Rugby Contact and Collisions – Clinical Challenges of a Global Game

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Abstract

Rugby Union (Rugby) is a sport that evolved from and resembles other forms of football but is unique in many respects and presents distinctive clinical challenges. This paper discusses those aspects of Rugby that are different from other sports as well as those injuries which have specific significance to the game as a result of it being a global collision sport with an increasing focus on serious injury prevention. Injury screening and intervention programs, neck injuries, Rugby's contribution to evolving concussion protocols, contact and travel-related illnesses and Rugby's drug intervention protocols are discussed.

Introduction

Rugby is a game said to have evolved from football (soccer) in England in the early 19th century. Its name is derived from Rugby School where a pupil, William Webb Ellis "who with a fine disregard for the rules of football as played in his time, first took the ball in his arms and ran with it" in 1823. (13) In 1895 Rugby split into Rugby Union and Rugby league which became a distinct game with 13 players. This article refers to Rugby Union. In this paper "Rugby" refers to the sport of Rugby Union played classically with 15 players per team by men and women, boys and girls in 120 countries across 6 continents. 10 person and 7 person versions of the game also exist and 7-a-side Rugby is being re-introduced to the Rio Olympics in 2016.

Although having evolved from other forms of football and often compared to other field sports such as NFL and Australian Rules Football, Rugby, as a continuous, multiple-sprint, un-helmeted collision sport in which players are only allowed limited, padded protective gear, has its own distinguishing profile of medical concerns. Rather than listing the injuries associated with Rugby, this paper seeks rather to address key injury and medical challenges facing the sport. These include screening for general and Rugby-specific injury risk, a focus on potentially catastrophic head and neck injuries, decisions regarding playing the sport with a single paired organ, Rugby's injury intervention strategies and the approach to doping in the sport.

Definitions

Scrum - the formation used in the set play re-starting play after a knock-on (spilling the ball forward) or forward pass. The forwards from each side bind together and then the two packs come together to allow the scrumhalf with the feed to deliver the ball to the scrum. A scrum can also be awarded or chosen in different circumstances by the referee. (Figures 1 and 2)

Lineout - the set play re-starting play after the ball has been taken out or kicked to touch. Both sets of forwards will line up opposite each other with the side with throw calling a play. The throw must be directly down the middle of the two lines. (Figures 3)

Tackle – the act of physically bringing an opposing player who has the ball to the ground. Legal tackles may not be around the neck or head and tacklers are required to use both arms and not tip the tackled player head first into the ground. (Figure 4)

Ruck - typically after a runner has come into contact and the ball has been delivered to the ground once any combination of at least three players have bound themselves a ruck has been set. The primary difference from a maul is that the ball is on the ground.

Maul - typically after a runner has come into contact and the ball is still being held by a player once any combination of at least three players have bound themselves a maul has been set. The primary difference from a ruck is that the ball is not on the ground. (37)

IRB – The International Rugby Board, Rugby Union's governing body.

Unique and distinguishing features

Rugby is a field-based team sports lasting up to 80 minutes with 30 players involved in continuous, short bouts of high intensity activity often encompassing multiple contact situations.

Different facets of the game allow for players of differing physiques and talents to contribute in different positions. The forwards are divided into tight forwards comprising 2 props, a hooker and 2 locks; they are largely responsible for the set pieces of play such as scrums and lineouts, and 3 "loose forwards" who are

also involved in set pieces but have a mandate to roam more. Forwards tend to be heavier with an emphasis on strength and power. The 7 backs tend to be smaller in stature with speed, agility and skill being assets. Because of the different player profiles, large discrepancies in size may occur resulting in physical challenges for smaller players.

The continuous nature of the game with no “time outs” requires injured players to be assessed on the field of play before a decision is made as to whether to permanently replace them with one of 7 available reserves. The referee will stop the game for potentially severe injuries in which case the time used in removing the injured player will be added as extra time.

