Australian Multidisciplinary Concussion Clinic: A New Model of Care.

Vicki Evans (Roach) AM, Clinical Nurse Consultant [1], Dr Vincent Oxenham DPsych Clin.Neuro, Senior Clinical Neuropsychologist [1,2], Dr Miriam Priglinger, Neurologist [1], Prof Gary Browne, Sport & Exercise Physician [1,3].*

1 Concussion Clinic, Department of Neurology, Royal North Shore Hospital. St Leonards. NSW 2065 Australia
2 Lifespan Health and Wellbeing Research Centre, Macquarie University, Sydney, NSW 2113, Australia
School of Psychological Sciences Faculty of Medicine, Health and Human Sciences, Macquarie University, Sydney, NSW 2113, Australia
3 Children's Hospital, Westmead, NSW 2145 Australia
*Corresponding author

Abstract

Literature suggests that there is a paucity of dedicated concussion clinics in Australia, with the ones that exist being privately owned and usually offering discipline specific services (e.g. physiotherapy) (Nguyen, McKay, Ponsford, Davies, Makdissi, Drummond, Reyes, Makovec Knight, Peverill, Brennan & Willmott, 2023). Whilst the long-term impact of concussions, for instance, traumatic encephalopathy syndrome, dominates media coverage, everyday concussions, especially at the community level, require more consideration. Concussions need to be identified and managed appropriately using best practice care. This is usually provided initially, by a General Practitioner or Emergency Department. However, if concussion symptoms are prolonged, a multidisciplinary team of concussion experts are best placed to provide the required holistic care.

Prior to 2022, there was no adult public concussion clinic in NSW and only one public paediatric concussion clinic at Sydney Children's Hospital, Westmead. The need for more clinics was apparent, and overseas literature suggests that multidisciplinary management made the most gain in regard to patient outcomes (Jaganathan & Sullivan, 2020). Therefore, the Northern Sydney Local Health District (NSLHD) established a multidisciplinary Concussion Clinic at Royal North Shore Hospital (RNSH) in 2022. This was the first of its kind in Australia, where a true multidisciplinary approach was at the centre of the model of care. While there are many multidisciplinary clinics in Australia, the difference is that this one had the multidisciplinary team (MDT) playing a combined role in the assessments and discussions with the patient, all seeing the patient together in real time. This made for better understanding of events, concussive mechanisms, recovery timelines, symptom causes, patient examination, and a diverse but cohesive evidence-based approach to treatment and management. There was less repetition for the patient, optimised resource and time allocation per patient, increasing quality and effectiveness of care while reducing wait times to access appropriate services, notwithstanding increased patient satisfaction.

Keywords: Concussion, multidisciplinary team, mild traumatic brain injury (mTBI).

Questions or comments about this article should be directed to Vicki Evans

Email address: Vicki.Evans@health.nsw.gov.au

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Introduction:

Concussive injuries include a broad range of symptoms affecting physical, emotional, cognitive and sleep functions. Specialised clinics deliver targeted care guided by healthcare professionals. Traditionally, these clinics were centred around the medical specialist who referred patients to other disciplines as needed. However, contemporary clinics increasingly adopt a multidisciplinary approach, integrating various healthcare providers such as nurse practitioners (NP), clinical nurse consultants (CNC), clinical nurse specialists (CNS), neuropsychologists, physiotherapists, exercise physiologists and related professionals within the same service.

Background:

The Neuroscience Network at RNSH has established a strong legacy of community engagement, particularly through head injury education initiatives and collaborative guideline development with local schools. In recent years, concussion has emerged as a focal point of intensive clinical and public discourse. Defined medically as a type of mild traumatic brain injury (Bielanin, Metwally, Paruchuri & Sun, 2023), concussion management presents significant challenges. Without appropriate and standardised guidance, inconsistent approaches often lead to inappropriate treatment, mismanagement, extended school absences, worsening symptoms, psychological complications including anxiety and depression, and hospital readmissions. Research indicates that concussion remains an underdiagnosed and largely invisible condition across all fields (Fried, Balla, Catalogna, Kozer, Oren-Amit, Hedanny & Efrati 2022). The convergence of increasing concussion presentations to the emergency department (ED), coupled with heightened media interest in concussion, dementia and chronic traumatic encephalopathy (CTE), highlighted the critical need for a dedicated specialty clinic.

