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## **Does a Case Study Based Intervention About Return to Play After a Mild Traumatic Brain Injury Increase Knowledge and Confidence in DNP Students**

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Does a Case Study Based Intervention About Return to Play After a Mild Traumatic Brain Injury Increase  
Knowledge and Confidence in DNP Students

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A DNP Project submitted in partial fulfillment-of the  
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### Abstract

**Background:** Mild traumatic brain injuries (mTBI) are common accidents that occur in everyday activities and are especially common in sports. Athletes who return to play (RTP) prematurely are at risk for repeat injuries. To combat this public health crisis, the CDC has an active campaign known as “HEADS UP” to educate athletes, parents, coaches, and school professionals, on recognizing, responding to, and minimizing the risks of concussions/brain injuries. The campaign has released specific guidelines for healthcare providers on how to manage return to play safely.

**Problem:** Are healthcare workers aware of the CDC’s HEADS UP resources and are they utilizing the guidelines when treating patients with a mTBI? If healthcare workers are aware and are utilizing the guidelines, how comfortable and confident are they in managing RTP following a mTBI?

**Methods:** This project utilizes a pre and post survey to assess the confidence and knowledge of Doctor of Nursing practice (DNP) students regarding RTP after a mTBI.

**Interventions:** A case-based intervention using the CDC’s recommended guidelines was provided following the pre survey. The case-based intervention included two scenarios with varying degrees of mTBI complications.

**Results:** Findings show both an increase in knowledge and confidence in mTBI RTP management following the case-based intervention.

**Conclusion:** The case-based training was effective and can be utilized as an alternative teaching method for healthcare professionals. Participants benefitted by either increasing their knowledge or reinforcing their current understanding of mTBI RTP.

### *Acknowledgements*

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## Introduction

Each year, about 2.5 million individuals have a traumatic brain injury (TBI), with approximately 50,000 of those resulting in death and over 80,000 suffering permanent disability (Brain Trauma Foundation - Frequently Asked Questions (FAQ) — Brain Trauma Foundation, n.d.). Individuals with a history of at least one TBI are four times more likely to sustain a subsequent TBI than those with no history of TBI (Ierssel et al., 2021). Traumatic brain injuries are defined as a “nondegenerative, non-congenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions” (Freire et al., 2011). The CDC’s HEADS-UP Campaign recommends a six-step RTP progression after suffering a sports/recreational related TBI (SRR-TBI) to reintroduce individuals to physical activity. This step wise progression aims to mitigate the risks associated with premature return to physical activity, which can exacerbate symptoms and prolong recovery.

Understanding the severity of TBIs may help with functional recovery and anticipating rehabilitation needs, thereby improving long term prognosis. When used properly, the RTP progression provides a guide for providers to work individually with players to create a unique regimen to RTP while preventing long-term consequences of TBI and reducing the risk of repeat TBIs (Ierssel et al., 2021). With more providers aware of the step wise progression, mTBI care and RTP will be standardized and increase treatment compliance as all patients will be receiving the same information.

## Review of Literature

The CDC launched the “HEADS UP” Campaign in 2003 after a national survey conducted by the Brain Injury Association of America found that one in three Americans were unfamiliar with the term “brain injury” (Waltzman et al., 2021). At the time, the main goal of the campaign was to improve identification and response to TBIs as well as reduce the risk of adverse outcomes from these types of injuries (Waltzman et al., 2021). The CDC released numerous free educational resources including videos,

fact sheets, public service announcements, and mobile applications to expand their outreach (CDC HEADS UP Campaign | HEADS UP | CDC Injury Center, n.d.). Since then, the “HEADS UP” Campaign has further expanded and now provides online training and certifications for healthcare professionals and coaches.

This movement encouraged individual states to implement their own safety laws and Washington was the first state in the US to take a step towards mTBI management in youth athletics. Washington state passed the Zackery Lystedt Law in May 2009, which requires immediate removal of participants suspected of having an mTBI (CDC HEADS UP Campaign | HEADS UP | CDC Injury Center, n.d.). Players can only return once they have been cleared by a licensed healthcare professional. Since then, all 50 states have followed suit, and have some variation of a return to play law that delineates how mTBIs in young athletes should be handled. These laws focus on parental and coaching education, as well as immediate treatment after an mTBI is sustained. All existing sports laws require that an athlete receive clearance from a healthcare professional, but there are no guides for healthcare providers on what is and is not acceptable to clear (CDC HEADS UP Campaign | HEADS UP | CDC Injury Center, n.d.). It is up to each healthcare provider to utilize existing tools to decide when a player should be cleared for activity.