In 1995 the game formally adopted a professional structure and now has professional (paid) players who earn a living from Rugby and amateur players at both club and school level. This has resulted in the further challenge of managing a similar spectrum of injuries in scenarios of vastly differing resources. Increasingly, injury intervention programs have focused on protocols that are accessible to players and teams with fewer resources.

Epidemiology of Rugby Injury

Of all popular team sports Rugby presents one of the higher overall rates of injury (69 per 1000 playing hours) compared to soccer (28/1000) and ice hockey (53/1000). (8) Risk of injury may increase with age and level of Rugby. This has been attributed to greater size, speed, increased competitiveness, more aggression and foul play. (3)

Pre-Participation Screening

The screening of Rugby players for current or potential medical conditions or injuries often occurs in a professional environment where medical support is available. Professional teams will include medical screening protocols similar to the IOC Periodic Health Evaluation (PHE).(14,25)

In a community (amateur club or school) setting the responsibility may fall on paramedical personnel or coaching staff to perform an evaluation based on a questionnaire. (31)

As in many other sports, there have been instances of sudden cardiac death in young Rugby players and the potential for increased risk during Rugby is recognised. (5)

Cardiovascular screening is regarded as an essential part of a PPE because of the potential for sudden death in athletes with undiagnosed heart disease. (2)

IRB Cardiac Screening Guidelines (2012) have been developed by the IRB Cardiac Screening Working Group with support from an independent cardiac expert. The recommendations have given due consideration to the different geographical, economical, medical expertise and social levels that exist across and within the member Unions of the IRB. As a result of these logistical differences, a tiered approach to cardiac screening in Rugby has been recommended. These include Community Rugby, Professional Rugby and National Tournaments and IRB-managed Tournaments. However, where practical, the IRB recognizes that best practice cardiac screening should include cardiac questionnaire, physical examination and ECG. (15)

In designing a pre-participation screen for coaches, the challenge is to be able to “red flag” potentially serious cardiovascular risk factors as well as musculoskeletal and neurological risks pertinent to a collision sport such as Rugby using easily understood questions that cast the screening net wide enough to determine who should be formally medically assessed. An example of this is the BokSmart PPE designed for use in school and club settings. (32)

Concussion screening

Pre-participation examinations for neurological problems such as concussion are extremely difficult, as most concussions recover fully and leave no residual indicators. However recording previous concussion history as well as other modifying factors may create an awareness of potential risk. The IRB also acknowledges the risks of recurrent, unrecognized and incorrectly managed concussion and the pathological entity of Chronic Traumatic Encephalopathy (CTE) even though relatively few cases have been described in Rugby players. (30)

The broadened definition of concussion includes any trauma-induced alteration in mental state and does not necessarily include a loss of consciousness or amnesia as in previous definitions. The range of symptoms possibly associated with concussion should be made clear to the athlete many of whom may not have recognized or appreciated there significance. Rugby encourages the use of the Sports Concussion Assessment Tool version 3 (SCAT3) (28) as an integral part of the screening process and computerized cognitive screening programs such as CogState Sport and ImPACT as useful additional adjuncts.

Risks of playing with prolonged concussion include exacerbation or prolongation of symptoms of the post-concussion syndrome. This is of particular significance in Rugby where many players are at school or university in a learning environment. In Rugby there exists the potential for diffuse cerebral edema or "second impact syndrome" in an acute setting as a less common but far more catastrophic consequence of unrecognized or poorly managed concussion. (4,11)

In Rugby a "gold standard" of concussion screening would include an annual preseason SCAT3 as well as a computerized cognitive test performed under supervision. In any event, Rugby coaches detecting any symptoms, recent history of concussion or multiple concussions in a player should ensure that the player seeks appropriate medical advice.