Aim:

The aim of this endeavour was to establish a comprehensive integrated multidisciplinary Concussion Service at RNSH, a tertiary referral centre. This service will deliver in-real-time collaborative assessments where multiple specialists, in a multidisciplinary team (MDT), evaluate patients concurrently in a single clinical setting (i.e. in the same consulting room). The service will also deliver essential education, facilitate safe and structured return to activity protocols for study, work, and sport, and ensure coordinated patient management across all domains of recovery.

Method:

A comprehensive community consultation process was initiated with local school and sporting groups to gather data through questionnaires, facilitated discussions and focus groups at several hospital forums. Following educational outreach sessions at local schools, a dedicated focus group was established within the School Nurses Association, to address their specific concussion-related concerns.

Hospital stakeholders representing diverse clinical and administrative departments were convened to assess comprehensive service needs. The multidisciplinary coalition included representatives from paediatrics, neurology, neuropsychology, emergency, the Divisions of Surgery, Medicine and Women’s & Children’s

Health, Health Promotions Services, the Youth Advisory Group, GP Network, and First Nation peoples. This extensive collaboration revealed significant knowledge gaps regarding concussion identification, diagnosis, treatment protocols and ongoing management.

To establish a service rooted in evidence-based practice, specialised guidance was sought from the Children's Hospital Institute of Sports Medicine (CHISM) at Westmead Children's Hospital. Given the absence of comparable multidisciplinary concussion services within Australia, international benchmarking became essential. This rigorous process involved consultation with leading institutions worldwide, including the Barrow Neurological Institute (Arizona, USA), NYU Langone Hospital (New York, USA) and the Ontario Concussion Group (Ontario, Canada).

The collective insights from these consultations, combined with data from Northern Sydney Local Health District (NSLHD) Emergency Departments (EDs), and local general practitioners (GPs), informed a formal submission to the NSLHD Executive. This proposal recommended two key implementation strategies:

1. *Concussion Educational Video* – Developed as the initial intervention, this resource has subsequently been adopted as an educational tool by the NSW Education Department, New Zealand schools and many sporting clubs across Australia and New Zealand. The link can be found at https://vimeo.com/674645370

2. *Integrated MDT Concussion Clinic* – Established with a core clinical team comprising a paediatric sport and exercise physician, adult neurologist, neuropsychologist and clinical nurse consultant. This service employs a truly collaborative approach where all specialists simultaneously participate in patient assessments, enabling comprehensive evaluation and coordinated care planning. Additionally, the clinic pioneered seeing patients as early as 10 days post-concussion, rather than traditional clinics that often accept referrals at the time patients are diagnosed with persisting symptoms (i.e. beyond four-weeks).

3.

Results: Background and Community Need

The growing prevalence of concussion cases has significantly impacted emergency department presentations, follow-up care requirements, educational participation, family dynamics, and sporting activities (Cassimatis, Orr, Fyfe & Browne, 2021; 9News, 2022). Media coverage has predominantly focused on chronic traumatic encephalopathy (CTE), generating heightened concern among educational institutions and parents (Pengilly, 2022). This environment revealed a critical gap in community-based concussion education and management resources.

Comprehensive Service Development

The integrated Concussion Service—comprising specialised clinic services, educational video resources, and a dedicated website—has received enthusiastic endorsement from community stakeholders and general practitioners as a specialised centre advocating for an often-invisible condition that potentially affects all dimensions of daily functioning

when inadequately identified or managed. The service has demonstrably improved school-based practices through targeted education and guideline development assistance (see Appendix 1). The comprehensive website provides essential contact information, downloadable resources, eligibility criteria, and seamless connections to complementary services.

