Medical-School Partnerships in Concussion Management: Promoting Successful Return to School and Life

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Disclosure Statement

- Psychological Assessment Resources, Inc.
  - Behavior Rating Inventory of Executive Function (BRIEF)
  - Tasks of Executive Control (TEC)

- -

- Acute Concussion Evaluation (ACE)
- Post-Concussion Symptom Inventory (PCSI)
- Exertional Effects Rating Scale
- Concussion Recognition & Response app
- Concussion Assessment & Response (CARE Sport) app

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Gioia

Christmas

Circa 1965

Niskayuna, NY

17

CIOIA
9

16

Objectives

1. Describe community-based care supporting the academic return of students to school after concussion
2. Define academic consequences of concussion, as targets for intervention
3. Understand the preparation necessary for medical and school systems to assist academic return
4. Define the stages of gradual return to school, and strategies for support.

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Four Corners Approach to Concussion Care

Family

Medical Systems

Child/ Teen
(Student, Athlete, Son/Daughter, Friend)

Athletic/ Recreational

School

Return to Life in School

- School:
  - Kid's Major "Job" is new learning/ acquiring knowledge
  - Practicing incompletely learned knowledge (HW)
  - Mental and physical exertion is essential to new learning/ practice

ALSO:

- Social with peers
- Interacting with teachers
- Managing the environment
- Academic pressure

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Clinical Report Sport-Related Concussion in Children and Adolescents
Mark E. Halstead, Kevin D. Walter and THE COUNCIL ON SPORTS MEDICINE AND FITNESS
Pediatrics published online Aug 30, 2010;
DOI: 10.1542/peds.2010-2005

School and the Concussed Youth: Recommendations for Concussion Education and Management

Maegan D. Sady, PhD[a,*], Christopher G. Vaughan, PsyD[a,b,c], Gerard A. Gioia, PhD[a,b,c]

KEYWORDS
• Concussion • Mild traumatic brain injury • Student-athlete • Student • School • Accommodations • Management

Learning is the centerpiece of child and adolescent development. Children's organ of learning is their brain; any adverse event that impairs the brain's functioning, temporarily or permanently, poses a significant threat to learning. Traumatic brain injury (TBI) of any severity is an adverse event that can threaten the developing child's future ability to learn. Although more severe forms of TBI may be readily recognized as a threat, greater attention is being paid now to both short- and long-term effects of TBI at the milder end of the spectrum.[1] Recent advances in concussion research have provided clinicians with numerous means to recognize and assess mild TBI, commonly known as concussion. It is now widely recognized that neurometabolic

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Academic Effects of Concussion in Children and Adolescents

Ransom, Vaughan, Pratson, Sady, McGill, & Gioia (2015)

- Objective: Examine academic effects in students recovering from concussion (RC-) as compared to recovered (RC+) students
- Sample: 349 students, 5-18 years, and parents within 4 weeks of injury. Two groups: actively symptomatic (RC-) vs. asymptomatic/ recovered (RC+); 3 levels of schooling.
- Measures: academic effects (CLASS), symptoms (PCSI), cognition

What kinds of school problems are you having SINCE YOUR INJURY?

Ransom et al. (2015)

Type of Problem	Elementary (n=42)	Middle (n=78)	High School (n=120)
Headaches interfering	53%	73%	71%
Can't pay attention	47%	58%	66%
Feeling too tired	53%	61%	52%
Homework taking much longer	35%	48%	63%*
Difficulty understanding material	29%	46%	54%
Difficulty studying for tests	18%	36%	53%*
Difficulty taking Notes	18%	17%	35%*
Average # reported Mn (SD)	2.53 (2.1)	3.37 (1.7)	3.92 (2.1)

* Significant ($p<.05$) difference across grade level

Academic Effects of Concussion in Children and Adolescents

Ransom, Vaughan, Pratson, Sady, McGill, & Gioia (2015)

- Results: RC- group reported higher levels of concern, more school-related problems than RC+ group.
- High school students report higher levels of problems.
- Higher symptom burden associated with greater reported academic problems.
- Significantly greater impairment on cognitive testing in RC- group.
- Summary: provides first empirical evidence of concussion's impact on learning/ performance reported by students. Suggests need to identify post-concussion academic effects to target interventions.