Convulsive Disorders

Guidelines from the American Academy of Pediatrics provides a qualified clearance for young athletes with well-controlled convulsive disorders to participate in conventional school-sponsored sports. This means that, if a sport entails higher risk, including rugby union, neurological consultation should be sought. Athletes with poorly controlled seizures should be withheld from contact or collision sports. (1)

Solitary Organs

Whether athletes with one paired organ, especially one kidney, should participate in sport, particularly collision sports, is controversial. Certainly Rugby should be forbidden if a single kidney is morphologically abnormal, polycystic or abnormally located. A single kidney is defined as "a morphologically normal

kidney without congenital abnormalities that resides in the usual anatomic position". All such patients need to understand the risks so they can make an informed decision. (12,43)

When an athlete has only one functional eye (with less than 20/40 corrected visual acuity), further evaluation by an ophthalmologist is recommended. These athletes can participate only in sports that permit the use of protective eyewear (such as swimming, track and field, and gymnastics) and do not involve projected objects. Wrestling, boxing and martial arts are contraindicated sports and by inference, rugby must also be regarded as high risk for these individuals.

Athletes with one functional eye with less than 20/40 corrected visual acuity require further evaluation by an ophthalmologist. Protective eye wear if allowed in the sport can reduce the risk of injury but must comply with Regulation 12 and Law 4. (16,41)

Testicle

The use of a protective cup in contact sport is recommended but must comply with Regulation 12 and Law 4 (16)

Traumatic injuries in Rugby

Spinal cord injury (SCI)

Injury to the spinal cord during Rugby is rare but has massive physical, emotional and financial implications for the player and his family and significantly affects the profile of the sport. Rugby-specific injury interventions such as BokSmart, Rugby Smart and the May Day Safety Procedure focus on neck injuries. (7,10) SCI has been the focus of much injury prevention research and intervention in Rugby. For instance, Quarrie reports an overall 1.4 spinal cord injuries per annum per 100 000 New

Zealand Rugby players. (34) This has reduced to 0.7 since 2001. This reduction corresponds with the

introduction of a local education program but may also have to do with the change of scrumming laws

The scrum was initially identified as being an area of the game associated with the most SCIs. Rule changes have reduced the number of scrums by as much as 40% as well as changing the manner in which the scrum is set. (40)

The tackle has now been identified as the area of highest risk whilst the hooker position is the most frequently injured. (7, 9)

As with all contact cervical injuries, SCI in Rugby results from a combination of distraction and compression forces in either flexion or extension. The way the cervical spine is exposed to force rather than the specific event (e.g. tackle, scrum collapse) dictates this. It is the manner in which the player's head and neck come into contact with the ground or another player that will determine the type of injury. For instance, in his head coming into contact with the ground, a compressive force may be exerted or his body could roll over creating a distractive force.

Again the challenge of managing potentially catastrophic injuries across Rugby communities varying in resources is real. The organogram below is a suggested systematic method of managing suspected neck injuries in Rugby.

Insert Fig 5

Head Injuries in Rugby

Concussion

Concussion is common in Rugby. The incidence of concussion at high school level has been reported as 21.5%. In another study, the prevalence of concussion was reported as a much higher 50% in schoolboy rugby players, as the majority of mild head injuries are often not recognized and reported, especially in cases in which schoolboys are concerned.(29,36) A similar prevalence has been noted in adult rugby players. In the 1999 Super 12 rugby competition, the incidence of concussion was reported as 20%, the most common injury for that competition. (15)

Rugby's regulations regarding the management of players suspected of having suffered a concussion evolves from the most recent Zurich concussion guidelines. (28) The clinical evaluation of a concussed Rugby player should incorporate a thorough symptom analysis, general, cognitive and neurological examination, and balance testing. Computerized cognitive testing, especially when compared to baseline (pre-injury) results, provides an additional useful tool. In addition, and as an essential final stress test, the athlete must be subjected to a series of graded exercise sessions increasing in severity before being returned to contact or collision sport. A structured clinical evaluation is particularly important in any environment.