Multidisciplinary Teams:

Traditional models typically operate on a 1:1 provider-patient basis with specialist seeing patients individually, even when working within a multidisciplinary team. The RNSH Concussion Clinic, as far as we are aware, represents a groundbreaking innovation in Australian Healthcare, offering specialised concussion management as early as 10 days post-concussion, highlighting the importance of early intervention, with an integrated MDT framework where clinicians collaborate simultaneously during patient consultations.

Traditional approaches often focus on specialised knowledge within a single discipline, while the Concussion MDT offers insight from a neurologist (or paediatric neurologist), neuropsychologist and clinical nurse consultant, all at the same time. The team operates on foundational principles of effective communication, seamless coordination, mutual respect, and professional trust. The clinical nurse consultant serves as the practice leader, orchestrating and facilitating team functions through essential skills in communication, problem solving, collaboration and adaptability.

Recent research by Dawe, Cronshaw & Frerk (2024) identifies critical collaborative competencies including active listening among team members, transparent communication protocols, systematic knowledge sharing, and unified professional goal alignment. Within this framework, the patient remains the central focus of all clinical decisions. Recognising that each patient presents with unique requirements, attentive listening becomes essential to developing personalised care pathways that optimise outcomes.

Jangathan & Sullivan (2020) recommended individualised MDTs for improved patient management. The RNSH Concussion MDT currently delivers services through a structured weekly face-to-face clinic, with morning sessions dedicated to paediatric cases and the afternoon for adults. The appointment schedule allocate 60 minutes for new patients and 30 minutes for follow-up reviews. Most patients require two clinical visits, though individual cases may necessitate one, three, or occasionally four appointments based on clinical progress. The recommended interval between the initial assessment and follow-up visits is approximately 4 weeks. Notably, the service currently operates without wait times for new referrals. The clinical nurse consultant manages the triage and booking process and serves as the primary liaison between patients, their families and referring GPs.

The RNSH Concussion Clinic –

1. **Early Intervention and Integrated Multidisciplinary Assessment Model:** The clinic sees patients as soon as 10 days post-concussion for early intervention and employs a pioneering 1:3 patient-to-provider ratio, where each multidisciplinary team member simultaneously evaluates the patient in a collaborative setting. This approach yields more comprehensive clinical insights, facilitates immediate clarification of complex issues, and ena-

bles real-time consensus building. Patients receive personalised resource materials, detailed explanations, and structured action plans directly during their consultation, enhancing both understanding and adherence.

2. **Knowledge Translation and Community Integration:** The clinic actively disseminates expertise through structured collaboration with healthcare networks, general practitioners, educational institutions, and community sporting organisations. This outreach includes detailed clinical summaries and strategic deployment of educational resources, creating a bidirectional knowledge exchange that strengthens community-based concussion management.

3. **Systems-Level Impact and Policy Development:** The clinic has established a foundation for broader discussions at district, state, and national levels regarding standardisation of post-concussion care protocols and public awareness initiatives. This advocacy role positions the clinic as a catalyst for systemic improvement in concussion management across various healthcare contexts.

4. **Innovative Educational Resource Development**: The clinic produced a concise five-minute educational video specifically designed for optimal engagement and retention. This resource employs strategic use of colour, animation, and authentic scenarios to effectively communicate critical concussion information within attention span limitations. The resource's exceptional quality and utility are evidenced by its widespread adoption across New South Wales, broader Australia, and New Zealand educational systems. Notable institutional integration includes incorporation into NSW Education Department teacher training curriculum, New Zealand's Public Health Unit programming, and documented implementation by numerous individual schools (see Appendix 1).

