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Quest for clarity: investigating concussion-related responsibilities across the New Zealand Rugby Community System

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ABSTRACT

There is a growing concern around concussions in rugby union, at all levels of the game. These concerns highlight the need to better manage and care for players. However, consistency around concussion-related responsibilities of stakeholders across the community rugby system remains challenging. Taking a systems thinking approach, this pragmatic, qualitative descriptive study explored key stakeholder groups within New Zealand's community rugby system's perceptions of their own and others' concussion-related responsibilities. Participants included players from schools and clubs, coaches, parents, team leads and representatives from four provincial unions. A total of 155 participants (67 females and 88 males) were included in the study. Focus groups and individual interviews were conducted. Thematic content analysis was used to analyse data. Thirty concussion-related responsibilities were identified. These responsibilities were contained within four themes: (1) policies and support (responsibilities which influence policy, infrastructure, human or financial resources); (2) rugby culture and general management (responsibilities impacting players' welfare and safety, attitudes and behaviour, including education, injury reporting and communication); (3) individual capabilities (responsibilities demonstrating knowledge and confidence managing concussion, leadership or role/task shifting) and (4) intervention following a suspected concussion (immediate responsibilities as a consequence of a suspected concussion). The need for role clarity was a prominent finding across themes. Additionally, injury management initiatives should prioritise communication between stakeholders and consider task-shifting opportunities for stakeholders with multiple responsibilities. How concussions will realistically be managed in a real-world sports setting and by whom needs to be clearly defined and accepted by each stakeholder group. A 'framework of responsibilities' may act as a starting point for discussion within different individual community rugby contexts on how these responsibilities translate to their context and how these responsibilities can be approached and assigned among available stakeholders.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Although guidelines for managing concussion in the community are available, the real-world implementation of these guidelines remains challenging.

WHAT THIS STUDY ADDS

⇒ The community rugby system is complex, involving several important concussion-related responsibilities and multiple stakeholders across different system levels. Within this study, a lack of clarity around concussion-related responsibilities was evident and may lead to gaps in concussion care.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Clarity around these responsibilities and how they can be fulfilled in a rugby system could help to optimise concussion management. The findings of this study may serve as a foundation for other rugby communities to develop their context-sensitive concussion strategies with clearly delineated responsibilities and involved stakeholders.

INTRODUCTION

Between 2011 and 2019, on average, 6589 sports-related concussions were reported annually in New Zealand (NZ).[1] A growing body of evidence suggests that concussions may be associated with long-term symptoms and disability.[2–4] With the tendency for concussions to be under-reported and associated with delayed clinical management, the true burden of concussions may be far greater, highlighting concussions as a major concern to the public health system.[5] These concerns emphasise the need to translate evidence-based concussion management strategies into real-world sporting contexts, especially those with high risk of concussion, such as rugby union.[6–9]

Injury prevention and management strategies have shifted from linear approaches

towards more complex, multifactorial system-wide perspectives in recent years.[10 11] Rasmussen's Risk Management Framework (RMF) is a methodological approach that examines accident causation by considering stakeholders' actions at multiple system levels.[12] Research using this approach has identified that sports injuries and their management are influenced by factors not only in the immediate context of the incident but also by stakeholder groups' actions across multiple levels of a system (eg, schools, parents, managers and regulatory bodies).[11 13 14] Rather than focusing on the immediate environment surrounding the person who has sustained an injury, 'systems-thinking' aims to understand the network of systemic contributory factors involved in the injury. Thus, stakeholders' decisions and behaviours across different levels of a system should be considered when investigating opportunities for improved injury prevention and/or management.[11] This type of broader, context-specific and systematic approach to addressing athlete injury management has been recommended to create a culture that results in earlier identification and improved disclosure of concussions. As such, NZ Rugby (NZR) has developed and delivered a community-based concussion care initiative and concussion management pathway (CMP) that aims to improve concussion culture from injury prevention through to early intervention, management and return to play.[15 16] The NZR concussion strategy recognises that concussion awareness, education and management involve stakeholder groups at personal (eg, players and coach), interpersonal (team), community (eg, provincial union (PU), healthcare providers and schools), organisational (NZR) and policy levels (eg, NZ sport, World Rugby).

Although resources such as the International Consensus Statement on Concussion in Sport and World Rugby's community concussion guidelines are available, stakeholder attitudes and behaviours regarding the identification and treatment of concussions lack consistency.[17–20] Previous research in Australian community rugby specifically identified confusion around real-world, 'on-the-ground' concussion management responsibilities as an important challenge.[11 14] Examining these concussion management responsibilities in the NZR community rugby system as a collective may lead to a greater understanding of potential gaps in concussion management and facilitate the development of strategies to fill these gaps.[18 21] Therefore, this study explored key stakeholder groups within the NZ community rugby system's perceptions of their own and others' concussion-related responsibilities. A secondary aim was to develop a framework of concussion-related responsibilities as it applies to key stakeholders within the NZ community rugby system that may serve to enhance the current system and inform future concussion strategies in NZ and internationally.

METHODS

Design

This project is part of an ongoing evaluation of a CMP in community rugby in NZ. A pragmatic, descriptive qualitative study was conducted using semi-structured interviews and focus groups underpinned by Rasmussen's RMF.[12] Additional information regarding development of the interview schedule, data collection and analysis is contained in online supplement A.