The IRB has been a sponsoring participant in the last two concussion consensus meetings (Zurich 2008 and 2012). Rugby has incorporated the Zurich guidelines in its management protocols, with an emphasis on implementation at different levels. Hence the IRB has developed the following guidelines for use at various levels of the game and re-evaluates these when new information comes to light:

- Concussion Guidance for the General Public
- Risk Management Strategy Overview
- Concussion Guidelines – Non-Approved Healthcare Professionals and General Public
- Concussion Guidelines – Certified and Approved Healthcare Professionals
- Concussion Management – Education Module
- Match Day Medical Staff – Education Module

Rugby concussion protocols are evaluated by an Independent Concussion Advisory Group appointed by the IRB Chief Medical Officer comprising a neurosurgeon, a neuropathologist, an injury prevention researcher and a sports medicine physician.

Rugby-specific concussion protocols

The IRB has introduced a series of initiatives to create awareness of concussion and standardize management by introducing a "Recognise and Remove" campaign.

In response to research confirming that a child's developing brain is more susceptible to concussion and takes longer to recover, Rugby has introduced age-specific return to play guidelines. Apart from clinical criteria, the age of the player and the level of medical support available determine the speed of return-to-play. (28,33,38)

The Pitchside Suspected Concussion Assessment (PSCA)

The PSCA is a multimodal, triage support tool developed for doctors at the elite (national and international professional tournament) level of Rugby to assist with the assessment of a player who has a head injury where the diagnosis is not immediately apparent.(18)

It has been developed for a 'replacement' sport recognizing that its introduction should not undermine the fabric of the game and its introduction should not be open to tactical manipulation. The PSCA is a 5 minute assessment that incorporates Maddock's questions, a symptom analysis and a balance test. It is performed in a stadium room close to the field. Failure on any one component of any one of the tests results in the player not being allowed to return to the game. The team doctor, independent match day doctor or the referee may request a PSCA with the independent match day doctor having an over-riding say in determining whether the player should return. Incorporation of video review into game day assessment has been encouraged.

The PSCA is followed by standardized clinical and cognitive evaluations immediately post-game and at 36-48 hours. These assessments together with video review feedback system for suspicious injuries help determine the validity of the PSCA for each player. The aim of this intervention is to confirm all PSCA documents are being received and that all suspicious head injuries which are not subjected to a PSCA are being reviewed by the Team Doctor. Each week the IRB Game Analysis department reviews all games where the PSCA is being used and identify suspicious head injuries using standardized criteria. Video clips are sent to Team Doctors for comment on each injury

Chronic traumatic encephalopathy:

This condition reflects the cumulative effect of long term exposure to repeated concussive and sub-concussive blows. Certainly there is growing concern that each episode of concussion may result in residual brain damage associated with the cerebral deposition of abnormal Tau protein. This is most evident in the development of cognitive dysfunction in boxing, the degree of which is directly related to the number of bouts in a boxer's career, but strong associations have emerged in American footballers and cases reported in former Rugby and soccer players. Genetic factors, associated with the ApoE4 gene, may also increase the risk of developing chronic brain injury in sport. Thus, it would be responsible to want to document a players' cognitive function periodically and note whether any cognitive deficit is present. Rugby supports future research needed to establish what severity of head injury causes summation and how long that residual effect may last and in 2013 the IRB issued the following statement regarding Rugby and long term neurological problems. (21,22,27,30)

Recognizing this potential link the IRB has adopted a proactive approach whilst awaiting further insight from more detailed research. The initiatives implemented include:

- Commissioning of an independent Safety Scientist to review the Laws, Regulations and Directives of the game to review that Rugby is doing everything possible within the fabric of the game to reduce head impact events especially illegal head impact events. This review has been completed and resulted in a positive report.
- Education of key stakeholders, doctors, players, coaches and referees regarding protection of the head and the Recognise and Remove message.