Clinical Impact and System Benefits

The establishment of a dedicated Concussion Clinic has measurably reduced emergency department re-presentation rates while enhancing cognitive health outcomes for paediatric and young adult populations through appropriate, staged return-to-activity protocols for daily living, educational participation, and athletic engagement (9News, 2022; NSLHD News, February & May 2023). The RNSH Concussion Service has emerged as a national reference centre, providing implementation guidance for similar services across Australia and contributing to statewide concussion information frameworks and collaborative research initiatives.

Improved Outcomes

The educational video component has substantially elevated awareness regarding concussion identification and management protocols throughout the community, with particular impact in educational settings (see testimonials in Appendix 1). Additionally, the Concussion Service exemplifies effective hospital-community collaboration, establishing a proactive approach to injury prevention and awareness.

The NSW School Sport Unit commented that *"The video contains clear information for children and young people on concussion. We liked the way it was created for a specific targeted audience, and the choice of footage, images and sports will engage young people immediately. The message of sitting out for one game compared to the whole season is a powerful one and something that will make children and young people think. We believe this will be a valuable learning tool for young people in supporting them in recognising the signs and symptoms of concussion, looking after your mate, removing, and reporting concussion and the importance of seeking medical care. The concussion video has been included in the resources section of our 2 Recognising and Responding to Concussion e-learning courses as a resource that teachers are encouraged to share with their students".*

Concussion frequently affects emotional regulation, with anxiety and depression representing common comorbidities (Gornall, Takagi, Morawakage, Liu & Anderson, 2021). The service addresses psychological well-being through structured patient-reported outcome measures and standardised post-concussion symptom scoring systems. Patient outcomes have improved significantly through implementation of graduated return-to-learning protocols prior to return-to-sport progressions. Positive feedback has been consistently documented through patient satisfaction questionnaires (see Appendix 2) and media coverage (9News, 2022; NSLHD News, 2023).

The successful implementation of the RNSH Concussion Service affirms NSLHD's commitment to proactive innovation addressing community concerns. This model enables appropriate outpatient management of concussion patients through coordinated general practitioner and specialist clinic collaboration.

Productivity and Sustainability

The RNSH Concussion Clinic delivers contemporary best-practice models of care through efficient multidisciplinary assessments and collaborative teamwork (see testimonials in Appendix 2). Operating within an outpatient framework, the service maintains financial sustainability through Medicare funding mechanisms. The clinic has established productive research partnerships with the NSLHD's EDs and two New South Wales universities.

Service development prioritised sustainability, cost-effectiveness, and accessibility. Clinical staff report enhanced professional engagement through participation in a specialised service and through development of educational resources with far-reaching community impact. The video development methodology has been published in the Australasian Journal of Neuroscience (Evans, 2023) and presented at the Australasian Neuroscience Nurses Association Annual Conference 2022.

The Concussion Clinic, Australia's first integrated multidisciplinary service of its kind, has maintained continuous operations for three years. Patients are seen as early as 10 days post-injury, aligning with research stating that early identification and intervention promote optimal recovery trajectories (Cassimatis et al., 2021). Patients seen at the concussion clinic typically receive 2-4 consultations within the multidisciplinary team framework. RNSH provides comprehensive support to community members, educational institutions, and general practitioners through timely written com-

munication, personalised consultation, and accessible educational resources. Table 1 (below) provides the RNSH Concussion Clinic data for 2022-2024.

***Table 1:** (Below) RNSH Concussion Clinic data 2022-2024.*

2022	**No. of Patients**	**Occasions of Service**
Paediatric	29	69
Adult	22	49
TOTAL	**51**	**118**
2023	**No. of Patients**	**Occasions of Service**
Paediatric	36	68
Adult	44	78
TOTAL	**80**	**146**
2024	**No. of Patients**	**Occasions of Service**
Paediatric	58	94
Adult	48	82
TOTAL	**106**	**176**

No. of Visits	**X1**	**X2**	**X3**	**X4**
2022	19	26	6	0
2023	30	42	7	3
2024	48	51	7	2

