

Concussion Update 2023:
The Amsterdam Consensus Statement



Jennifer King, DO, FAAP, CAQSM • Kapiʻolani Bone & Joint Center
Assistant Professor • JABSOM

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIʻOLANI
PALI MOHI
STRAUB
WILCOX

CREATING A
healthier
HAWAII

I have no financial disclosures




CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIʻOLANI
PALI MOHI
STRAUB
WILCOX

Overview

- Origins of the consensus statement
- *Key points from the statement*
- Updated assessment tools
- Return to learn/sport
- Promoting recovery
 - Normal vs Protracted



CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIʻOLANI
PALI MOHI
STRAUB
WILCOX

History of Concussion Consensus Statements

- Concussion in Sport Group (CISG) initially met in 2001
- Conceptual understanding of sport-related concussion (SRC) using an expert panel
- 5th international conference on concussion in sport held in Berlin, October 2016
- 6th international conference in Amsterdam, October 2022
- Evidence-based approach
- Transparency in methods



SomeECards.com

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI
PALI MOHI
STRAUB
WILCOX



CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI
PALI MOHI
STRAUB
WILCOX

Concussion Consensus Statement


- <https://bjsm.bmj.com/content/57/11>
- Additionally, there is **free** access to the various concussion assessment tools:
 - Concussion Recognition Tool-6
 - Sport Concussion Assessment Tool-6
 - Sport Concussion Office Assessment T-6
 - Child SCAT6 and Child SCOAT6

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI
PALI MOHI
STRAUB
WILCOX

Take Home Point- Get moving!

- “Strong evidence exists regarding the benefits of physical activity and aerobic exercise treatment as **early interventions**”




FreePik

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI PALI HONI STRAUB WILCOX

Take Home Point- Get moving!

- Don't be afraid of starting simple cardiovascular activity
- This can occur concurrently with return to life/learning
- Okay even while mildly symptomatic
 - Follow the “rule of 2” for severity of symptoms
- Prior to **strategic** **sports athletics**




FreePik

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI PALI HONI STRAUB WILCOX

No Prolonged Rest

- Physical deconditioning
- Metabolic disturbance
- Fatigue
- Reactive depression



- Strong evidence for benefits of physical activity and aerobic exercise treatment as early interventions.
- No evidence that rest beyond several days is beneficial!

TheMediaPicture.com

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI PALI HONI STRAUB WILCOX

Concussion Defined

- Concussion remains a clinical diagnosis
- Concussion IS a Mild Traumatic Brain Injury
- Mild TBI and Concussion are interchangeable

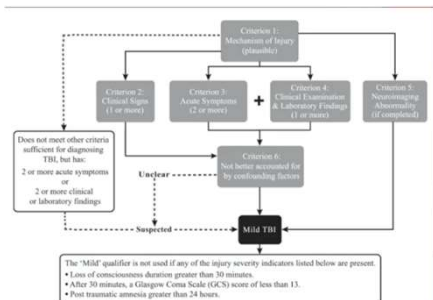
> Arch Phys Med Rehabil. 2023 May 19;S0003-9993(23)00297-6.
doi: 10.1016/j.apmr.2023.03.036. Online ahead of print.

**The American Congress of Rehabilitation Medicine Diagnostic
Criteria for Mild Traumatic Brain Injury**

CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH
KAPOLANI
PALI MOHI
STRAUB
WILCOX

According to the ACRM



CREATING A HEALTHIER HAWAII

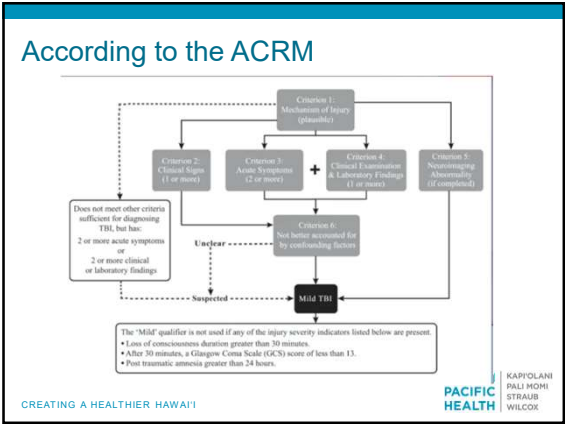
PACIFIC
HEALTH
KAPOLANI
PALI MOHI
STRAUB
WILCOX