Finally the IRB supports ongoing research to assist in identifying:

- the true incidence of these health issues in current and former players
- which athletes might be most at risk
- what other factors may influence long term outcomes and
- at what level of head impact exposure (number and size) might risk be increased

The IRB Recognise and Remove message incorporates 6 Rs

Recognise - Learn the signs and symptoms of a concussion so you understand when an athlete might have a suspected concussion

Remove - If an athlete has a concussion or even a suspected concussion he or she must be removed from play immediately

Refer - Once removed from play, the player should be referred immediately to a qualified healthcare professional who is trained in evaluating and treating concussions.

Rest - Players must rest from exercise until symptom-free and then start a Graduated Return to Play. The IRB recommends minimum rest periods for different ages (U/6 to U/15 - 2 weeks minimum rest, U/16-U/19 - 1 week minimum rest, Adults - 24 hours minimum rest)

Recover - Full recovery from the concussion is required before return to play is authorized. This includes being symptom-free. Rest and specific treatment options are critical for the health of the injured participant.

Return - In order for safe return to play in Rugby, the athlete must be symptom-free and cleared in writing by a qualified healthcare professional who is trained in evaluating and treating concussions. The athlete completes the GRTP (Graduated Return to Play) protocol.

Infection issues in Rugby

Infection transmission in Rugby is important because of player contact. In addition, the travel schedule of professional Rugby teams, particularly in Southern Hemisphere competitions, has been shown to be a significant contributor to systemic infections.

Infection control in Rugby

Skin and Soft Tissue Injury

Any athlete with a skin injury (abrasion, laceration etc.) should be removed from the field of play until the area of injury can be securely covered with occlusive dressings or bandages to prevent leakage of body fluid and to protect the lesion becoming infected. Careful attention should be paid to the wound ~~care~~ after play to avoid skin infection. (17)

Bacterial infections and their prevention.

The common causes of bacterial skin infections are Gram positive bacteria; Staphylococcus aureus and Streptococcus. These infections can complicate abrasions ~~or~~ skin breakdown or chaffing. Common infections are wound infections, boils, abscesses and superficial infections such as impetigo. This group of infections usually respond to local wound care and topical or oral antibiotic therapy.

Viral infections

Scrum-pox (Herpes Rugbeiorum) caused by the Herpes Simplex Virus – 1 is a particular risk to forwards who contract facial lesions in the scrum. Transmission occurs from an infected individual to a susceptible host by skin-to-skin contact.

Return-to-play guidelines recommend that the player should be free of systemic symptoms of viral infection, have no new lesions for 72 hours and have no moist lesions. All lesions must be dried and

surmounted by a firm, adherent crust. The player should have been on oral antiviral therapy for at least 120 hours. Treatment options are acyclovir 400mg twice daily (5days), Valacicolvir 2gm twice daily (1day) or Famciclovir 1500mg one dose only. Prevention of transmission is facilitated by the screening of athletes for active lesions and removing affected individuals from competition.

Blood borne infections

Blood borne infections are transmitted by exposure to blood from bleeding gums, substance misuse, unprotected sexual contact, and travel to endemic areas. The risk of transmission of blood borne viruses in bleeding injuries varies with each virus. Transmission of HIV is estimated to be 1:43 million games based on the estimated prevalence of HIV infection amongst athletes, the risk of percutaneous HIV transmission in health care and the risk of a bleeding injury in American football. Risk of transmisison of Hepatitis B is 50-100 times higher and is HBV is a vaccine-preventable. The IRB does not discriminate and does not have any policy which prevents HIV positive players from playing the Game.

Despite these low risks, the IRB emphasises strong preventative measures for the spread of blood borne diseases:

• Law 3.11(a) requires that Players with open or bleeding wounds must leave the field to have the bleeding controlled and the wound covered.

• Law 4.4(a) prohibits Players from wearing any item that is contaminated by blood.