Despite the publication of an evidence-based guideline for mTBI prognosis, diagnosis, and management, many studies have shown that healthcare providers do not consistently implement the clinical recommendations (Sarmiento et al., 2021). Several barriers to implementing guidelines include perceptions of healthcare providers (self-efficacy, perceived importance of recommendations, relevance of practice), the environment in which the guideline is to be implemented in (inpatient, ambulatory, long-term care settings), and individual characteristics of the guideline (clarity, specificity, strength of evidence) (Sarmiento et al., 2021). To assess the effectiveness of the HEADS-UP online provider training, the CDC conducted a study to analyze pre and posttest module data. The study found that healthcare providers who completed the HEADS-UP training “not only demonstrated significant improvements in knowledge but also reported improved self-efficacy related to mTBI diagnosis and management” (Sarmiento et al.,

2021). The study was repeated with youth coaches, sports officials, and athletic trainers, all of which had similar results with an increase in knowledge and self-efficacy (Daugherty et al., 2020; Kroshus et al., 2023). These findings suggest that online training modules may be an effective tool to support the implementation of the CDC Pediatric mTBI guideline (Sarmiento et al., 2021).

## **Pathology**

Mild traumatic brain injuries often lack early structural damage detectable on neuroimaging and are primarily diagnosed based on reported symptoms including headache, dizziness, and cognitive difficulties (Semple et al., 2016). The initial impact leads to diffuse axonal injury, followed by a secondary phase marked by physiological changes such as decreased blood flow and inflammatory responses (Romeu-Mejia et al., 2019; Sahler & Greenwald, 2022). This "window of vulnerability" increases the risk of repeat TBIs, particularly in youth athletes, whose brains are still developing. Prolonged symptoms post-TBI can interfere with daily functioning and increase the risk of depression and neurodegenerative conditions (Kroshus et al., 2023). Returning to play prematurely can lead to impaired neuromotor control and cognitive processing, exacerbating deficits and increasing the risk of further injury due to impaired balance and executive function (Ierssel et al., 2021).

## **Theoretical Framework**

The theoretical framework guiding this project is the Donabedian Model for Quality of Care. This model focuses on three main categories: structure, process, and outcomes (Donabedian, 1988). The structure in focus is DNP students' knowledge and confidence regarding returning to play after a mTBI through a pre and post survey. By assessing current knowledge and confidence, the project aims to examine current quality of care and determine whether the CDC's healthcare resources are distributed to their target audience. The process being analyzed is a case-based intervention based on the 6-step return to play progression published on the CDC's HEADS UP website. The educational case-based intervention was structured to mimic real life examples of SRR-TBI and the varying recovery process. The outcome is

whether a case-based intervention can improve DNP students' knowledge and confidence on RTP after a mTBI. The results were as predicted as data showed the case-based intervention did lead to an increase in knowledge and confidence in managing RTP following an mTBI. This project meets the Donabedian Model criteria by utilizing a case-based intervention to educate and improve mTBI knowledge in healthcare providers.

### **Purpose of the Project**

The purpose of this project is to determine whether a case-based intervention can improve DNP students' knowledge and confidence on managing return to play following a mild traumatic brain injury. There were two goals for this project: 1) introduce DNP students to the CDC's HEADS Up Campaign and guidelines to managing return to play for patients with a mTBI and 2) reinforce mTBI RTP knowledge for DNP students who are familiar with the topic and resources. The PICO (population, intervention, comparison, and outcome) statement is: "For DNP III students about to graduate, can a case-based intervention increase confidence and knowledge on return to play following a mild traumatic brain injury when comparing pre survey scores to post survey scores?"

### **Methods**

#### **Participants**

A secure Qualtrics link was sent out to 82 final year Doctor of Nursing Practice (DNP) students at a private university in the Pacific Northwest. The link was sent via Microsoft outlook through the cohort generated email list provided by the university. The cohort consists of five advanced practice specialties: midwifery, psychiatric mental health, adult gerontology, acute care adult gerontology, and family practice. Voluntary response sampling was utilized, and no incentives were offered. Participants are at least 21 years of age and hold at least one bachelor's degree. There were no other exclusionary factors, and no demographic information was collected other than the type of specialty the student was studying in and how many years of experience they had as a registered nurse.



## Measures

The survey was kept open for four weeks and there was no time limit once the survey was opened. The survey consisted of a pre survey, case-based educational intervention, and a post survey to evaluate DNP students' knowledge and confidence in managing return to play following a mild traumatic brain injury. All three parts of the project were delivered online. The presurvey began with a consent question that outlined the goals of the project and what participating would entail. The students were aware that their participation was voluntary and that they were free to withdraw their participation at any time. Following the consent question, there were six mTBI and return to play knowledge questions. There were two confidence questions to gauge what the confidence level was prior to the educational intervention. Questions were developed after thorough research on mTBI and completing the healthcare provider training on the HEADS-UP website.

