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Submission to the Senate Community Affairs  
Committee inquiry into concussion and repeated head  
trauma in contact sports

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## EXECUTIVE SUMMARY

Australia is viewed as a leading global sporting Nation. Increasing participation in sport and physical activity is a key policy objective of Australian governments at all levels. The weight of evidence supporting the benefits of sport and physical activity is substantial. Insufficient physical activity has both immediate and long-term 'costs' for individuals as well as population-wide health and wellbeing<sup>1</sup>.

As such, we have an obligation to be at the forefront of sports medicine, medical research, and emerging technologies as well as practical strategies to minimise sports injury risks, particularly concussion.

Whilst modest levels of government investment have been made into concussion research, there has been a considerable lack of engagement with the private sector. Critical as this research may be, there is a need for a collaborative approach with industry to implement initiatives that improve research outcomes and ultimately the standard of care model.

The research to date has failed to collect and report objective, longitudinal, head impact exposure data. Fundamentally, many questions will remain unanswered until a long-term databank of head impacts is established to drive downstream research outcomes.

In addition to health implications, it is evident that our insurance sector is increasingly seeing sports injury risks as a challenge. This will be a key driver in the development and viability of our national sporting landscape. Australia's sports sector is worth \$83bn a year and is a major contributor to our economy: 3% of GDP<sup>2</sup>. Better managing concussion and repeated head trauma risks is vital to ensuring the safety and viability of both community and elite sports.

We consider there are three great unmet needs pertaining to the management of sport related concussion and repeated head trauma:

1. The lack of an objective, longitudinal head impact exposure database;
2. The lack of a nationally accessible, evidenced-based, acute management platform utilising consistent protocols; and
3. The lack of a comprehensive concussion incident database - across sports, gender, age, remote and First Nations communities.

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<sup>1</sup>

<sup>2</sup> Confederation of Australian Sport. <https://www.sportforall.com.au/australian-sports-contribution-to-the-nation/#:~:text=The%20sport%20industry%20generates%20an,3%25%20of%20the%20nation's%20GDP.>

## RECOMMENDATIONS

HITIQ submits the following recommendations based on the company's capabilities to deliver strong outcomes to overcome the current unmet needs in the sector.

- a. The widescale Implementation of head impact sensor technology to longitudinally track exposure in both community and elite sports;
- b. In conjunction with relevant peak bodies and stakeholders, deploy best in class technologies at scale to identify, manage and treat concussion in community sports. This is achieved via;
  - I. A scalable point of care incident reporting platform for potential concussive incidents;
  - II. Rapid access to specialised clinicians following a potential concussive incident;
  - III. Consistency in the clinical assessment, diagnosis and management of concussion; and
  - IV. The implementation of consistent, guided, return to learn, work and play protocols.
- c. The creation of a de-identified, open source, National head impact and concussion database to drive future Australian led research.

## INTRODUCTION

HITIQ is pleased to make this submission to the Community Affairs Committee's inquiry into concussion and repeated head trauma in contact sports. This submission will address a number of the inquiry's terms of reference (A, B, C, G) with a specific focus on point A.

## ABOUT HITIQ

HITIQ Ltd ([www.hitiq.com](http://www.hitiq.com)) is an Australian company building and distributing technology platforms to assist in the surveillance, detection, assessment & diagnosis of sports related brain injury.

Operating at the intersection of health and safety, technology, and sports, HITIQ's products address key limitations in the protocols currently utilised in the management of sports related concussion.

HITIQ's technology suite includes independently validated smart mouthguard sensors, capable of detecting both concussive and sub-concussive impacts, virtual reality based assessment tools, standardised concussion assessment applications as well as telehealth infrastructure to ensure the highest standard of immediate care for all Australians, regardless of geographic location.

To date, we have invested close to \$20m into the development of our technology. Our work has been conducted in close association with leading concussion experts who are members of our Scientific and Medical Advisory group. Its members include Associate Professor Andrew Gardner (University of Sydney), Dr Joshua Goldman (UCLA), Professor Jeffrey Rosenfeld AC OBE, Professor Carolyn Emery (University of Calgary), Assistant Professor Douglas Terry (Vanderbilt University) and Dr Robbie Sikka.

Our goal is to provide the empirical data to empower caregivers and sports administrators with the best tools to provide advanced concussion management. We have worked across 60 leagues and competitions: with 800+ customers and over 45,000 users globally. Our database consists of more than 125,000 baseline and concussion examinations as well as millions of head impact data points.

While HITIQ's technology is currently leveraged in several elite sporting environments, there is significant scope to scale the implementation into community sports where the expertise and infrastructure supporting concussion management is severely lacking.

## AUSTRALIA'S CONCUSSION LANDSCAPE

Globally, concussion is a significantly underreported health issue carrying substantial health costs. True prevalence of the injury is not currently well understood.

The best available data suggests there is 32,000 concussion based hospital admissions in Australia per year. At an average cost per admission of \$1580, this equates to a direct acute health burden of \$50 million annually<sup>3</sup>.

The immediate and long-term 'cost' of sports related injuries results from:

- Health costs for treatment;
- Health system costs for insurance;

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<sup>3</sup> Thomas, E et al (2020) 'Does Australia have a concussion epidemic' National Library of Medicine. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7136981/>

- Time and productivity lost to employment, school and home activities;
- Participation loss due to negative experience and ultimately time lost to future physical activity; and
- The cost of long-term physical, psychological or emotional damage.