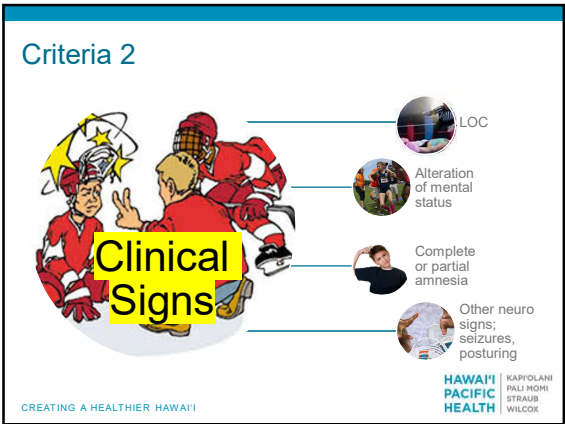
Criteria 1

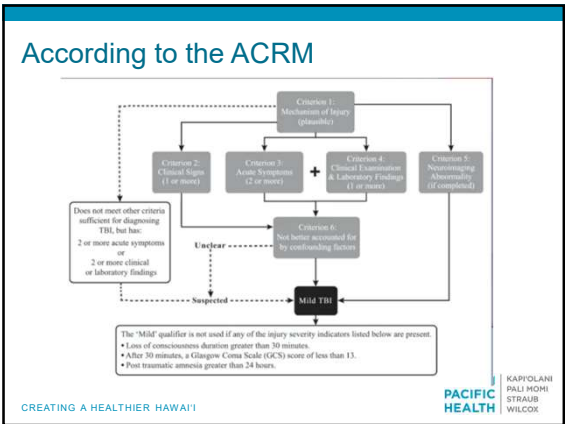


CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH
KAPOLANI
PALI MOHI
STRAUB
WILCOX







Criteria 3 (**2**)

Clinical symptoms
Post-Concussion Syndrome

- Subjective alteration in mental status
- Physical symptoms
- Cognitive symptoms
- Emotional symptoms

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI PALI MOHI STRAUB WILCOX

Clinical symptoms

Mental status

- confused
- disoriented
- dazed

Physical

- headache
- nausea
- dizziness
- balance problems
- vision problems
- sensitivity to light and noise

Cognitive

- feeling slowed down
- mental fog
- difficulty concentrating
- memory problems

Emotional

- emotional lability
- irritability

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI PALI MOHI STRAUB WILCOX

According to the ACRM

Criteria 1: Mechanism of Injury (if applicable)

Criteria 2: Clinical Signs (1 or more)

Criteria 3: Acute Symptoms (2 or more)

Criteria 4: Clinical Examination & Laboratory Findings (1 or more)

Criteria 5: Neuroimaging, Abnormality (if available)

Criteria 6: Not injured according to the confounding factors

Does not meet other criteria sufficient for diagnosing TBI, but has 2 or more acute symptoms or 2 or more clinical or laboratory findings

Unclear

Suspected

Mild TBI

The "Mild" qualifier is not used if any of the injury severity indicators listed below are present:

- Loss of consciousness duration greater than 30 minutes
- After 30 minutes, a Glasgow Coma Scale (GCS) score of less than 15
- Post-traumatic amnesia greater than 24 hours

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI PALI MOHI STRAUB WILCOX

Criteria 4



Clinical and laboratory findings



Cognitive impairment



Balance impairment



Oculomotor impairment



Elevated biomarkers intracranial injury

CREATING A HEALTHIER HAWAII


HAWAII PACIFIC HEALTH KAPIOLANI PALI MOHI STRAUB WILCOX

According to the ACRM

CREATING A HEALTHIER HAWAII

PACIFIC HEALTH KAPIOLANI PALI MOHI STRAUB WILCOX

Clinical Diagnosis Achieved



CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH KAPIOLANI PALI MOHI STRAUB WILCOX

Prevention

- Mouthguards in ice hockey
- Limit body checking in ice hockey
- Limit contact practices in American football
- Tackling rule changes in American football
- Neuromuscular warm up in rugby
- Notable omissions?