A case-based education was chosen as the intervention model to teach or reinforce knowledge on returning to play following a mTBI. Case-based education was introduced to help learners actively engage in a topic through authentic clinical cases by having students apply their knowledge in practice (McLean, 2016). A copy of the 6-step return to play progression was provided with direct links to the HEADS-UP website at the intervention's start. Two case studies were included that walk participants through a scenario where an athlete was starting the return to play progression following a mTBI. The correct answer and reasoning were provided following each question. Each question had the link to the 6-step return to play progression for participants to have open as a reference.

The post survey includes the same six initial knowledge questions and the confidence questions administered in the pre-survey. The answer and reasoning for each knowledge question was provided. The post survey also included two demographic questions, asking participants what specialty they are currently studying in and how many years of experience they have as a RN.

## Ethical Considerations

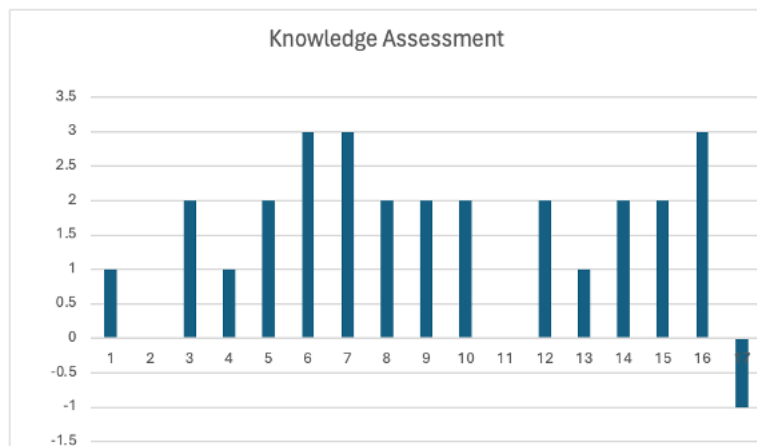
The university institutional review board (IRB) has determined the study to be exempt from IRB review in accordance with federal regulation criteria. Data was collected from March 8, 2024 to April 5, 2024. Participants will remain anonymous, and all data collected will be kept confidential and destroyed upon the author's graduation, on June 8, 2024.

## **Results**

26 participants started/completed some portion of the survey with 17 participants completing the entire pre/post survey with the case study intervention. For the knowledge portion, all but one participant had either the same score or an improved score from the pre and post survey. Confidence on treating mTBIs increased by at least one point for every participant. Confidence on managing the return to play progression also increased by at least one point for every participant. Nine participants had one to two years of experience as a registered nurse (RN). Four participants had three to five years of experience as a RN. Three participants had five or more years of experience as a RN. One participant had less than one year of experience as an RN. Primary care had the most participants, at 7 out of the 17. Five participants specialized in acute care. Five participants specialized in psychiatry/mental health. There were no participants from the midwifery track.

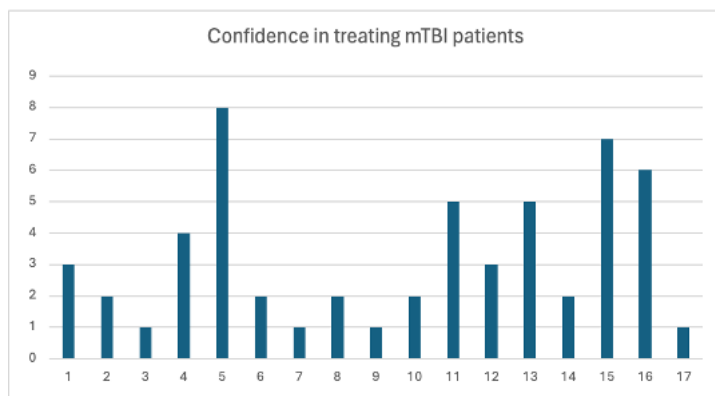
Each graph in figures 1-3 below represents each participant's performance on the post survey compared to the pre survey. Each positive bar graph represents an improvement, with no change indicating the participant picked the correct answer both times. A negative bar graph represents the participant chose the correct answer on the pre survey but then chose an incorrect option on the post survey.