Participants and data collection

Purposeful sampling was used to facilitate the inclusion of participants across different levels of the community rugby system.[11] The project was conducted in four geographically and socioeconomically diverse PUs in NZ to facilitate maximum variation in views. From this pool of PUs, we purposefully sampled male and female rugby playing schools and premier-level community clubs from a range of socioeconomic backgrounds. Club and school representatives were asked to recruit teams from which team leads, coaches, players and parents were invited to participate in the study. Additionally, PU representatives and NZR representatives involved in NZR's CMP within the four unions were invited to participate. 'Team leads' refer to those responsible for using the NZR phone application (App), allowing them to log concussions. These could be team managers, physiotherapists or coaches, depending on the team's preferences or resources. Role multiplicity was evident within certain stakeholder groups. For example, team leads were often also physiotherapists, but for this study, they were included in their capacity as team lead, irrespective of their professional backgrounds/responsibilities. Participants were thus enrolled according to their primary role in relation to the CMP. Written informed consent was obtained before the interviews and focus groups started. Focus groups and interviews followed a semistructured approach and were conducted by four experienced interviewers. The focus groups and interviews were audiorecorded, lasting 30–75 min. Twenty-eight focus groups (n=151) and four individual interviews were convened, comprising 155 participants (table 1). Individual interviews were conducted in instances where focus groups were not practically possible. Of the 93 players, 74 (80%) were high school players and 19 (20%) were club players. The sample represented 16 schools, 5 clubs, 4 PUs and NZR.

Analysis

Audio recordings were transcribed verbatim and imported into NVivo software (QSR International, V.1.5). Thematic content analysis was used to analyse data.[22] The analysis phase consisted of two separate steps to answer the research objectives.

Step 1: coding and development of a list of responsibilities

First, MB and JC independently coded the transcripts inductively to identify concussion-related responsibilities. Codes from the transcripts were organised

Table 1 Demographic characteristics of stakeholder groups included in the study, based on their primary role in the NZR CMP (N=155)

Representative stakeholder groups	Age mean±SD (range)	Female n (%)
Coaches (n=7)	53±11 (41–75)	1 (14.3)
NZR representatives (n=2)	40±8 (34–46)	0 (0)
Parents (n=24)	45±6 (26–57)	13 (52)
Players* (n=93)	17±3 (13–26)	33 (35.5)
PU representatives (n=6)	46±17 (26–69)	2 (33.3)
Team leads (n=15)	30±11 (20–53)	12 (80)
School or club representatives (n=8)	38±10 (24–53)	6 (75)

*n=26 (28%) were diagnosed with a concussion in the 2018 rugby season.
CMP, concussion management pathway; NZR, New Zealand Rugby; PU, Provincial Union.

independently into preliminary categories representing the responsibilities discussed by participants. After that, in an iterative process, both researchers' preliminary categories were discussed among the research team and subsumed into a composite list of categories representing stakeholders' responsibilities. To further summarise the key responsibilities, we created a thematic map by grouping the categories into higher-order themes.

Step 2: developing a hierarchical framework of concussion responsibilities across NZ's community rugby system

In this stage, each transcript was revisited and deductively coded according to the categories in the responsibilities list. These responsibilities were labelled based on whether it was related to:

- Stakeholders' self-identified (perception of their responsibilities).
- Expected responsibilities (expectations of the responsibilities of other stakeholders).

These 'self-identified' and 'expected' responsibilities were collated according to the different levels of the hierarchical NZ community rugby system. During this process, it was indicated if any of the responsibilities within the stakeholder group were 'interwoven':

- Interwoven responsibilities were defined where agreement or overlap between self-identified and expected responsibilities for a single stakeholder were observed.

The hierarchical levels of this framework were adapted from previous research grounded in Rasmussen's RMF.[11–13 23] During the focus groups and interviews, participants referred to the responsibility expectations they had of additional stakeholder groups who were not interviewed in the current study. As such, the responsibilities of these stakeholder groups were still included in the framework but are labelled only as 'expected' responsibilities. Using an iterative process, the research team then explored the potential pressure points, gaps or inefficient replication of responsibilities that appeared to be present within this specific sample of a community rugby system.

Patient and public involvement

The public was not involved in the design of this research. The provincial rugby unions who agreed to participate in the study assisted with recruiting schools and clubs.

RESULTS

Step 1 results: concussion-related responsibilities

Thematic content analysis of the focus group data produced 264 preliminary categories (including duplicates). Refinement of these categories produced 30 categories representing stakeholders' responsibilities. The categories were diverse, from developing rugby policy to providing education and disclosing concussions on the field (table 2). Detailed descriptions are contained in online supplement B, table 1.

Four key themes describing the different responsibilities related to concussion management were identified from the 30 overarching content categories: (1) policies and support, referring to responsibilities which influence system-wide strategies or policy, infrastructure, human or financial resources; (2) rugby culture and general management, which refers to responsibilities impacting players' welfare and safety, buy-in, attitudes and behaviour, including education, injury reporting and communication; (3) individual capabilities, which refers to responsibilities that require knowledge, skills and confidence managing concussion, leading, enforcing protocols or role/task shifting and (4) intervention following a suspected concussion, concerning the responsibilities stakeholders assume as a consequence of a suspected concussion.

Step 2 results: hierarchical framework of concussion responsibilities across the community rugby system

The framework of concussion responsibilities across stakeholders that form part of the NZR community system is presented in table 3.