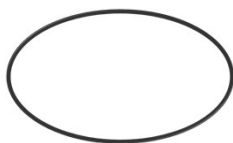


CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH | KAPOLANI
PALI MOHI
STRAUB
WILCOX

Alphabet soup of new tools (Ver 6)

- CRT 6
 - Concussion Recognition Tool
- SCAT/Child SCAT 6
 - Sport Concussion Assessment Tool
 - Acute injury - 1 week
- SCOAT/Child SCOAT 6
 - Sport Concussion Office Assessment Tool
 - Subacute 3-30 days



TollnerLaw

CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH | KAPOLANI
PALI MOHI
STRAUB
WILCOX

CRT, SCAT, SCOAT, and Child Versions

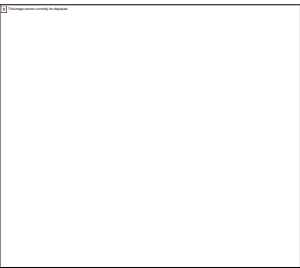

- Multimodal tools for concussion assessment
- “Components (of tools) may assist with clinical assessment and guide individualized management”
- On Field → Off Field → Serial Follow Ups
- Acute (Training Room)-
 - Observable signs, symptom evaluation (gss), cognition (immediate memory, delayed recall, concentration), coordination and balance
- Subacute (In Office)-
 - History (head injury/neuro psych/learning disorder), symptom eval, cognition, orthostatic vitals, cervical spinal assessment, neurologic eval, balance, anxiety screen, depression screen, sleep screen

CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH | KAPOLANI
PALI MOHI
STRAUB
WILCOX

Updates to the Sideline Concussion Assessment Tool (SCAT6)

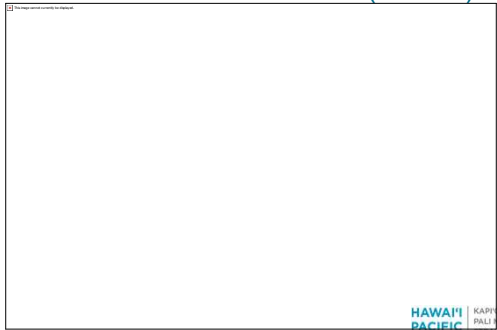
- “Add a more robust set of visible signs on field...”

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI PALLI HONI STRAUB WILCOX

Flowchart for Immediate Care (SCAT6)




CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI PALLI HONI STRAUB WILCOX

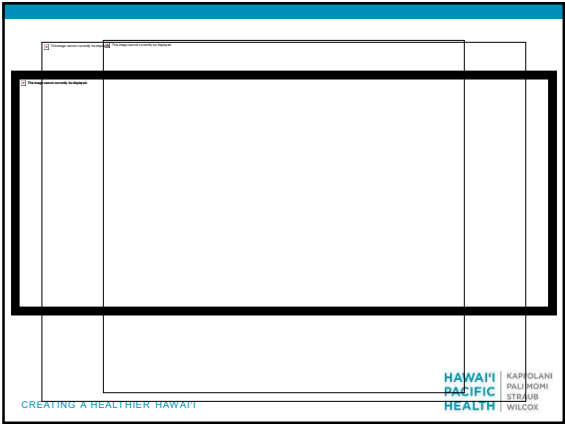
SCAT6 Updates

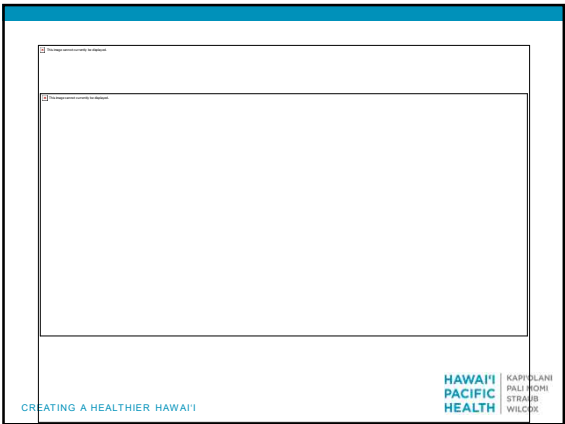
- Addition of visible signs
- Psychometric properties: longer word list, 10 instead of 5
- Digit span backward subtest: increased longest string by two digits
- Months backward with timed information processing
- Optional timed dual gait tasks



CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI PALLI HONI STRAUB WILCOX





Sport Concussion Office Assessment Tool (SCOAT6)

- Evolved from the SCAT
- In-depth History, GGS
- Orthostatic Vitals
- Neurologic Evaluation
- Oculomotor Screen
- Cognitive Assessment
- Tandem Balance/Dual task
- Depression/Anx/Sleep Screens

- Child Version Tweaks

ArtCoats

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI PALI MOHI STRAUB WILCOX

Return to Learn

"Not all athletes will need an RTL strategy or academic support."

But some do, new guideline provided in 2023 recs

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPI'OLANI PALI MOMI STRAUB WILCOX

Return to Activity Early

- "Return-to-sport strategies have been updated based on evolving evidence"
- Previous return to play protocol is currently Hawaii State Law, so changes will need to be made
- For the current football season DOE forms will look the same

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPI'OLANI PALI MOMI STRAUB WILCOX

Hawai'i State Law; 2012 Act 197, 2016 Act 262

Education

coaches

mandatory removal

physician

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPI'OLANI PALI MOMI STRAUB WILCOX

Return to Activity (Steps 1-3)

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI
PALI MOHI
STRAUB
WILCOX

Return to Activity (Steps 4-6)

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI
PALI MOHI
STRAUB
WILCOX

Emerging Assessment Technology

- “Emerging technologies are valuable research tools for the study of concussion but not yet suited for routine use in clinical practice”
- “Computerized neurocognitive tests should not be used in isolation” (ImPACT or SWAY)
- Advanced Neuroimaging
- Fluid-based Biomarkers
- Genetic Testing

Elizabethtown Area School District, Science

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI
PALI MOHI
STRAUB
WILCOX

Physical Therapy Intervention

- “Cervicovestibular rehabilitation is indicated for athletes with neck pain, headaches, dizziness and/or balance problems.”
- If these symptoms persist at 10 days

—

CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH

KAPOLANI
PALI HONI
STRAUB
WILCOX

Vestibular-Ocular Therapy

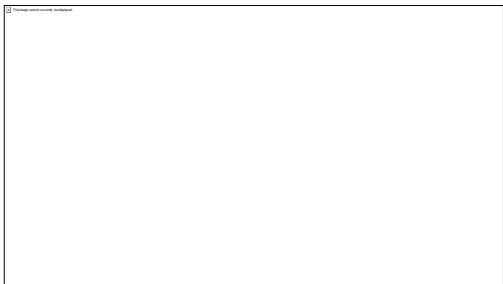


CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH

KAPOLANI
PALI HONI
STRAUB
WILCOX

Vestibular-Ocular Therapy

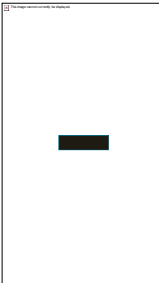


CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH

KAPOLANI
PALI HONI
STRAUB
WILCOX

Vestibular-Ocular Therapy




CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI
PALI HONI
STRAUB
WILCOX

Delayed Recovery Considerations

- “Individuals with persisting symptoms (duration >4 weeks) should be evaluated with a multimodal clinical assessment including the use of standardized and validated symptom rating scales.”



CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI
PALI HONI
STRAUB
WILCOX

Cervical / Vestibular

- Neck stiff or VOMs abnormal
- Cervical/Vestibular therapy
- Limit head motion in class or home
- Don't drive!
- Gradual exposure to busy environments

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPOLANI
PALI HONI
STRAUB
WILCOX





Cognitive / Fatigue

- Get on normal daily routine
- Sleep hygiene +/- melatonin
- Academic adjustments
- Speech therapy referral
- Neuropsychology referral

USNews
CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI
PALI MOHI
STRAUB
WILCOX





Post-Traumatic Migraine

-  Treat the same as migraine without history of concussion
-  Family history puts them at higher risk
-  If daily, consider prophylactic treatment
-  Consider Neurology referral

Brain and Life Magazine
CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI
PALI MOHI
STRAUB
WILCOX

Mood (Anxiety/Depression/Irritability)

-  Ensure adequate support system
-  Referral to a behavioral therapist or Behavioral Health
-  Cognitive Behavioral Therapy
-  Academic adjustments if impacting learning or attention

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH | KAPIOLANI
PALI MOHI
STRAUB
WILCOX

Retire- Individualized Decision

- “There is **no clear evidence** of the factors that, if present, would unequivocally lead to retirement or discontinued participation in contact or collision sports.”
 - Wish we could be more specific, not yet
- “Decisions regarding retirement or discontinuation from contact or collision sports are complex...should involve ...preferably a **multidisciplinary team**.”
- “The shared decision-making process should be **individualized**.”

SPORTS

Google image serving www.mjjewelllearning.com

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH KAPIOLANI PALLI HONI STRAUB WILCOX

Calling it Quits?

- No defined rule for total number of concussions and retirement from contact sport
- Longer recovery times
- Shorter intervals between concussions
- Less traumatic impact to cause symptoms
- Not returning to normal/baseline

Google image serving www.mjjewelllearning.com

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH KAPIOLANI PALLI HONI STRAUB WILCOX

Project Play

Google image serving www.mjjewelllearning.com

CREATING A HEALTHIER HAWAII

HAWAII PACIFIC HEALTH KAPIOLANI PALLI HONI STRAUB WILCOX

Roadmap for SRC Success

- Removal when concussion suspected
- 24-72 hours
 - Rest, limit screens, +light cardio, +perhaps attempt adjusted school
- 72 hours-14 days
 - ***EARLY CARDIO***
 - Encourage normal schedule
 - Sleep, meals, school +/-adjusted
 - Consider VO/cervical PT if applicable
 - See a skilled practitioner (ie. PCP, ATC, or Concussion Specialist)
- >4 weeks
 - Consider multimodal assessment
 - ex. VOPT, Neuropsych, BH, Migraine

CREATING A HEALTHIER HAWAII

 HAWAII
PACIFIC
HEALTH
KAPOLANI
PALI MOHI
STRAUB
WILCOX

Summary of Key Updates

- Early aerobic exercise as treatment
- Sport specific concussion prevention strategies
- Updated return-to-learn and return-to-sport strategies
- Early Cervicovestibular rehabilitation (>10 days)
- Strategy for persistent symptoms (duration >4 weeks)
- Updated concussion assessment tools, now Ver-6.0
 - Changes to assessment tools (Added a more robust set of visible signs to the SCAT/Child SCAT/CRT, 10 words, harder concentration section, VO section, orthostatic vitals, mental health and sleep screens)
 - Added child versions SCAT6 and SCOAT6