Figure 1



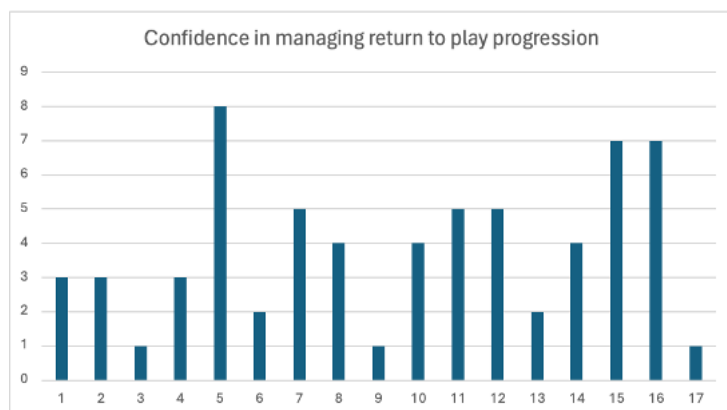
*Changes in knowledge from pretest to posttest. Positive change indicates the participant initially chose the incorrect answer on the presurvey to choosing the correct answer on the post survey. Negative changes indicate the participant initially chose the correct answer on the presurvey and chose the incorrect answer on the post survey. Participants without a bar graph indicate no change.*

Figure 2



*Changes in confidence in treating mild traumatic brain injury patients from pretest to posttest. Positive bar graphs indicate an increase in confidence.*

Figure 3



*Changes in confidence when managing return to play progression from pretest to posttest. Positive bar graphs indicate an increase in confidence.*

A T test was applied to three sets of data: knowledge questions, and each of the confidence questions. The one-tailed P value for the knowledge questions was calculated at  $P < 0.01$ . The one-tailed P value for the first confidence question on treating mTBIs was calculated at  $P < 0.01$ . The one-tailed P value for the second confidence question on managing return to play was calculated at  $P < 0.01$  as well. All three sets of data show a highly statistical significance between the pre survey results and post survey results following the case-based intervention.

### Discussion

With a P value  $< 0.01$ , the T test results suggest that the observed increase in post test scores compared to pretest scores is likely not due to random variation or sampling error, but reflects a true change in participants. All but one participant had an improvement on the knowledge portion of the study. Questions regarding TBI symptom recognition and risk factors for obtaining a TBI had the biggest improvement from pretest to post test, following the case-based intervention. Return to play knowledge questions had a 50% increase in correct answers. All participants were able to correctly identify common symptoms of a TBI, risk factors in prolonging recovery following a TBI, and when to start the return to play

progression. Some questions were not answered, and those surveys were voided. Only complete surveys were used to analyze the change in knowledge in pre survey and post survey scores.

All participants had an increase in self-reported confidence by at least one point. The first confidence question asked participants to rate their confidence in treating patients with a mTBI and post survey results showed a 6.76 average on a scale of 1-10 compared to 3.86 on the presurvey. The second confidence question asked participants to rate their confidence in managing the return to play progression and the average was a 7.35 on a scale of 1-10 compared to 4.1 on the presurvey. These findings imply that using a case-based intervention and providing accessible resources (direct links to the CDC's website), can improve knowledge and confidence and therefore is a viable learning modality. The study was successful, and the data found showed that mTBI knowledge and confidence can be improved with a case-based intervention.

### **Limitations**

This study was limited by participant population as only DNP III students were asked to participate. Since participants self-volunteered to participate, the data gathered could be skewed towards participants who are familiar with mTBI guidelines or are interested in mTBI. The study was not able to track whether the resource links were utilized during the post survey questions.

An additional limitation is that this study only measures changes in knowledge and self-efficacy immediately following the case-based intervention. The study was not able to measure long term effectiveness on health care provider's knowledge and self-efficacy. The study was also not able to measure patient outcomes. Moreover, external environmental or individual provider characteristics were not considered.

### **Conclusion**

With over 3 million Americans suffering long-term effects of a sports-related traumatic brain injury, the topic has quickly become a major public health crisis and is frequently underreported,

underdiagnosed, and mismanaged given the previous lack of standardization of treatment (Brain Trauma Foundation - Frequently Asked Questions (FAQ) — Brain Trauma Foundation, n.d.). The CDC's return to play progression provides a guideline for healthcare providers to follow when treating patients with a mTBI. This project examined how confident and knowledgeable ARNP students were in managing return to play in mTBIs and how a case-based intervention could improve their ability to provide consistent up to date treatment. The case-based intervention proved to be successful, with both confidence and knowledge increasing when comparing pre and post intervention surveys. Further implementation of case-based training of the HEADS UP campaign would be needed to determine whether improved confidence and knowledge leads to better patient outcomes.

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