Level 1: responsibilities of the governing body (NZR)

The nature of the responsibilities identified was conceptually broader in scope compared with the lower levels of the community rugby system. NZR representatives described high-level governing responsibilities, including education, supporting players' welfare and safety, enforcing protocols and facilitating buy-in and favourable attitudes towards optimal concussion management (see table 2 for role definitions). Supporting and driving the delivery of educational programmes with respect to injury prevention and management was perceived as a key responsibility at this level. NZR representatives noted they were responsible for promoting a high-quality experience, described as a 'safe game culture'. With respect

Table 2 Thematic map of concussion-related responsibilities as part of New Zealand Rugby's (NZR) CMP

Theme		Responsibility	Definition of responsibility	Illustrative quote
1	Policies and support	1.1 Develop and implement policy	To develop or implement policies, protocols or guidelines specific to concussion management.	'Yeah, I think too there needs to be a real, I suppose structure or system in place put in by the school just to outline what's your procedures.'—*Team lead*
		1.2 Resource provision and support	To provide human resources/trained personnel, or other forms of service or financial support.	'…if it's a player from one of the rep teams, you'll often find…that the manager or the coach will go out and you know, keep in contact with that person… but I just don't have the time or the resources…to do what I'd like to do.'—*PU representative*
2	Rugby culture, and general management	2.1 Support players' welfare and safety	To promote a safe game culture; oversee, lead or support actions related to general player welfare, health and safety.	'Within our organisation, we actually have a separate focus on safety and research but it all folds into quality of experience, the game has to be safe for it to be a quality experience or we have mutual interest with our Rugby Smart Division which looks after this.'—*NZR representative*
		2.2 Buy-in, attitudes and behaviour	To facilitate change by fostering buy-in for concussion-related initiatives, relationships and work towards developing favourable concussion attitudes and behaviours. Two sub-categories, 'team culture, trust and support' (eg, fostering trust) and 'compliance' (eg, adhering to the game rules) formed part of this category.	'…our community is four and a half million people, you know the All Blacks and our Black Ferns affect the general psyche of millions of people every weekend. We could be doing more to influence mum and dad, nana and granddad, uncle and aunty because they're the ones that influence our kids.'—*NZR representative*
		2.3 Communication between stakeholders	To act as a high-level conduit for information sharing and decision-making; facilitation of communication and action of communication between stakeholders to allow optimal concussion management; or to communicate one's medical history (eg, history of concussion and other injuries).	Parent A: 'need to make sure that the schools are doing the right thing by our children.' Parent B: 'Consistency.' Parent A: 'Yeah, consistency through all channels of rugby… So, if your kid goes to [school name] intermediate, plays junior rugby here, and he can't play for his club but then turns out for [school team name] on a Wednesday – ' Parent B: 'And plays, yeah.' Parent C: 'Cause he doesn't say anything.' Parent A: 'Yeah. So, is there a cross-communication? I mean that would be pretty hard but, how would you do that?'—*Parents*
		2.4 Injury reporting and administration	To report and record serious injuries utilising information systems within the rugby system.	'Primarily it is to actually be on the administrative end and that is to receive the serious injury reports around concussion injuries, so this is from all levels of rugby whether it's right at the top of the Magpies but say primarily during the club rugby season from club rugby senior grades of all levels, secondary schools right through all the grades and junior rugby as well…'—*PU representative*
		2.5 Education	To provide or support the delivery of concussion specific education initiatives.	'…like education with like all the players, coaches, managers and like blood pressure, like education that everyone has to, so everyone's on the same page…'—*Player*

Continued

Table 2 Continued

Theme		Responsibility	Definition of responsibility	Illustrative quote
3	Individual capabilities	3.1 Knowledgeable about concussion	To be knowledgeable about concussion and concussion care (including the self-pursuit of self-education and the rules of the game pertinent to concussion (eg, stand down period).	'Well if your kids been concussed then you find out as much information as you can.'—*Parent*
		3.2 Knowledgeable about first-aid	To be knowledgeable and/or have the capability to act as a first responder in an accident.	'We do stipulate in our plan that all of the well there needs to be someone with(in] you routine that's trained in first-aid; they supply their own first-aid kits just because, we as competition managers aren't there on the day. Half the time we are, but half the time we are not so schools need to be self-sufficient.'—*PU representative*
		3.3 Authority and leadership	To demonstrate authority and leadership through decision-making, supervision and influence.	'…we set culture right from the outset of the field, or as soon as we drop the kids off, that's it until full time. They belong to the coaches, parents don't go on the field or make any decisions from the side-line, it was all the coach. They made the decision on play or not play.'—*Parent*
		3.4 Enforcing protocols	To monitor and enforce concussion protocols and consistency in management between stakeholders.	'Somebody [a player] dobbed in and said, 'if you have a concussion can you still trial for reps?' Like, you literally have a concussion—are you seriously asking this question? So the concussion happened on the Wednesday, he was knocked out cold, but the rep trials were on Saturday and it's not part of club rugby, so he can still trial right? …I just pulled rank and the mother abused me. And I'm like, 'you talking to me isn't going to change anything. He's not playing, he's not trialling, and if I see that he is trialling he will not be in the team.''—*PU representative*
		3.5 Role multiplicity and task shifting	To take more responsibility and make more decisions if the actor primarily responsible for duty is unavailable.	'Well yeah like(a co-worker)and I last year were working with the physio; he's done so much stuff that he, just sort of took over that side [of responsibility). Just cause he had that obviously experience but, so and this year, having to make the decisions ourselves, yeah, it was challenging but a good idea.'—*Team lead*