What are you most concerned about?

Type of Problem	Elementary (n=27)	Middle (n=105)	High School (n=166)
Amount of Work	28.6	21.9	25.9
Returning to Sports	17.9	27.6	19.9
Ability to Learn	17.9	17.1	18.1
GRADES DROPPING	11.5	25.3	**#1** 33.3

Gioia et al – unpublished data

General Principles of Recovery

- No additional forces to head/ brain
- Get good nighttime sleep
- Managing Activity – Exertion Relationship
  - Not over/ under-exerting body or brain
  - Attend to/ modify activities that increase symptoms

Ways to over-exert

- Physical
- Cognitive (concentration, learning, memory)
- Social & Emotional

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Managed Activity

Concussion in Sports: Postconcussive Activity Levels, Symptoms, and Neurocognitive Performance

Cynthia W. Majerske, MD, MS*; Jason P. Mihalik, MS, CAT(C), ATC†; Dianxu Ren, PhD*; Michael W. Collins, PhD*; Cara Camiolo Reddy, MD*; Mark R. Lovell, PhD*; Amy K. Wagner, MD*

Objective: To examine the role postinjury activity level plays in postconcussive symptoms and performance on neurocognitive tests in a population of student-athletes.

Not too Little, Not Too Much

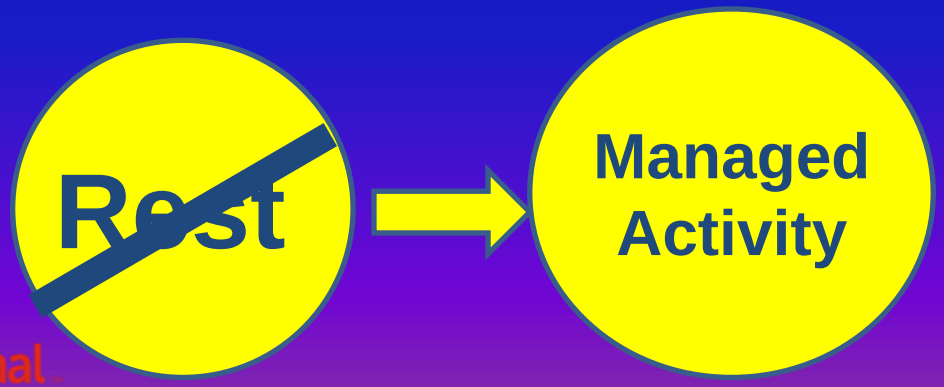
(80 males, 15 females: age = 15.88 ± 1.35 years) were retrospectively assigned to 1 of 5 groups based on a postinjury activity intensity scale.

Results: Level of exertion was significantly related to all outcome variables ($P < .02$ for all comparisons). With multivariate analysis, activity intensity remained significant with respect to visual memory ($P = .003$) and reaction time ($P < .001$).

Conclusions: Activity level after concussion affected symptoms and neurocognitive recovery. Athletes engaging in high levels of activity after concussion demonstrated worse neurocognitive performance. For these tasks, those engaging in moderate levels of activity demonstrated the best performance.

Progressive Activities of Controlled Exertion (PACE)

1. Set the Positive Foundation for Recovery
2. Define the Parameters of the Activity-Exertion Schedule
3. Skill Teaching: Activity-Exertion Monitoring/ Management
4. Reinforcing the Progressive Path to Recovery



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Active Recovery Management (ARM)

<u>Key Messages</u>

- You will get better.
- You will improve and recover.
- You have control of your activity.
- Your efforts to control your activity and time will pay off.
- Find your “sweet spot” of activity.