Conclusion:

Concussion represents an invisible injury with far-reaching consequences. Optimal recovery and successful reintegration to educational, occupational, and recreational activities requires specialised management by a dedicated multidisciplinary team with concussion-specific expertise. Multidisciplinary practice accommodates the need for a comprehensive approach to concussion management. The innovative early intervention (10 days post-injury) and collaborative assessment model—where all specialists simultaneously evaluate and interact with the patient—has demonstrated significant benefits in both clinical outcomes and resource utilisation efficiency. This approach enables comprehensive, coordinated care planning that addresses the complex, multidimensional nature of concussion recovery within a single clinical encounter.

Recognition Awards: RNSH Concussion Clinic

Winner: NSLHD Quality & Improvement Award: Keeping People Healthy 2023

Winner: NSW Health Awards 2023

Finalist: NSW Premier's Awards 2024

Finalist: NSLHD Exceptional people Awards 2024

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Appendix 1: NSLHD Concussion Video Testimonials from local schools.

"The school really LOVES the video. This is perfect for our Coaches Induction…we would also use this for talks with our students and in the PDHPE program!" *(Barker College).*

"It's a great animation to demonstrate the signs and symptoms of a concussion, it will be useful for us as an educational video, when we need to explain the implications of a concussion to students or staff". *(Cranbrook School).*

"Thank you very much for sending us this important information. It will be included in our programs". *(Killarney Heights High School).*

"LOVE the video it's fantastic. Our challenge is pitching from year 7 through to year 12 and that is something that this video covers. It has been an excellent resource and a very valuable tool in our readiness for the upcoming winter sport season. The video is suitable for all student ages an additionally our staff. Videos such as these greatly assist in improving outcomes for our students', staff, and College community". *(St Ignatius College).*

"Clinic & video - great news! Well done on the video. Great animation and I like the way you have included all ages and both genders. Congratulations on such a professional and informative production". *(Sydney Children's Hospital Network).*

"That's great news – well done. Good to see your hard work getting taken up and having an impact". *(Loreto Kirribilli).*

"A fabulous initiative – great for the community". *(Northern Beaches)*

"The video was very insightful, educational & clear. The video will be pushed via our internal channels whilst also living on our school website. The video and the working relationship that we will continue to have going forward is a much needed". *(St Joseph's College).*

"Fantastic! This is great!" *(Davidson High).*

"Thank you for providing this, it has been forwarded on to our Student Services/sick bay, and Sports Coordinator". *(Marist College).*

"This is great news. We will apply it". *(Monte Saint Angelo).*

"Excellent news for our students and staff. Fantastic resource!" *(St Aloysius College).*

Appendix 2: RNSH Concussion Clinic: Outcome & Patient Satisfaction

From Schools & Referrers:

The RNSH Concussion Clinic: "We really appreciate the updates on our students and the best ways to manage their symptoms at school". *(St Ignatius College)*

"The clinic's response was exceptional. My patient was seen with the team, and I was electronically updated the next day with a full report". *N.M. GP (2024)*

From Parents/Patients:

"They each asked different types of questions. They understood". *Patient T.K. (2024)*

"I didn't have to repeat my story. They were all there together". *Parent (2024)*

"Concussion is not something that your friends can see. You must be strong an seek the right people to help you. Then you can help educate others". *(M.C. 2023)*

"The way in which we were able to see everyone together, was really beneficial". *Patient G.S. (2023)*

"I really appreciated the people in the team that I could talk to. They understood what I was going through, and they helped my mum understand too". *(E.L. 2022)*

From PARVAN *(Prevention & Response to Violence, Abuse & Neglect, NSW Health)*

"A good resource for our domestic violence patients".

The NSLHD Concussion Video:

"Fantastic resource for teachers, coaches and students" *(Barker College).*

"I saw the video they made in school. It was really good". *(W.T. 2023)*