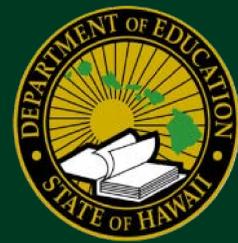




Comparison of Concussion Management Programs on Return to Participation Outcomes of Concussed High School Student-Athletes during 2010-2011



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Context

A multifaceted approach for the management of sport related concussion that includes a clinical examination, graded symptom check list, postural stability testing, neurocognitive testing, and Gradual Return to Play Protocol (GRPP) has been recommended by several concussion consensus statements and position papers (Table 1). Health care professionals caring for concussed student-athletes across the United States may not be following these guidelines and may be allowing student-athletes to Return to Participation (RTP) prematurely.

Objective

To investigate how the duration of RTP and GRPP for concussed high school student-athletes was influenced by the type of Concussion Management Program (CMP) which incorporated two different neuropsychological testing batteries (Figure 1) for RTP decision-making.

Design

Retrospective cross-sectional investigation design.

Setting

Two different neurocognitive tests were utilized within a CMP in 43 public high schools in the State of Hawaii.

Table 1. Gradual Return to Play Protocol

Step	Description
Step 1.	Complete cognitive rest
Step 2.	Return to school full-time.
Step 3.	Light exercise. This step cannot begin until athlete is cleared by the treating physician for further activity. At this point the student athlete may begin walking or riding a stationary bike.
Step 4.	Running in the gym or on the field. No helmet or other equipment.
Step 5.	Non-contact training drills in full equipment. Weight training can begin.
Step 6.	Full contact practice or training.
Step 7.	Play in game

Note. Steps 3-7 are supervised by the Athletic Trainer at the high school. Each step is separated of a minimum of 24 hr.

Figure 1. Concussion Management Program Protocol

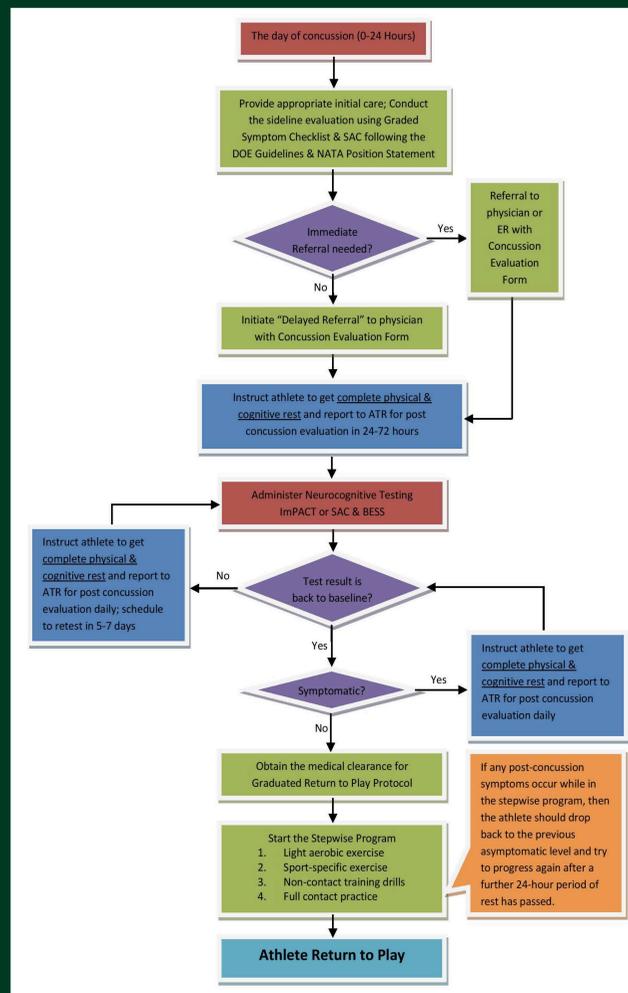


Table 2. Return to Participation Outcomes of Concussed Student-Athletes for ImPact and SAC

	ImPACT	SAC
Days of Restricted Participation	17.71 ± 11.91	18.33 ± 7.91
Duration of GRPP	8.95 ± 5.61	9.14 ± 4.53

No significant ($p=.599$, $p=.748$) difference was found for ImPACT compared to SAC.

Note. SBCT = School Based-Concussion Team; ImPACT = Immediate Post-Concussion Assessment and Cognitive Testing; SAC = Standard Assessment of Concussion; BESS= Balance Error Scoring System

Participants

Concussed student-athletes ($n=426$, between age 13 to 18) who underwent baseline and post-concussion neurocognitive testing during school year 2010-11.

Interventions

Two different neurocognitive tests used in a CMP were compared: 18 schools utilized the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) and 25 schools utilized Standard Assessment of Concussion (SAC).

Main Outcome Measures

Complete data sets (Table 2) for days of restricted participation post-concussion (ImPACT $n=239$, SAC $n=129$), duration of the GRPP until return to unrestricted participation (ImPACT $n=231$, SAC $n=125$), and 95% confidence interval (CI). The duration of the GRPP was defined as the number of days spent in the rehabilitation period starting from light aerobic exercise to full-contact practice. The GRPP consisted of five steps, each separated by a minimum of 24 hours.

Results

No significant ($F_1=.277$, $p=.599$) difference was found between restricted participation post-concussion for ImPACT= 17.71 ± 11.91 (CI= $16.19-19.23$) days compared to SAC= 18.33 ± 7.91 (CI= $16.95-19.70$) days. No significant ($F_1=.104$, $p=.748$) difference was found for average duration of GRPP that incorporated ImPACT = 8.95 ± 5.61 (CI= $8.22-9.68$) days compared to SAC= 9.14 ± 4.53 (CI= $8.33-9.94$) days (Table 2).

Conclusions

We found that the days of restricted participation post-concussion and the duration of GRPP for concussed student-athletes was not significantly different when using the two different neurocognitive testing batteries in the CMPs. The two neurocognitive testing batteries used in this study are just one part of the multifaceted nature of the RTP decision-making as part of a comprehensive CMP. Furthermore, a CMP incorporating a neurocognitive test in addition to clinical examination, graded symptom check list, postural stability testing, and GRPP is vital to determining appropriate duration of RTP and prevent the premature release of concussed student-athletes. Injury surveillance is an important aspect of future recommendations and modification of CMPs.