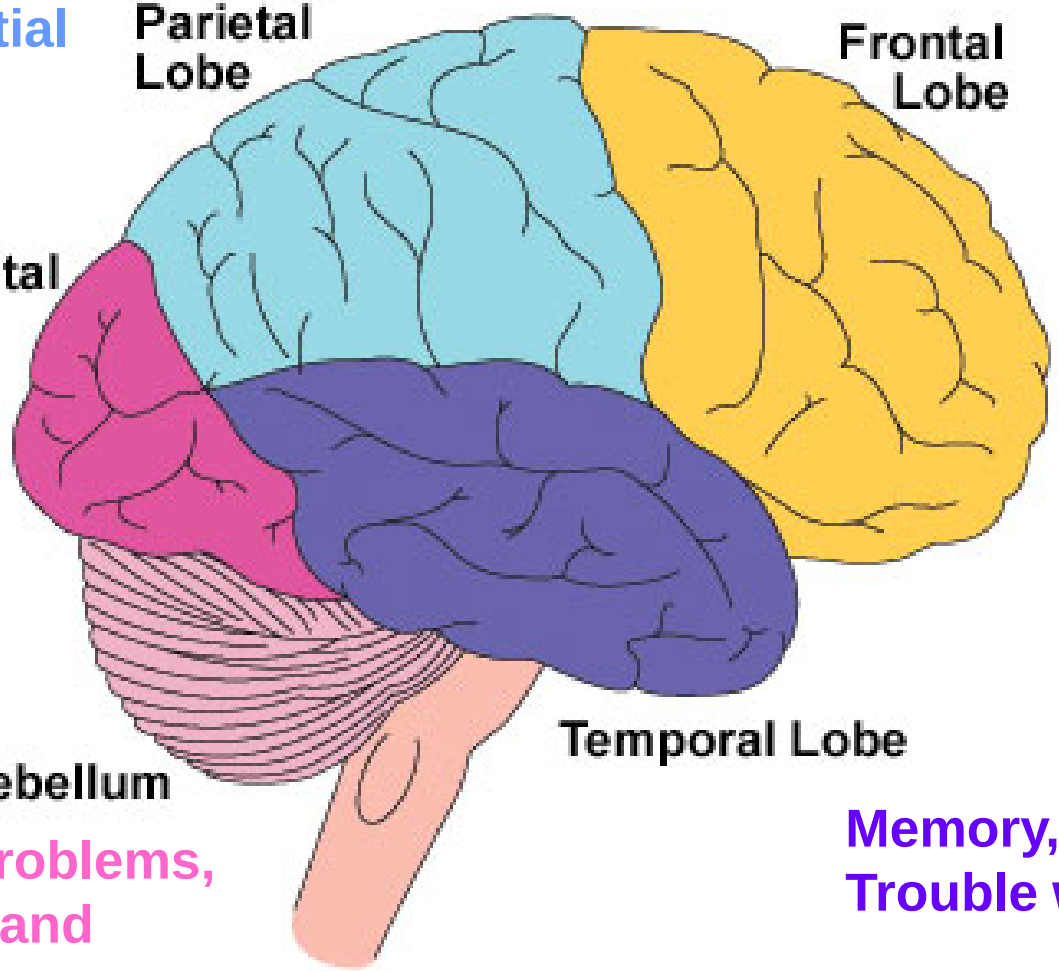
LONG-TERM COMPLICATIONS, BRIEF TREATMENT APPROACHES

- PCS:
  - Best understood of the long-term complications, but still very early in its stages of clear recognition and treatment
  - Key may be early, aggressive rest
  - Medications: Aimed at sleep, headaches, depression, anxiety and attention deficit symptoms; are typically aimed at specific symptoms and not used in very early stages of concussion treatment
  - Vestibular rehabilitation
- CTE:
  - Likely from repetitive, subacute blows
  - Some research looking into total “hit” counts (similar to pitch counts for adolescents)
  - Key is likely prevention and rapid removal from play when symptomatic

How does a concussion affect basic life activities in the short-term?[14]

- PHYSICAL
  - Headache, Dizziness, Balance problems, Nausea/Vomiting, Fatigue, Sensitivity to Light, Sensitivity to Noise
- COGNITIVE
  - Feeling mentally foggy, Feeling slowed down, Difficulty concentrating, Difficulty remembering, Difficulty focusing
- EMOTIONAL
  - Irritability, Sadness, Nervousness, More emotional than usual
- SLEEP
  - Trouble falling asleep, Sleeping more than usual, Sleeping less than usual

What specific aspects of learning are affected?[15]



Visual-spatial difficulties

Trouble with: General cognition, Problem solving, Concentration, Reasoning, Personality changes

Trouble with vision

Memory, Depression, Trouble with hearing

Balance problems, Dizziness and Vomiting

CONCUSSION IN THE CLASSROOM

Five phases to "Return-to-Learn":[14]

1. No school
   - Symptoms are typically severe at this stage. Physical activity is completely restricted during this time. The student should be closely monitored by a healthcare professional during this stage and all stimulating activities are severely restricted, such as TV, computers, phones, video games, or loud music.
2. Partial Attendance with Accommodations
   - Students should gradually be re-introduced to classroom work. Prioritize classes, reduce non-essential work, delay quizzes/exams/papers, and work to accommodate specific symptoms of student. Try to eliminate or reduce homework as much as possible in this stage.
3. Full Attendance with Accommodations
   - Continue to build on the limitations listed above. Gradually increase tests and homework. Consider tutor assistance.