Continued

Table 2 Continued

Theme		Responsibility	Definition of responsibility	Illustrative quote
4	Intervention following a suspected concussion (in the context of the NZR Concussion Management Pathway)	4.1 Disclose	To tell someone about a suspected concussion, whether personally experienced or externally observed.	'…I'm forever reinforcing to them [players] about it's important to communicate to us as coaches, that if you get a head knock so that we can manage it, and so sometimes they're reluctant to say anything because they don't want to not play or they think they can't go back on.'—*Coach*
		4.2 Spot and recognise (awareness)	To be aware/alert to concussions, in self and others.	'Awareness that there could be an issue…so coaches are obviously out there, but they're watching the game; they need to be watching that [when] a players gone down, could there be a concussion issue? They don't necessarily have to know what to do, but they should be aware that something's going down and to call it.'—*Parent*
		4.3 Log concussion	To be responsible for logging concussions specifically via the CMP phone-based application.	Interviewer: 'Were you involved in logging it in or did your medics take care of that for you' Coach 1: 'It's my physio's job to log that in' Coach 2: 'Same our medic' Interviewer: 'And you're happy with them doing that?' Coach 2: 'Yip'—*Coach*
		4.4 Remove	To remove self or others from field following a suspected concussion.	'Oh you've just gotta pull the pin, you've just gotta go off I reckon'.—*Player*
		4.5 Stop game	To stop the game following a suspected concussion.	'Stop the game, like recognise what's happening and then deal with the situation.'—*Player*
		4.6 Use blue card	Referee issuing a blue card during game play as part of the game rules.	'If it's a blue card, which we have in senior club rugby and secondary school grades that have official referees here in [PU), is to make sure that the referees know what their responsibilities are as well.'—*PU representative*
		4.7 Acute medical management	To provide on-field medical support following a suspected concussion, including assessment of injuries, deciding if return to play is appropriate and diagnosing injuries.	'Being able to identify it on field when it happens… you're like firsthand, you're the first person sort of dealing with it in, like deal with it.'—*Team lead*
		4.8 Leadership and logistical management/coordination as part of acute incident	Where an actor undertakes a leadership role specifically in the acute phase of an injury. For example, delegating an actor's role, using authority to override other's decisions about return to play and undertaking the immediate coordination of care for the injured player	'My role [is] to remove them from the field, to monitor them and ask them questions and get some symptoms, and then I would definitely not let them back on and I'd communicate with their parents and encourage them to go and see a doctor.'—*Coach*
		4.9 Acute on-field support	To provide support on the field following a concussion incident, which includes supporting the coach and/or assisting with transferring duty of care (eg, following up with the injured player on the side-line).	'I think it's to take the duty of care away from the coach as quickly as possible, just out of a bit of respect for his, you know, amount of position and coaching… basically responsibility for your kid, that's what I'm trying to say.'—*Parent*

Continued

Table 2 Continued

Theme	Responsibility	Definition of responsibility	Illustrative quote
	4.10 Diagnose	Providing a medical assessment of the player for a diagnosis of concussion.	'I went to the doctor and then that's when they like diagnosed it…'—*Player*
	4.11 Seek diagnosis and treatment	Advising players to seek medical help specifically following a suspected concussions.	'My coaches were the ones that said go to the doctor and get it checked out and one of my teammates, 'cause she'd been concussed earlier on in the year…'—*Player*
	4.12 Follow recovery protocol	Specifically following aspects of the gradual return to play and graduated return to learn protocols; to guide players through, or be an active participant (to action) in the GRTP and GRTL, treatment and individual rehabilitation.	'So as a player if you get a head knock, obviously, it's your role and responsibility to look after yourself and make sure you go through your proper steps. But like if you know you have a concussion make sure you get off the field and then following on from that doing what you need to do listening to the physio doing a rehab.'—*Player*
	4.13 Manage recovery process	Manage, oversee and coordinate the recovery and clearance process, ensuring the recovery protocol is followed, including training and medical clearance.	'… if someone has been concussed just go through the stats to get them back to play and try to take charge of that with the coaches. Organise the appropriate training around that time.'—*Team lead*
	4.14 Follow-up	The general actions of follow-up on player's diagnosis status, recovery and subsequent management, including players' progression through the CMP.	'Just ongoing monitoring because sometimes, stuff, just some of the mild stuff carries on for quite a while, even though it's mild…'—*Coach*
	4.15 Clearance	To seek or provide medical clearance as a prerequisite for players to return to play.	Coach: 'We had a few cases this year where we've had to send the boys ah suspected to send them to the medical to see the doctors' Interviewer: 'And they were diagnosed at that point?' Coach: 'No, they were cleared but we sent them through to just go through the process.'—*Coach*
	4.16 Quality of care	To deliver healthcare that is multidisciplinary and consistent in objective and optimal management.	'…our GP (general practitioner) refused to clear him [the player). She doesn't like rugby, she doesn't like people playing rugby and was not going put her registration at risk by clearing him…she went, '3 weeks! Minimum of 3 weeks!' …There was a knowledge deficit of hers but also her personal opinion clouded her professional judgement.'—*Parent*
	4.17 Responsible for Baseline testing	To conduct, champion and/or use baseline concussion assessment either before, or after a suspected concussion has occurred	'Interviewer: What roles and responsibilities does your child's coach have around concussions? Parent: um definitely the baseline testing would be the first educating the parents and the kids.'—*Parent*
	4.18 Use portal	To use a bespoke online website, which grants general practitioners access to players' baseline assessment, as part of NZR's CMP	My experience that I had with the testing was when I took one of my players to the medical and the doctor didn't use the website and he used his own tool. I can't remember what the form, was but yeah, so maybe there's no use of you having that base(line] test if the kids are not going to use it when they go to a medical.—*Coach*

CMP, concussion management pathway; GRTL, Graduated return-to-learn protocol; GRTP, Graduated return-to-play protocol.