Original Article

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Medical-School Partnership in Guiding Return to School Following Mild Traumatic Brain Injury in Youth

Gerard A. Gioia, PhD[1]

Abstract

Mild traumatic brain injury is recognized as a prevalent and significant risk concern for youth. Appropriate school return is particularly challenging. The medical and school systems must be prepared partners to support the school return of the student with mild traumatic brain injury. Medical providers must be trained in assessment and management skills with a focused understanding of school demands. Schools must develop policies and procedures to prepare staff to support a gradual return process with the necessary academic accommodations. Ongoing communication between the family, student, school, and medical provider is essential to supporting recovery. A systematic gradual return to school process is proposed including levels of recommended activity and criteria for advancement. Targets for intervention are described with associated strategies for supporting recovery. A 10-element Progressive Activities of Controlled Exertion (PACE) model for activity-exertion management is introduced to manage symptom exacerbation. A strong medical-school partnership will maximize outcomes for students with mild traumatic brain injury.

Goals of Proper School Return

- Prepared Systems: trained medical & school providers
- Initial medical evaluation of student & communication of symptom profile to school
- School team translates symptom profile into necessary academic adjustments & accommodations
- Regular monitoring of symptom progress in school, home
- Coordination / communication between Student/ Family, Medical Provider, School, Athletics
- (Re)Adjust accommodations with progress/ recovery

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Medical System Preparation

- Training Resources for Medical Providers
  - CDC toolkit "Brain Injury in Your Practice"
  - Tools- Acute Concussion Evaluation (ACE), SCAT-3, Self/Parent Symptom scales
- Need for School-focused training program for healthcare providers
  - School toolkit is helpful background but not oriented to the healthcare provider

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School System Preparation

Table 1. School Concussion Management: Activities & Responsibilities*.

Activity	Responsible Parties	Evidence of Completion
1. Concussion management policies and procedures (P & P)	School administration [school nurse, counselor, psychologist]	Written policy in school manual; copy provided to all school staff
2. Development of school concussion resource team	School administration; school nurse, counselor, psychologist, designated teacher, athletic trainer	Written policy in school manual
3. Examine teaching/support methods to support recovery, maximize learning/ performance, reduce symptom exacerbation	School administration; school nurse, counselor, psychologist	Written policies on teaching methods
4. Teacher/staff education and training (online video training, CDC School Professional Fact Sheet)	Teacher, school counselor, school nurse, administrators	Verification of completion provided to school administration
5. Develop list of concussion resources for education, consultation & referral (medical, school, state/local Brain Injury Association)	School administration	List of resources provided in P & P; available to school staff & families

*Adapted from Sady et al 2011

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Gradual Return to School

Six Stages w Recommended Activity Level & Criteria for Movement

Stage	Description	Activity Level	Criteria to Move to Next Stage
0	No return, at home	Day 1 - Maintain low level cognitive and physical activity. No prolonged concentration. Cognitive Readiness Challenge: As symptoms improve, try reading or math challenge task for 10-30 minutes; assess for symptom increase.	To Move To Stage 1: (1) Student can sustain concentration for 30 minutes before significant symptom exacerbation, AND (2) Symptoms reduce or disappear with cognitive rest breaks* allowing return to activity.

Targets for Student Support and Treatment

- Accommodations/ Supports
  - Neuropsychological (Cognitive and Emotional) Symptoms Affecting School
  - Physical Symptoms Affecting School

Targets for Return to "School Life"

- Adapt recommended 'time off' to students' symptom level, activity tolerance, and rate of improvement.
- Return student with active planning and collaboration with school.
- Accommodations/ Supports
  - Neuropsychological (Cognitive and Emotional) Symptoms Affecting School
  - Physical Symptoms Affecting School

Tools for School Management Support

Acute Concussion Evaluation (ACE) Care Plan

Gerard Gioia, PhD[1] & Micky Collins, PhD[2]
[1]Children's National Medical Center
[2] University of Pittsburgh Medical Center

Children's National Medical Center

Changes You Can Make Based on Type of Concussion Symptoms

THINKING/REMEMBERING (such as having difficulty thinking clearly or concentrating, feeling slowed down)

- Reduce class assignments and homework to key tasks only and base grades on adjusted work.
- Provide extra time to work on class assignments.
- Provide written instructions and help for homework and classwork.
- Allow extra time to take tests, limit tests to one per day, and/or provide study guides.
- Allow your students to show they understand a concept orally instead of in writing.
- Provide class notes and/or allow students to use a computer or tape recorder to record classroom information.