• IRB Regulations 15.2.1(c) and 15.3.1 set out the Match doctor's role in relation to monitoring blood injuries in International Matches. The Match doctor's role is to supervise the appropriate treatment of any blood injury and to ensure that the bleeding is stemmed, the wound is covered and all blood-stained apparel removed prior to the player returning to the field. Athletes should use squeeze water bottles which they do not put in their mouth. (16)

Infections associated with travel

The largest epidemiological study of illnesses in travelling athletes involved Rugby players competing in the southern hemisphere Super Rugby tournament, a high intensity competition involving regional teams from South Africa, New Zealand and Australia. Because Rugby is a global game, international teams often travel across many time zones. (39) The Super Rugby competition is unique in teams having to cross up to 11 time zones more than once in a season (16 weeks). This means that they are exposed to different environmental conditions including temperature, humidity, atmospheric pollution, aeroallergens and diets. Players travelling between continents may also be exposed to different strains of pathogenic organisms. This tournament is also an event that is characterized by very high-intensity international standard rugby, weekly matches with an addition of three to five training sessions per week. The incidence of illness with frequent travel may be up to 72% with the most frequently affected systems being respiratory, gastrointestinal and skin and subcutaneous tissues.

Drug Abuse in Rugby

The use of exogenous substances to enhance performance in sport goes back centuries but has become increasingly prominent and problematic in the era of professionalism due to financial incentives and increased temptations to perform and gain prestige. Associated with the increased pressures, status and income of top sportspersons, including Rugby players, there also appears to be a trend to use increasingly accessible recreational drugs.

Performance-enhancing drugs in Rugby

Rugby Union is a multi-faceted game requiring, amongst other attributes, strength, power and speed. In an attempt to enhance their chances of success in a professional sporting environment, Rugby players may choose to use performance-enhancing substances many of which are banned by sport's governing bodies. Of these, the anabolic androgenic steroids are the most widely abused. (23)

The IRB has one of the most comprehensive drug testing protocols in international sport and works closely with the World Anti-Doping Agency (WADA). The IRB conducted 7 930 in and out-of competition urine and blood tests across men's and women's tests in all IRB competitions in 2013 with a 0.16 per cent violation of Anti-doping code. In addition the IRB has a "Keep Rugby Clean" education program accessible on its website. Trends from drug test results suggest that senior professional players who are regularly screened have a cleaner record and that young players breaking into the professional ranks account for higher numbers of doping violations. (23)

Illicit recreational drug use in rugby

Anecdotal reports of rugby players using recreational drugs have increasingly emerged in the lay press. Statistics reveal a preponderance of positive tests for marijuana but both locally and internationally there are an increasing number of test positives as well as press reports of cocaine, ecstasy and LSD use. After a number of high profile cases involving rugby union players testing positive or admitting to using illicit drugs and after researching the policies of several other sporting codes, the English Rugby Football

Union (RFU) has launched an integrated three-fold programme of education, testing and sanction together with counseling and treatment for recreational drug users. The testing programme also provides for Premiership clubs to request a pre-employment drugs test on any prospective new signings subject to player agreement. (35)

For a first positive test (or first admission of use), the matter is kept confidential between the RFU illicit drugs staff, the player and his club's medical officer. The problem is dealt with as a confidential health-related issue with the focus firmly on how to help the player deal with and be treated for his drug use.

Only if the player fails to comply, or commits a second violation, is the player liable to suspension and public disclosure of the reasons for his suspension. Importantly however, positive tests for illicit drugs following in-competition tests conducted under the anti-doping programme continue to be dealt with in accordance with the anti-doping regulations to the exclusion of the illicit drugs policy, although counselling and treatment may still be made available to the player.