Table 3 Hierarchical representation of stakeholder groups and their responsibilities, which are the following: (1) interwoven responsibilities (self-identified responsibilities that appear to align with what is expected by others); (2) self-identified responsibilities (stand-alone) (additional self-identified responsibilities that are not reported as an expectation from others and thus not included as part of interwoven responsibilities) and (3) expected responsibilities (stand-alone) (additional responsibilities that others expect of a specific stakeholder but not identified by stakeholders themselves and thus not included as part of interwoven responsibilities) within the NZR community setting

Hierarchical level	Responsibilities			
Governing body	NZR			
	Interwoven: 1. Education 2. Player welfare and safety 3. Enforcing protocols 4. Buy-in, attitudes and behaviours	Self-identified (stand-alone): Develop and implement policy		Expected (stand-alone): 1. Communication between stakeholders 2. Resource provision and support
(2) Provincial unions, clubs and schools	Provincial Union Representatives	Schools		Clubs
	Interwoven: Injury reporting and administration Self-identified (stand-alone): 1. Education 2. Develop and implement policy 3. Follow-up 4. Communication between stakeholders 5. Clearance 6. Resource provision and support 7. Enforcing protocols 8. Buy-in, attitudes and behaviours 9. Player welfare and safety 10. Role multiplicity and task shifting Expected (stand-alone): No additional expected responsibilities	Interwoven: 1. Communication between stakeholders 2. Develop and implement policy Self-identified (stand-alone): Role multiplicity and task shifting Expected (stand-alone): 1. Concussion knowledge 2. Player welfare and safety 3. Authority and leadership 4. Manage recovery process 5. Injury reporting and administration 6. First-aid knowledge 7. Resource provision and support 8. Buy-in, attitudes and behaviours 9. Follow-up 10. Log concussion 11. Recognise		Interwoven: 1. Enforcing protocols 2. Resource provision and support 3. Player welfare and safety 4. Communication between stakeholders Self-identified (stand-alone): No additional self-identified responsibilities Expected (stand-alone): 1. Authority and leadership 2. Manage recovery process 3. Injury reporting and administration 4. Buy-in, attitudes and behaviours 5. Education
(3) Direct supervisors	Coaches	Parents	Physiotherapists	General practitioners*

Continued

Table 3 Continued

	Interwoven: 1. Education 2. Buy-in, attitudes and behaviours 3. Authority and leadership 4. Leadership and logistical management/coordination as part of acute incident 5. Injury reporting and administration 6. Communication between stakeholders 7. Player welfare and safety 8. Role multiplicity and task shifting 9. Recognise 10. Remove Self-identified (stand-alone): 1. Follow recovery protocol 2. Manage recovery process 3. Follow-up 4. Enforcing protocols 5. On-field support 6. Seek diagnosis and treatment Expected (stand-alone): 1. Concussion knowledge 2. Acute medical management 3. Baseline testing 4. First-aid knowledge 5. Stop game	Interwoven: 1. Concussion knowledge 2. Player welfare and safety 3. On-field support 4. Recognise 5. Buy-in, attitudes and behaviour Self-identified (stand-alone): 1. Education 2. Communication between stakeholders 3. Seek diagnosis and treatment 4. Remove 5. Resource provision and support 6. Baseline testing Expected (stand-alone): 1. Enforcing protocols 2. Injury reporting and administration	Expected: 1. Manage the recovery process 2. Leadership and logistical management/coordination as part of acute incident 3. Recognise 4. Acute medical management 5. Clearance 6. Follow recovery protocol 7. Follow-up 8. Concussion knowledge 9. Player welfare and safety 10. Authority and leadership 11. Log concussion 12. Enforcing protocols 13. Buy-in, attitudes and behaviours 14. Education	Expected: 1. Diagnose 2. Clearance 3. Concussion knowledge 4. Portal usage 5. Manage the recovery process 6. Follow-up 7. Quality of care 8. Authority and leadership	
(4) Stakeholders involved in acute concussion incident and recovery phase	Team leads	Wider team	Players	Referees*	Medics/undergraduate physiotherapy

Continued

Table 3 Continued

	Interwoven: 1. Recognise 2. Remove 3. Manage the recovery process 4. Follow-up 5. Communication between stakeholders 6. Buy-in, attitudes and behaviours Self-identified (stand-alone): 1. On-field support 2. Acute medical management 3. Seek diagnosis and treatment 4. Role discomfort 5. Leadership and logistical management/coordination as part of acute incident 6. Role multiplicity and task shifting 7. Education 8. Baseline testing Expected (stand-alone): 1. First-aid knowledge 2. Use of blue card 3. Concussion knowledge 4. Report injuries 5. Authority and leadership	Interwoven: 1. Player welfare and safety 2. Buy-in, attitudes and behaviours 3. Injury reporting and administration 4. Communication between stakeholders Self-identified (stand-alone): Spot and recognise Expected (stand-alone): No additional expected responsibilities	Interwoven: 1. Buy-in, attitudes and behaviours 2. Player welfare and safety 3. Remove 4. Disclose Self-identified (stand-alone): 1. Injury reporting and administration 2. Seek diagnosis and treatment 3. Follow the recovery protocol 4. Concussion knowledge 5. Stop game Expected (stand-alone): No additional expected responsibilities	Expected: 1. Recognise 2. Leadership and logistical management/coordination as part of acute incident 3. Stop game 4. Remove 5. Concussion knowledge 6. First-aid knowledge 7. Player welfare and safety 8. Use blue card 9. Acute medical management 10. Authority and leadership 11. Injury reporting and administration 12. Buy-in, attitudes and behaviours	Expected 1. Recognise 2. Log concussion 3. Concussion knowledge 4. Leadership and logistical management/coordination as part of acute incident 5. Acute medical management