FATIGUE/SLEEP AND PHYSICAL (such as feeling tired, having no energy, having headaches or dizziness)

- Allow time to visit the school nurse for treatment of headaches or other symptoms.
- Provide rest breaks.
- Give your students extra time to go from class to class, to avoid crowds.
- If bothered by light, allow your students to wear sunglasses or sit in a place that is less bright (e.g., draw blinds, sit away from window).
- If bothered by noise, provide a quiet place for your students to study, take a test, or spend lunch or recess.
- Do not substitute concentration activities for physical activity (e.g., do not assign reading instead of PE).

EMOTIONAL (such as feeling sad, irritable, anxious)

- Develop an emotional support plan for your students (e.g., identify an adult to whom they can talk if feeling overwhelmed).
- Locate a quiet place for your students to go to if they feel overwhelmed. And provide information on how they can safely get to this quiet location.
- Students may benefit from continued involvement in certain extracurricular activities during their recovery. Identify student and family preferences and consider these activities, approved by their health care provider, in relation to rest time and academic work.

CDC

The **REAP** Project

Reduce
Educate
Accommodate
Pace

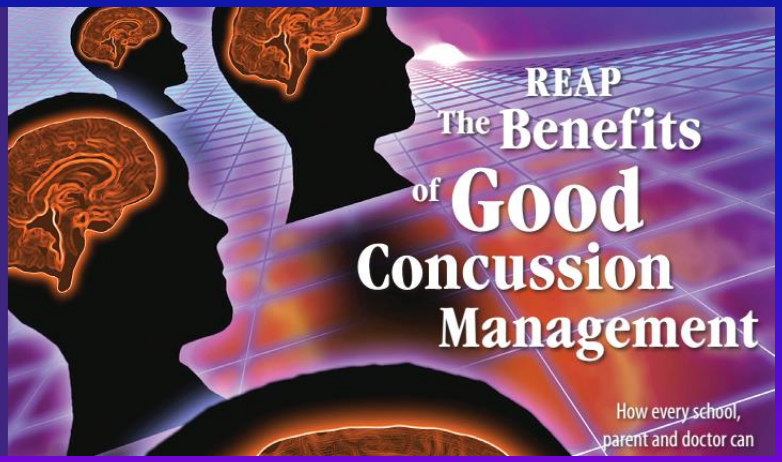
A Partnership between:

Rocky Mountain Hospital For Children at Sky Ridge Medical Center

Swedish Medical Center

and

Cherry Creek Schools
Denver Public Schools
Aurora Public Schools
Littleton Public Schools



Targets for Student Support and Treatment

Table 3. Accommodations for Post-Concussion Neuropsychological (Cognitive and Emotional) Symptoms Affecting School.

Postconcussion effect	Functional School Problem	Accommodation/ Management Strategy
Attention/concentration	Short focus on lecture, classwork, homework	Shorter assignments, break down tasks, lighter work load
"Working" memory	Holding instructions in mind, reading comprehension, math calculation, writing	Repetition, written instructions, use of calculator, short reading passages
Memory consolidation/retrieval	Retaining new information, accessing learned info when needed	Smaller chunks to learn, recognition cues
Processing speed	Keep pace with work demand, process verbal information effectively	Extended time, slow down verbal info, comprehension-checking
Cognitive fatigue	Decreased arousal/activation to engage basic attention, working memory	Rest breaks during classes, homework, and exams
Anxiety	Interferes with concentration; Student may push through symptoms to prevent falling behind	Reassurance from teachers and team about accommodations; workload reduction, alternate forms of testing
Depression/withdrawal	Withdrawal from school or friends due to stigma or activity restrictions	Engage student with friends at lunch or recess, build in time for socialization
Irritability	Poor tolerance for stress, alienate peers or teachers	Reduce stimulation and stressors, provide rest break

Targets for Student Support and Treatment

Table 4. Accommodations for Postconcussion Physical Symptoms Affecting School.