There is significant scope to implement technology led strategies to reduce the national burden associated with these 'costs'.

## COMMITTEE REFERENCE POINTS

### **a. The guidelines and practices contact sports associations and clubs follow in cases of player concussions and repeated head trauma, including practices undermining recovery periods and potential risk disclosure.**

The guidelines and practices currently proposed by many contact sports associations and clubs have a number of key shortcomings, both in structure and implementation.

There is a significant lack of oversight in several areas of the concussion care model. These shortcomings are outlined below and include:

- I. A scalable point of care incident reporting platform for potential concussive incidents;
- II. Rapid access to specialised clinicians following a potential concussive incident;
- III. Consistency in the clinical assessment, diagnosis and management of concussion; and
- IV. The implementation of consistent, guided, return to learn, work and play protocols.

These concerns are echoed by the community. Research conducted by HITIQ in 2022 demonstrated that:

- **80%** of *parents* who have children playing contact sports report that clubs need more information about how to manage potential concussion incidents;
- **70%** of parents report needing more information about how to manage potential concussion incidents;
- **40%** of parents whose children do not play contact sports report that they don't want their children participating due to the risk of head injuries and how they are managed; and

- Only **17%** of parents strongly agree they feel confident in their ability to manage a concussion incident

## **Our Solution**

The 'HITIQ ConneQt' software application provides an end to end ecosystem for players, guardians, and team administrators to manage sport related concussion.

The application allows team administrators or parents to enter an incident report following a potentially concussive event. This is a guided process to ensure all pertinent information is documented. Key stakeholders (guardians and club administrators) are notified when an incident report is entered to ensure continuity of care. Via the app, guardians have access to concussion management resources, can perform assessments to monitor symptoms and, critically, can book a telehealth consultation with a trained doctor on the same day as the incident.

Specialist doctors within the ConneQt network follow industry best practice, adhering to a standardised consultation protocol within the ConneQt MD Portal. By having access to the incident report, collected at the time of the event as well as any follow-up symptomology assessments, the clinician can make a more informed diagnosis.

The outcome of the consultation is shared with the team admin to ensure they are aware of the players status. If the player is diagnosed with concussion, they should not return to play until they have followed the prescribed return to play process. Players and guardians are guided through this process within the application.

While much research has been conducted collecting concussion information in emergency rooms, the majority of incidence do not result in a hospital visit. To truly understand the concussion landscape in Australian community sports, there is a requirement to collect information at the point of injury.

This system creates a standardised method for identifying people at risk of concussion, allows stakeholders to easily document necessary information and provides immediate access to high quality medical care for all Australians.

## **b. The long-term impacts of concussions and repeated head trauma, including but not limited to mental, physical, social and professional impacts;**

Historically, key medical personnel have relied on subjective and observational methodologies to identify impacts, assess and diagnose brain injury. The limitations in this standard of care have resulted in undetected impacts and undiagnosed concussions.

To adequately understand the cause-and-effect relationship between head trauma and clinical outcomes, accurately quantifying the number and magnitude of head impacts experienced by participants in contact sport is vital.

### **Our solution**

As part of its technology ecosystem, HITIQ's Nexus Smart Mouthguard system was developed to identify, collect, and quantify all head impact exposures in training and game environments.

The discrete sensor has been independently validated and is fit for purpose in contact sports. The technology is currently deployed in the AFL, Super Rugby and US College Football.

The Nexus mouthguard's high frequency sensor array measures parameters related to head impact injury biomechanics, specifically linear and rotational accelerations (force). HITIQ's sophisticated algorithms can accurately translate the raw accelerometry data into inferred forces experienced through the centre mass of the brain.

Only by longitudinally tracking the head impact exposure of players, can we truly understand the 'cause' element of this complex problem.

## **c. The long and short-term support available to players affected by concussion and repeated head trauma**

As already highlighted, the availability of short-term support for players (and guardians) affected by concussion is significantly lacking.

When a potentially concussive incident takes place, key decision makers are unaware of how to best manage the situation. Club administrators and guardians don't possess adequate resources to facilitate quality decision making, access to medical help is often delayed or non-

existent and many local GPs are not sufficiently trained in the diagnosis and management of concussion.

Poor management in the short term is likely to create more significant long term issues. By implementing technology to ensure immediacy of quality care, this risk can be significantly mitigated.

**g. The prevalence, monitoring and reporting of concussion and long-term impacts of concussion and repeated head trauma, including in First Nations communities**

It is not possible to accurately measure the prevalence of concussion while the systems we rely upon for the identification, diagnosis and reporting of injury are insufficient or non-existent.

Do we see increased risk in certain sports, age groups and/ or genders? Are particular ethnic groups or people of certain demographic or socioeconomic status more vulnerable?

There is a need for a standardised national system, that captures community sports participants Australia wide, to ensure concussive incidences are identified and documented accurately. This infrastructure would provide accurate insight into the true prevalence of concussion and in-turn, provide an avenue for better monitoring and management. We consider that HITIQ has the clear ability to provide this solution.