*Stakeholder not interviewed.
NZR, New Zealand Rugby.

to buy-in and attitudes, the focus was on the facilitation of these concepts among lower-level stakeholders. For example, NZR staff felt that part of their responsibility was influencing individuals to participate in educational programmes to change the game culture. Developing and implementing policy was described in the context of aligning strategic goals across different organisation sectors, such as game experience, safety and growth. Schools and PU reps at the local area government level also perceived this as a responsibility. However, their perception was more related to developing processes or policies specifically for concussion management within their schools or clubs.

Other participants' expectations of NZR's responsibilities were similar to the governing body's self-identified responsibilities. However, additional expectations were mentioned in communication between stakeholders and resource support, such as personnel resources and support for smaller schools and girls' teams.

Level 2: responsibilities of the PUs, schools and clubs

Overall, there was an imbalance between the high number of responsibilities (n=10) assumed by PU representatives and the responsibilities expected of schools (n=11) vs the interwoven responsibilities for these stakeholders (n=1 and n=2, respectively). Clubs, in general, were fulfilling expectations about their responsibilities in the rugby system. However, stakeholders expected additional responsibilities to those mentioned by club representatives to be fulfilled, such as authority and leadership, managing the recovery process and injury reporting.

PU representatives reported broad responsibilities, which included acting as a conduit for information sharing, influencing rugby culture and monitoring players' recovery from concussion (ie, following up with players and seeking evidence of medical clearance before returning to play). Their responsibilities also reflected those found at lower system levels, such as follow-up and clearance. PU representatives expressed discomfort with the extent (and uncertainty) to which they should follow-up with players to monitor their condition following a suspected concussion. No expected responsibilities were identified which were not being met by PU representatives.

A school representative (director of rugby) reported that his primary responsibility was facilitating communication between stakeholders and developing and implementing policy. However, stakeholders across the rugby system expected schools to undertake a broader range of responsibilities, essentially combining the responsibilities of PU representatives, clubs and responsibilities relevant to the intervention following a suspected concussion at the lower levels of the rugby system. Interestingly, the same school representative did not identify education as the school's responsibility and noted some discomfort with the amount of responsibility associated with this role.

Clubs undertook responsibilities closely tied to implementing concussion care (eg, ensuring the concussion protocol is adhered to following a concussion), communication between stakeholders, and generally supporting players' welfare and safety. Other stakeholders also expected clubs to be more active in other aspects, such as managing the recovery process, injury reporting, administration and education.

Both PU and the school representatives expressed role multiplicity and task shifting as one of their responsibilities, that is, to take more responsibility and make more decisions if the stakeholder primarily responsible for duty is unavailable.

Level 3: responsibilities of direct supervisors

Four stakeholder groups were presented at the direct supervisor level: coaches, parents, physiotherapists and general practitioners (GPs) (although only data on the 'expected' responsibilities of physiotherapists and GPs were collected). Across all framework levels, coaches held the greatest number of interwoven responsibilities (n=9) and the greatest number of self-identified, expected and interwoven responsibilities (n=20). Coaches identified and were expected to undertake a broad range of responsibilities from both a leadership and supervisory position, such as injury reporting, education, facilitating buy-in and attitudes and communication between stakeholders and responsibilities related to the acute concussion incident and recovery phase.

Participants shared the view that coaches played a role in intervening following a suspected concussion (eg, recognise and remove or stop the game), through to leadership and logistical management/coordination as part of acute incident (including medical management and being knowledgeable about first aid) and managing players' recovery. Unlike stakeholders at any other level of the rugby system, it was both self-identified and expected that coaches were adept at multiple roles and task shifting (one stakeholder assuming or alternating between different roles). Some coaches voiced uncertainty regarding the transfer of duty of care, that is, where their responsibility ends and to which point they should follow-up to ensure the player's welfare.

Generally, parents self-identified and were expected to be knowledgeable about concussion support, players' welfare and safety, and provide acute side-line support. Some parents also reported removing a player with a suspected concussion from the field was their responsibility.

Physiotherapists and GPs were expected to deliver clinically relevant responsibilities, such as acute medical management, diagnosis and clearance. However, compared with GPs, physiotherapists were expected to undertake a broader set of responsibilities that reflected their closer relationship with teams, such as on-field support, managing the recovery process, leadership and logistical management/coordination as part of the

acute incident, concussion recognition, recording injury details and following the recovery protocol.

Level 4: responsibilities of stakeholders involved in acute concussion incident and recovery phase

Five remaining stakeholder groups are represented at the level of persons involved in the acute concussion incident and recovery phase: team leads, wider team, players, referees and medics (first-aid personnel).

Team leads held a broad range of self-identified, expected and interwoven responsibilities, reflecting the multiple roles this stakeholder group assumed in the rugby system. For example, team leads also identified as physiotherapists, rugby medics or undergraduate physiotherapy students and non-medical staff (eg, school teachers) consequently meant that they had responsibilities which often overlapped with the leadership, team culture and acute injury management responsibilities held by the coach and other stakeholders with clinical backgrounds in the system—physiotherapists, medics and GPs. Medics, in particular, had expectations confined to the acute injury setting that were also duplicated by physiotherapists. Undergraduate physiotherapy students within the team lead group expressed uncertainty with identifying concussions on the field. Interestingly, players expected team leads to remove a player from the field before they got blue-carded so that they would not have to be subjected to the mandatory stand down period ('to have each other's backs').