CREATING A HEALTHIER HAWAII

 HAWAII
PACIFIC
HEALTH
KAPOLANI
PALI MOHI
STRAUB
WILCOX

Bibliography and Resources

- Arch Phys Med Rehabil. 2023 May 19. Online Ahead of Print. "The American Congress of Rehabilitation Medicine Diagnostic Criteria for Mild Traumatic Brain Injury."
- Davis GA, Patricios JS, Purcell LK, et al. Introducing the Child Sport Concussion Office Assessment Tool 6 (Child SCOAT6). *British Journal of Sports Medicine* 2023;57:668-671.
- Echemendia RJ, Ahmed OH, Bailey CM, et al. Introducing the Concussion Recognition Tool 6 (CRT6). *British Journal of Sports Medicine* 2023;57:689-691.
- Echemendia RJ, Brett BL, Broglio S, et al. Introducing the Sport Concussion Assessment Tool 6 (SCAT6). *British Journal of Sports Medicine* 2023;57:619-621.
- Echemendia RJ, Burma JS, Bruce JM, et al. Acute evaluation of sport-related concussion and implications for the Sport Concussion Assessment Tool (SCAT6) for adults, adolescents and children: a systematic review. *British Journal of Sports Medicine* 2023;57:722-735.
- Patricios JS, Davis GA, Ahmed OH, et al. Introducing the Sport Concussion Office Assessment Tool 6 (SCOAT6). *British Journal of Sports Medicine* 2023;57:648-650.
- Patricios JS, Schneider KJ, Dvorak J, et al. Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport—Amsterdam, October 2022. *British Journal of Sports Medicine* 2023;57:695-711.
- Patricios JS, Schneider GM, van Iersel J, et al. Beyond acute concussion assessment to office management: a systematic review informing the development of a Sport Concussion Office Assessment Tool (SCOAT6) for adults and children. *British Journal of Sports Medicine* 2023;57:737-748.
- Schneider KJ, Patricios JS, Meeuwisse W, et al. Amsterdam 2022 process: A summary of the methodology for the Amsterdam International Consensus on Concussion in Sport. *British Journal of Sports Medicine* 2023;57:712-721.

CREATING A HEALTHIER HAWAII

 HAWAII
PACIFIC
HEALTH
KAPOLANI
PALI MOHI
STRAUB
WILCOX

Other Resources

- Images depicted presumed open source or only utilized for educational purposes
- Hawai'i Concussion Awareness and Management Program: <http://www.hawaiiconcussion.com/>
- UPMC Rethink Concussions: <http://rethinkconcussions.com/>
- Brain 101: Concussion Handbook: <http://brain101.org/casino.com/1000>
- REAP (Reduce/Educate/Accommodate/Pace) Program: a community-based concussion management program: <http://www.rockymountainhospital-forchildren.com/sports-medicine/concussion-management/reap-guidelines.htm>
- CDC Foundation Online Training for Clinicians: <http://preventingconcussions.org/>
- Centers for Disease Control and Prevention: Fact Sheet for School Professionals on Returning to School after a Concussion: http://www.cdc.gov/concussion/pdf/TBI_Returningto_School-a.pdf
- Centers for Disease Control and Prevention: Heads Up for Schools: <http://www.cdc.gov/concussion/HeadsUp/schools.html>
- Centers for Disease Control and Prevention: Online Coaches Training: http://www.cdc.gov/concussion/HeadsUp/online_training.html
- Dr. Mike Evans Concussions 101 Video: <http://www.myfavouritemedicine.com/concussions-101/>
- Frequently Asked Questions about 504 Plans: <http://www2.ed.gov/about/offices/list/ocr/504faq.html>
- Sample Return to Learning Note for Physicians: <http://www.aap.org/en-us/about-the-aap/Committees-Councils/Sections/Council-on-sports-medicine-and-fitness/Documents/returntoschool.pdf>
- Dynamics of Concussion: <https://psu-sysc.kumu.io/dynamics-of-concussion>

CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH

KAPOLANI
PALI HORI
STRAUB
WILCOX

CREATING A

healthier

Jennifer.king@hphmg.org

CREATING A HEALTHIER HAWAII

HAWAII
PACIFIC
HEALTH

KAPOLANI
PALI HORI
STRAUB
WILCOX