Conclusion

Rugby, having evolved from other forms of football, has similar injury profiles to other contact and collision sports. However, its unique format as a continuous multiple sprint and repetitive collision sport played globally by both genders and a spectrum of age groups, presents specific clinical challenges which have required dedicated interventions. Increasingly more emphasis is being placed on preventative screening, conditioning and education programs. Potentially catastrophic injuries such as cervical spine injuries have always received a high profile and recent rule changes together with injury prevention modules appear to be reducing risk. Apart from adopting international concussion consensus guidelines, Rugby has introduced more specific age-related graduated return to play as well as pitch side triaging. A specific pattern of infective conditions has been identified as a result of both the contact nature of the game and certain as well as global travel. As with many professional sports, drug violations remain a threat but specific educational and testing programs aim to mitigate the risk to the athlete and the sport.

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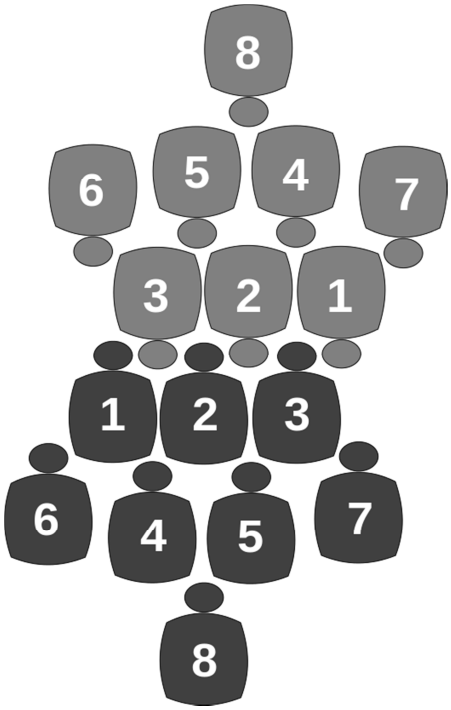