The 'wider team' referred to participants' discussions of the team as a collective, thus including both players, coaches or team leads as a unit. Relative to other stakeholders in the system, participants noted fewer responsibilities for the wider team and players specifically (total n=5 and 9, respectively). Participants felt that the wider team, as a collective, had a role to play in creating a culture which supported players' welfare and safety, buy-in and attitudes, and actions that led to better concussion awareness, injury reporting and communication between stakeholders. It was a shared perception that players were responsible for disclosing concussions and being responsible for themselves or others during play. Players also felt that their responsibilities included communicating openly about their history of injury, seeking diagnosis and treatment, being knowledgeable about concussions and stopping the game. However, some players reported that it is up to the player to decide on the field whether what they are experiencing is serious enough to disclose (ie, assess their health and make their own decisions).

Stakeholders expected referees to take on a leadership position following a concussion, from early recognition to utilising game rules to support concussion care (eg, stopping the game, issuing a 'blue card') and acute medical management. However, some PU representatives felt that young, inexperienced referees could not be expected to have the same responsibility as experienced referees. Additionally, players felt it was the referee's responsibility to send the player off the field to be assessed for concussion but not necessarily give a blue card (which would result in a mandatory stand-down period during which the player is not allowed to return to playing rugby).

Considering the system as a whole

Considering these themes and the hierarchal representation of responsibilities by level in the community rugby system revealed areas of concern regarding role gaps or overlaps across levels. These areas of concern act as important recommendations for the future. For example, the need for clarity on specific stakeholder responsibilities was a prominent finding across aspects of injury reporting, education, facilitating attitudes, leadership, authority and various actions as part of the CMP. Additionally, aspects that may require future support included the following: ensuring communication within the system, finding support for and task-shifting opportunities for stakeholders with multiple responsibilities (including delegation or enhancing the role of parents), encouraging all stakeholders to prioritise concussion knowledge in themselves, building trusting relationships for the hand-over of duty of care, fostering positive player attitudes and beliefs around disclosure. A detailed description of these 'pressure points' is contained in Supplement B.

DISCUSSION

This study reported participants' perceptions of their own, and others' concussion-related responsibilities. The findings illustrated that some stakeholders have complex, interdependent and multidimensional responsibilities, which may be challenging to fulfil.

Concussion responsibilities and lack of clarity

This study identified 30 distinct responsibilities related to concussion management in community rugby (table 2). Our findings also suggest a lack of clarity with respect to 'who should be doing what', which may partly be explained by the sheer number of responsibilities and complexities identified within the community rugby system. The lack of clarity is consistent with previous work conducted in Australian rugby union and has important implications.[11 14] First, if several different stakeholder groups perceive that they are responsible for a specific task (eg, spotting for concussions, or educating players), it may serve to distribute the load and share the responsibility among stakeholders, which may contribute to efficiency in management. Indeed, some specific responsibilities should ideally be assumed across multiple stakeholders. One such example, 'supporting players' welfare and safety', was a prominent responsibility across multiple stakeholders and levels of the system. Conversely, overlap in responsibilities between stakeholders and the perception that someone else is also responsible may lead to certain actions related to that responsibility 'slipping through the cracks', as no designated person fully accepts the responsibility or ensures the task/duty

is executed or completed. This finding resembles the 'by-stander effect' in injury management, where the presence of several people in an injury situation have been shown to reduce the likelihood of an individual stepping in to help.[24] Overlapping responsibilities between stakeholders may also not be the most efficient use of human resources, which is not ideal for stakeholders with a long list of responsibilities. Second, these uncertainties may lead to a sense of anxiety if a stakeholder takes on multiple responsibilities (often across multiple levels of the system) because they are unsure if it will be taken care of by someone else. PU representatives, for example, described this as not knowing where their duty of care ended once a player was no longer in the rugby environment following a suspected concussion.

Lack of clarity may also lead to gaps in providing concussion care. For example, providing or supporting education about concussions was not identified as a responsibility related to schools. Yet, it was identified as a perceived role by PU representatives (at the same level of the rugby system as schools) and among other stakeholders in the levels above and below the school (ie, Regulatory Bodies and Associations; Direct Supervisors). These results suggest that full adoption of concussion care may be stymied by a lack of ownership for education and injury surveillance at some levels and fragmented adoption of the responsibilities pertinent to concussion care. Research conducted in occupational health has similarly highlighted the importance of clarifying responsibilities in managing employees' stress and mental health in the workplace.[25] Multilevel strategies that focus on improving education competency and translating evidence into practice among all those who care for concussed athletes should be investigated and encouraged.[7 8]

The need for additional support

Our findings suggest that some stakeholders and aspects of concussion management appear to require additional support. Although it is a positive finding that the importance of education and player welfare was reported at the higher levels of the system (levels 1 and 2), it appears that more tangible support and the presence of governing bodies are expected at lower levels (eg, human resource support for baseline testing, additional support in the flow of communication or general support for smaller schools and female rugby). Some stakeholders expressed discomfort with the extent of their responsibilities, and some were uncomfortable assuming responsibilities that they did not feel qualified for. Additionally, the findings suggest a high burden of responsibility, overlapping and multidimensional responsibilities assumed by coaches and team leads in the rugby system. For example, coaches and team leads had responsibilities that span the aspects of leadership through the acute management of concussion on-field and the subsequent recovery process.