CONCUSSION IN THE CLASSROOM

4. Full Attendance without Accommodations
   - Student may continue to have light symptoms during this time, but participation in the classroom does not worsen symptoms. At this stage, the student no longer requires special assistance to complete the work expected of them, but a plan to “catch-up” may be required. Physical activity is still restricted until a healthcare professional notes that the student is back to his/her baseline.
5. Full Attendance and Extracurricular Involvement
   - It is important to ensure that the student is doing well in the classroom prior to becoming involved in extracurricular activities again. Complete resolution of symptoms is required before physical activity can be re-introduced. A progression back to full activity is still required before full participation in sports, gym class or weightlifting is allowed.

CONCUSSION IN THE CLASSROOM

Symptom-specific accommodations an educator can make:

1. Extending test time
2. Allow the student to take tests in a separate, quiet space
3. Move the student to the front of the classroom
4. Break down assignments into small, manageable tasks
5. Move student away from the window or allow the student to wear sunglasses
6. Allow the use of a tape recorder for lectures
7. Assist with the use of a planner to organize assignments and keep track of due dates
8. Check the student's comprehension of directions by asking the student to restate the information in his/her own words

CONCUSSION IN THE CLASSROOM

How do you know if a student's symptoms are worsening?

1. Increased irritability
2. Poor performance on assignments/exams
3. Increased emotions/decreased ability to cope
4. Impulsive behaviors
5. Repeated questions
6. Decreased ability to concentrate

CONCUSSION IN THE CLASSROOM[16]

Develop a plan and create good lines of communication:

1. Identify your team prior to an injury
   - Student, parent, teacher, counselor or school psychologist, administrator, athletic trainer, physician, school nurse, athletic director, coach
2. Identify team leaders and make management plan/process
   - One-Leader Model vs Two-Leader Model (separate medical and academic leaders)
3. Establish clear roles.
   - Key points include reporting concussion to the team leader, contacting student/family, assessing medical needs, assessing academic needs, creating accommodations if necessary, distributing these accommodations to team, continuous re-assessment of needs, creating flow of communication between team members

CONCUSSION IN THE CLASSROOM

- May need to especially modify participation in certain activities[14]:
  - Band
  - Choir
  - Movies in the classroom
  - Computer use
  - Pep rallies and assemblies
  - Specific classes with excessive noise, such as classes that work with wood, metal, auto mechanics, etc.
- In rare cases, difficulty with classroom participation can be prolonged. Special education plans may be required in these situations
- Overall, remember that there is a fine balance between allowing a student to get “behind” in his/her work and ensuring that class work is not causing long-term symptoms of concussion and cognitive difficulty

Back to the case

Our 15-year-old student had just been sent to the school nurse and the teacher had noted he had failed his quiz

What should have been done differently and what do we do now?

What should have been done?

- An assessment by the concussion team leader should have been made to determine if this student was ready to re-enter the classroom

- If he had been allowed to attend school that day, the teacher would have been aware of his symptoms and made accommodations for the quiz

HOW COULD THIS CASE HAVE GONE?

1. Concussion was identified at the game, student medically evaluated and physical/mental rest advised.
2. Team leader at his school was made aware of the concussion and contacted the student and family over the weekend.
3. Because of severe symptoms noted on the Scorecard, it was decided to send the student to the physician's office on Monday.
4. At his physician appointment, concussion was confirmed. It was decided that he was having the most trouble with bright light and loud noise. A note was sent to the team leader to allow this student to attend partial class the next day with accommodations.
5. After discussing this situation with other key members of the team, it was decided that the student would not attend band or gym. Participation in debate would also be limited for now. The student would be moved from his usual seat next to the window and would be allowed to sit quietly in the library during his chemistry lab. This list of accommodations was sent to the entire team.

CASE, CONTINUED…

6. The student attended a follow-up appointment with his physician two days later. His symptoms had significantly improved, although he still had a mild headache. A note was written to the team leader to allow full attendance without accommodations. Physical activity was still completely restricted.
7. The concussion team created a plan to help the student complete the work he had missed the last couple of days. He was allowed to return to band and debate, but gym and football were still restricted.
8. His daily symptoms were being monitored by the athletic trainer at school. Once all his symptoms were zero, the athletic trainer contacted the physician and a return-to-play progression was initiated. This took 5 days and allowed him to slowly return to both gym class and the football team.
9. By the next week, he was earning As and Bs in school again and was playing in the football game on Friday night.

THANK YOU

Questions?

RESOURCES FOR FURTHER INFORMATION

- Zurich Consensus Statement
  - McCrory P, et al. Consensus Statement on Concussion in Sport, 3rd International Conference on Concussion in Sport. Clin J Sport Med 2009;19:185–200
- National Federation of State High School Associations
  - www.nfhs.org
- Kansas Sports Concussion Partnership
  - www.kansasconcussion.org
- Kansas State High School Activities Association
  - www.kshsaa.org
- NCAA Concussion in Sports
  - www.ncaa.org
- CDC, Heads Up
  - http://www.cdc.gov/concussion/HeadsUp/youth.html

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- 15. Toledo E, Lebel A, Becerra L, et al. The young brain and concussion: Imaging as a biomarker for diagnosis and prognosis. *Neuroscience and Behavioral Reviews*. 2012;36:1510-1531.
- 16. A school administrator's guide to academic concussion management. http://www.nationwidechildrens.org/academic-concussion-management. Accessed July 12, 2012.

WHAT IS A CONCUSSION?[1]

- **Definition**

  Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathologic and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:

  - 1. Concussion may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an impulsive force transmitted to the head.
  - 2. Concussion typically results in the rapid onset of short-lived impairment of neurologic function that resolves spontaneously.
  - 3. Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury.
  - 4. Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course; however, it is important to note that, in a small percentage of cases, post-concussive symptoms may be prolonged.
  - 5. No abnormality on standard structural neuroimaging studies is seen in concussion.