Fig 1. An illustration of the positions adopted by opposing forwards in a scrum

Fig 2. Setting a scrum

Fig 3. A lineout

Fig 4. Correct tackle technique

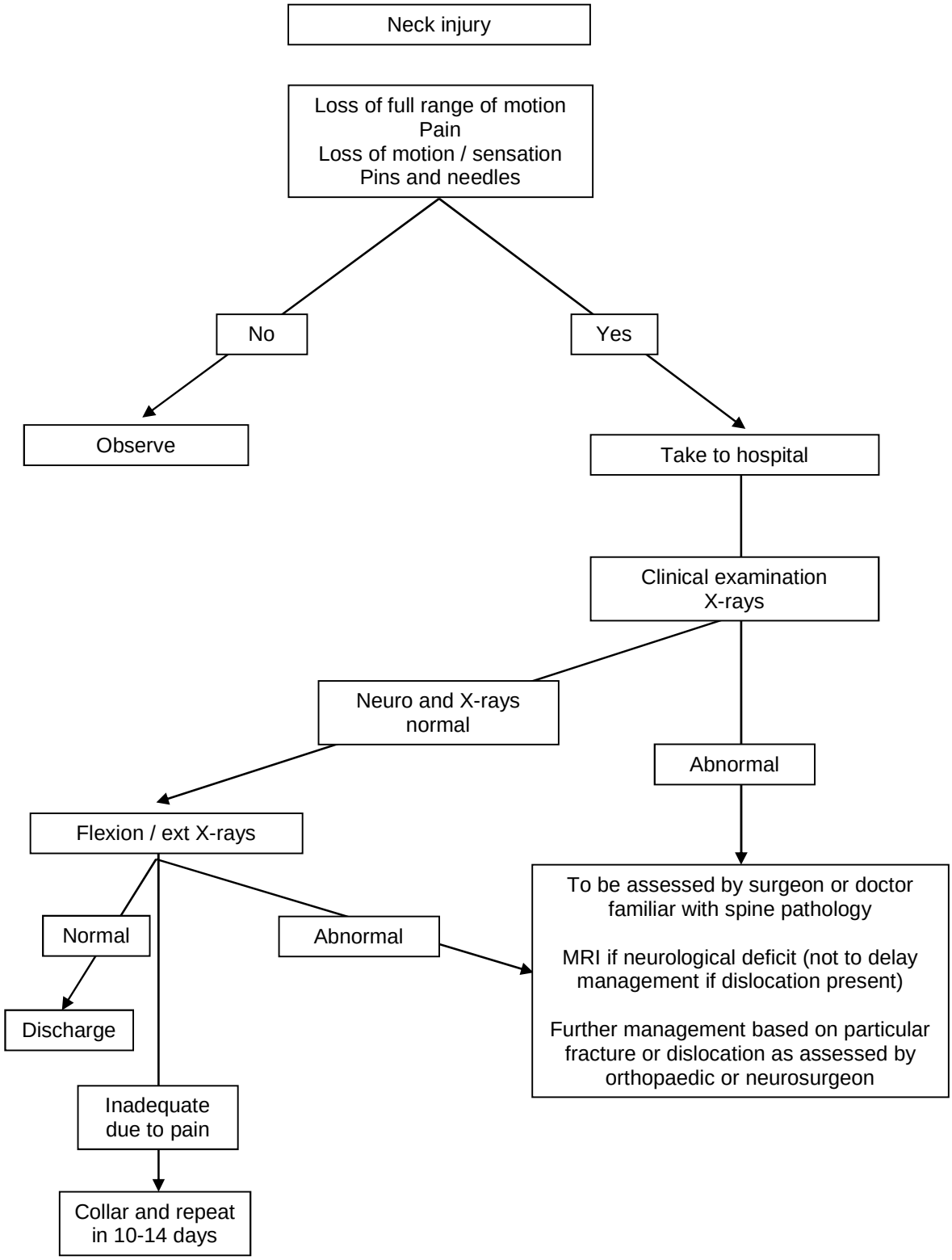

Figure 5. An approach to managing neck injuries in community Rugby.

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System	Illness	Percentage of all illnesses	Incidence (per 1000 player days)
Respiratory	All respiratory system illness (n=144)	30.9	6.4 (5.5–7.3)
	Acute upper respiratory tract infection (n=74)	15.9	3.3 (2.8–3.8)
	Allergic rhinitis (n=21)	4.5	0.9 (0.8–1.1)
Digestive	All digestive system illness (n=128)	27.5	5.6 (4.9–6.6)
	Infective gastro-enteritis (n=61)	13.1	2.7 (2.3–3.2)
	Non-infective gastro-enteritis (n=31)	6.7	1.4 (1.1–1.7)
Skin and subcutaneous tissue	All skin and subcutaneous illness (n=105)	22.5	4.6 (4.0–5.4)
	Bacterial skin infection (n=44)	9.4	1.9 (1.6–2.3)
	Fungal skin infection (n=18)	3.9	0.8 (0.6–1.0)
	Viral skin infection (n=14)	3.0	0.6 (0.5–0.8)
	Allergic dermatitis (n=12)	2.6	0.5 (0.4–0.6)
Nervous	All nervous system illness (n=21)	4.5	0.9 (0.8–1.1)
	Headache (n=19)	4.1	0.8 (0.7–1.0)
Mental or behavioural	All mental or behavioural illness (n=20)	4.3	0.9 (0.7–1.1)
	Sleep disorder (n=18)	3.9	0.8 (0.7–1.0)
Ears and mastoid	All ear and mastoid illness (n=16)	3.4	0.7 (0.6–0.9)
	Otitis externa or media (n=9)	1.9	0.3 (0.2–0.4)
Genitourinary	All genitourinary illness (n=13)	2.8	0.6 (0.5–0.7)

Table 1. Illness during the 2010 Super 14 Rugby Union tournament – a prospective study involving 22 676 player days

The frequency (percentage of all 466 illnesses reported in affected systems) and the incidence (per 1000 player days) of illness in each system and for common specific diagnoses