PU representatives also perceived their responsibilities spanned from a collation of region-level injury surveillance data to direct follow-up with injured players and seeking confirmation of their medical clearance. Although not specifically interviewed as part of this study, physiotherapists have multiple responsibilities in the immediate management and recovery of players with concussion,[26 27] and this was also evident in the expectations of physiotherapists from the participants in this study. These findings demonstrate these stakeholders' broad influence on concussion care and its direct impact on players. This may also explain the discomfort team leads and PU representatives reported due to the multiple roles they have to assume. Additionally, our framework of responsibilities (table 3) suggests that currently, management of concussion recovery rests on the shoulders of the coach and team lead/physiotherapist, with potentially greater opportunities for schools, clubs and parents to have more involvement in the player's recovery process.[28]

Overall, the multidimensionality of stakeholders' responsibilities in the rugby system demonstrates stakeholders' ability (or need) to readily adapt to the capabilities and resources of stakeholders available from one community setting and level of the rugby system to another. Again, the flip side to this indirect approach may be that stakeholders' responsibilities may become implicit rather than explicit, resulting in duplication, miscommunication and inefficiencies in concussion care.

Of note, the participants in this study had multiple expectations from schools, which raises questions about the school's concussion-related responsibilities and whether schools are suitably resourced to fulfil all expected responsibilities. Similarly, clubs' capacity or resource constraints to provide education, resources for rehabilitation and optimal medical support should also be considered. In this sense, task shifting and role multiplicity may be unavoidable. Still, acquiring adequate knowledge and support structures for these stakeholders should be prioritised if we wish to not only enhance concussion care efficiency but also address the role discomfort reported by some stakeholders. Importantly, greater strides towards utilising other stakeholders, such as parents, could assist in this regard.[29] Moreover, school-based nurses can be valuable in many aspects of concussion care.[30] However, no specific role expectations of nurses were identified. The way these stakeholders can and should be actively engaged in the management system should be further investigated.

Implication for policy and practice

Within community rugby, there appears to be a gap between available guidelines and the real-world application of these guidelines.[11 20] This study has revealed that there is a need for the rugby community to actively engage in strategies that could bring clarity around concussion-related responsibilities. A framework that states which responsibilities are relevant to concussion care and who may be responsible, and how these responsibilities can be fulfilled in a rugby system could help optimise stakeholders' experience by aligning their expectations with their concussion responsibilities. 'Model of care' (MoC)

is one potential strategy that could help inform how these responsibilities are enacted in a local rugby system.[31] These system-strengthening approaches align sociopolitical, organisational, workforce and other health system characteristics to support the implementation of best practices. MoCs can be used as a facilitator to bridge the gap between evidence or guidelines for care delivery within a system by considering what to do and how to do it across each level of the system.[31] In the context of rugby-related concussion and trauma, injury outcomes are generally dependent on the resources available and carers' skills available at the specific time of care.[32] A systematic approach in the identification and subsequent management of players with concussions using an MoC approach could be one way to address the variability of concussion care delivered to rugby players in the community.

Apart from support for community rugby systems to recognise concussion symptoms and follow specific recovery guidelines, how concussions will realistically be managed in a real-world sports setting and by whom needs to be clearly defined and accepted by each stakeholder. The development of this 'framework of responsibilities' is intended as a starting point for discussion within different individual community rugby contexts on how these responsibilities translate to their context and, importantly, how these responsibilities can be approached and assigned among available stakeholders. Specifically, ensuring clarity around who is responsible for various concussion management responsibilities and identifying and supporting task-shifting opportunities are critical.

Future work should explore the engagement of other stakeholders that could alleviate some of the pressure experienced by stakeholders with multiple responsibilities. Parents appeared well positioned to play an active role in managing recovery and could provide additional support within the system.[29 33] However, stakeholders stepping into new roles should be adequately educated and supported.[34] It must also be remembered that knowledge alone does not predict behaviour.[35] Rugby has long-standing challenges with players and sometimes coaches and parents, placing performance above welfare (to win at all costs, not let the team down or be 'tough').[18 36] Even if clarity around responsibilities is achieved, enacting these responsibilities may still be restricted by unfavourable attitudes.[37 38] Thus, strategies that aim to facilitate a positive change in concussion attitudes should similarly remain a priority.

Limitations

The results of this exploratory study should be considered with its limitations in mind. First, due to practical constraints within the study design, not all stakeholders that could form part of concussion management in the community (eg, GPs) were interviewed as part of this study. However, participants referred to the responsibility expectations they had of GPs, and as such, these responsibilities were still included in the framework. Second, role multiplicity played a critical part in this study. For example, participants were classified according to their primary role in the team. Although some team leads were also physiotherapists, physiotherapists were not specifically represented as a primary stakeholder group. In this sense, role multiplicity likely affected participants' experiences, as a team lead who is also a physiotherapist may have more experience and knowledge in injury management compared with a team lead who is a teacher without medical training. Third, there were a limited number of school representatives in the current study, which may limit the transferability of the results more broadly across the school context. Further research is recommended to evaluate the transferability of the study findings in different cultural and sporting contexts.

CONCLUSION

The community rugby system is complex, involving several important concussion-related responsibilities and multiple stakeholders across different system levels. A context-sensitive approach to clarification of responsibilities is needed to facilitate optimal concussion management. Stakeholders need clarity around their concussion responsibilities, and more support is needed for those with multiple responsibilities. The findings of this study may serve as a foundation for other rugby communities to develop their context-sensitive concussion strategies with clearly delineated responsibilities and involved stakeholders.

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