Postconcussion effect	Functional school problem	Accommodation/management strategy
Headaches	Interferes with concentration, increased irritability	Rest breaks, short nap
Light/noise sensitivity	Symptoms worsen in bright or loud environments	Wear sunglasses, seating away from bright sunlight or other light. Avoid noisy/crowded environments such as lunchroom, assemblies, hallways
Dizziness/balance problems	Unsteadiness when walking	Elevator pass, class transition prior to bell
Sleep disturbance	Decreased arousal, shifted sleep schedule	Later start time, shortened day
Symptom sensitivity (exertional effects)	Symptoms worsen with *over*-activity, resulting in any of the above problems	Reduce cognitive or physical demands below symptom threshold; provide rest breaks; complete work in small increments until symptom threshold increases

There's Increasing Knowledge and Awareness, But…

- Parents and coaches may lack basic skill about <u>what to do</u> when concussion is suspected.

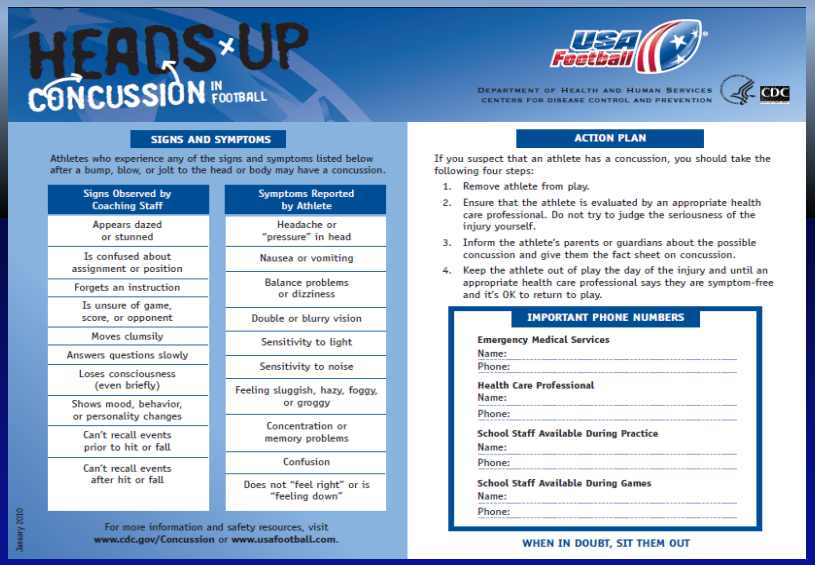
"How will I remember?

"What do I look for if I suspect a concussion?"

"What should I do?"

Tools

- CDC "Heads Up" *Sideline* Materials
  - Clipboard sticker
  - Wallet card
  - Symptom checklist



HEADS UP CONCUSSION IN FOOTBALL

USA Football

Department of Health and Human Services
Centers for Disease Control and Prevention

SIGNS AND SYMPTOMS

Athletes who experience any of the signs and symptoms listed below after a bump, blow, or jolt to the head or body may have a concussion.

Signs Observed by Coaching Staff	Symptoms Reported by Athlete
Appears dazed or stunned	Headache or "pressure" in head
Is confused about assignment or position	Nausea or vomiting
Forgets an instruction	Balance problems or dizziness
Is unsure of game, score, or opponent	Double or blurry vision
Moves clumsily	Sensitivity to light
Answers questions slowly	Sensitivity to noise
Loses consciousness (even briefly)	Feeling sluggish, hazy, foggy, or groggy
Shows mood, behavior, or personality changes	Concentration or memory problems
Can't recall events prior to hit or fall	Confusion
Can't recall events after hit or fall	Does not "feel right" or is "feeling down"

For more information and safety resources, visit **www.cdc.gov/Concussion** or **www.usafootball.com.**

January 2010

ACTION PLAN

If you suspect that an athlete has a concussion, you should take the following four steps:

1. Remove athlete from play.
2. Ensure that the athlete is evaluated by an appropriate health care professional. Do not try to judge the seriousness of the injury yourself.
3. Inform the athlete's parents or guardians about the possible concussion and give them the fact sheet on concussion.
4. Keep the athlete out of play the day of the injury and until an appropriate health care professional says they are symptom-free and it's OK to return to play.

IMPORTANT PHONE NUMBERS

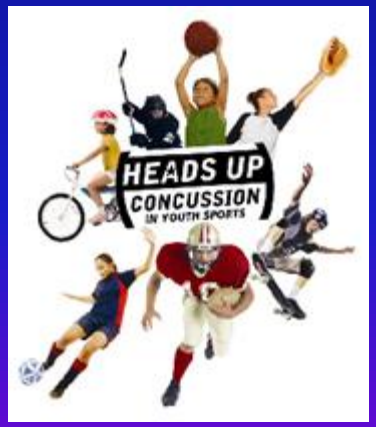
Emergency Medical Services
Name:
Phone:

Health Care Professional
Name:
Phone:

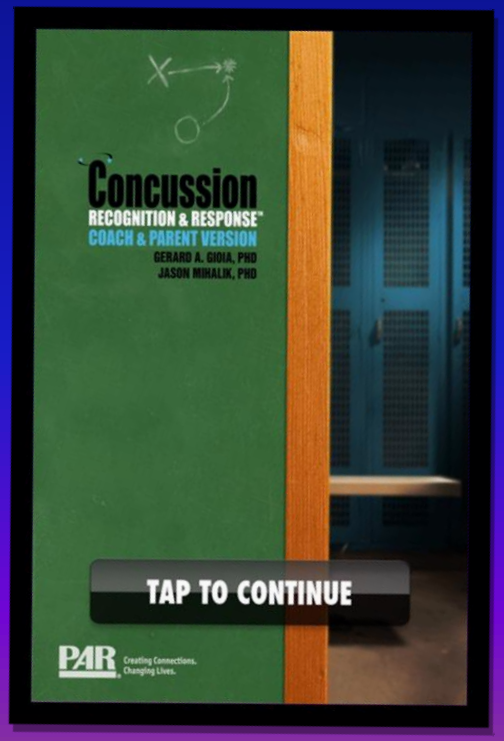
School Staff Available During Practice
Name:
Phone:

School Staff Available During Games
Name:
Phone:

WHEN IN DOUBT, SIT THEM OUT



- Smartphone App
  - Concussion Recognition and Response



www.cdc.gov/headsup

Concussion Recognition

"I SUSPECT!"

1

2

Blow / Force to Head / Body

+

Change in Function / Behavior / Performance

HEADS UP CONCUSSION IN FOOTBALL

USA Football

Department of Health and Human Services
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WHEN IN DOUBT, SIT THEM OUT

Post-Concussion Signs & Symptoms

Physical	Cognitive	Emotional	Sleep
Headache	Concentrate	Irritability	More
Fatigue	Memory	Emotional control	Less
Balance/ Dizziness	Speed of Thinking	Sadness	Cannot

+ +

Concussion Response

1 + 2 = "I Suspect"

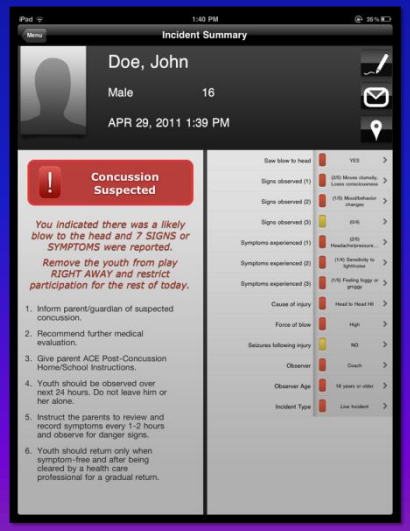
"When in Doubt, Sit Them Out"

Removal from sport

Protect from further injury

Notify Parent

Support Recovery



Summary

- Return to School requires medical-school teamwork
- Active rehabilitation of concussion is emerging as positive
- Individualized moderated, progressive cognitive and physical activity with monitored symptom management may have value

The SCORE Team

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SCORE

Safe **C**oncussion **O**utcome,
Recovery & **E**ducation

Children's
National Medical Center

Thank You!

PLAY HARD.
PLAY SAFE.
PLAY SMART!