Mouth Protectors in Junior Rugby in Scotland

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This thesis is submitted by the author as the requirement towards the degree of Master of Science (Medical Science) in the College of Medical, Veterinary & Life Sciences, University of Glasgow, November 2011.

Abstract

Introduction.

Sporting injuries can account for a significant number of orofacial injuries (Wright et al., 2007). The majority of studies have found that mouth protection is an effective way of preventing dental injury (Newsome et al., 2001). Jagger et al., (2010) stressed that it was important that trained personnel were in attendance at matches and training to provide early management and advice on trauma treatment and further management.

Aim.

The aim of this study was to determine:

- The policies of individual Scottish Rugby Union clubs regarding the use of mouth protectors by their Junior players when attending training sessions and playing on match days.

- The availability of medical, dental, and first aiders (health professional personnel) at Junior player training sessions and during match day games.

Material and Method.

A self-reporting questionnaire that sought to obtain the above information was sent by Royal Mail with an enclosed stamped addressed envelope to all 230 Scottish Rugby Union (SRU) affiliated clubs enclosing two letters. The first

explained the research by Mr Mike Broad and Professor Richard Welbury and the second was a letter of support from Dr James Robson with his personal encouragement for each affiliated club to participate in this research.
A further postal batch was sent out to non-responders after the first response date had passed. After receiving the second postal replies and the return date had passed a third batch of contacts was undertaken by telephone calls.

Results.

- The total response from the 151 affiliated clubs with Junior players was 77% (117).
- Either a policy or advice regarding mouth protectors was provided by 78% (91) of the 117 responding clubs.
- 89% (104) of clubs allowed players to participate in training and 83% (97) of clubs allowed players to participate on match days without wearing mouth protection.

- The availability of health professionals:
    - Present on match days, First Aider 94.8% (111), Doctor 19.6% (23), Dentist 1.7% (2); ñOn callò on match days Doctor 27.3% (32), Dentist 0% (0).
    - Present on training sessions, First Aider 86.3% (101), Doctor 3.4% (4), Dentist 0.9% (1); ñOn callò on training days, Doctor 9.4% (11), Dentist 0% (0).

Conclusion.

It was concluded:

With reference to club policies on the use of mouth protectors by Junior players when training and playing, 77.7% (91) of the 117 clubs had a policy or provided advice. Despite this 89% (104) of clubs allowed players to participate in training and 83% (97) of clubs allowed players to participate on match days without wearing mouth protection.

Availability of medical, dental, and first aider (health professionals) at Junior Clubs is as follows: Present on match days, First Aider 94.8% (111), Doctor 19.6% (23), Dentist 1.7% (2); ñOn callò on match days Doctor 27.3% (32), Dentist 0% (0). Present on training sessions, First Aider 86.3% (101), Doctor 3.4% (4), Dentist 0.9% (1); ñOn callò on training days, Doctor 9.4% (11), Dentist 0% (0).

Dedication

ñThe advantage law is the best law in rugby, because it lets you ignore all the others for the good of the gameò (Derek Robinson).

To Professor Richard Welbury my supervisor, and an avid lover of the wonderful game of Rugby Union, my heartfelt gratitude for his wisdom and insight.

To my wife, Rosemary, for her love of rugby and meé which enabled this research to be completed with good grace, and hopefully also ñfor the good of the gameò.

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Acknowledgements

I am immensely grateful to many people who have encouraged and supported me throughout this research project. None more so, than my supervisors who, unbeknown to them have had the patience of saints.

This was an enjoyable project for me, made all the more so, by an interesting subject matter.

Declaration

This thesis represents the original work of the author.

The work of the following people prior to this included:

- Letter from Dr James P. Robson, Head of Medical Services, Scottish Rugby accompanying the questionnaire.
- List of affiliated ruby clubs supplied by Mrs J McLeod of the Scottish Rugby Union.

Michael Thomas Broad

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Chapter 1

1.1 Introduction.

Many people play and indeed enjoy playing sport. An individualôs enthusiasm for participating in sport is variable as is the skill mix. Whether it is the individual playing a ñsolo gameò such as golf or a ñteam gameò such as soccer, there are rules and regulations which are necessary to enable the sport to be played correctly, and enjoyed without incurring injuries and especially non-recoverable injuries.

The sport of Rugby Union Football is no different. While the regulations for the playing of the game are uniform, it is apparent that the regulations for ensuring injuries are minimised are at the behest of each affiliated club and the individual player within each rugby club.

This research study undertook to ascertain the policies of Scottish Rugby Union (SRU) affiliated clubs as to the wearing or non-wearing of mouth protectors (mouthguards) in Junior Rugby in (SRU) Clubs. This research was able to provide additional data including the availability of health professionals (doctors, dentists, first aider) at training sessions and on match days. The data collected from this research will be shared with the Scottish Rugby Union (SRU) to enable a greater understanding of the implications should mouth protectors be worn or not worn while training and playing Rugby Union in Scotland.

Like rugby clubs in many different countries it is not mandatory in Scotland for individuals or clubs to ensure the wearing of mouth protectors while training or playing rugby.

1.2. Literature Review.

1.2.1 Overview.

There are many types of contact sports ranging from individual one-on-one sports where one individual is pitted against another, e.g. boxing or judo, to team sports where a number of individuals compete against a similar number of individuals, for example, ice hockey or rugby union. By their very nature, and hence their name ócontact sportsô, there is physical contact between participants and this can result in injuries. In terms of the various injuries that can be sustained during participation in contact sports, the mouth and the craniofacial skeleton can be a focus. These injuries can range from complex facial fractures to damage limited to the teeth and their supporting tissues.

Sporting injuries can account for a significant number of oro-facial injuries. In the West of Scotland a review of all dental injuries presenting to a dental hospital paediatric department by Wright et al., (2007), showed that the commonest cause of injures were falls (49%). Eighteen percent were sports related with males accounting for 79% of these sporting injuries.

The degree of injury sustained can be affected by the type of sport played. It has also been suggested that the older and longer a sports person continues in a

contact sport the more likelihood of them sustaining an oro-facial injury, (Ferrari and Medeiros 2002). A review by McIntosh and McCrory (2005) reported that, the highest number of head and neck injuries were found in boxing, horse racing, ice hockey, and snow activities. Rugby is a contact sport in which oro-facial injury is still a common finding. In a recent study, undertaken by Jagger et al., (2010), some 70% of school boy rugby union players reported that, they had sustained at least one injury, with 26% indicating a dental injury. Of interest, the dental injuries were the single most common injury sustained.

There are several ways in which oro-facial injuries can be reduced during contact sports. It is well documented that helmets, face masks, pads and mouthguards have been in use for a number of years in different sporting arenas. The use of protective ñgearò in contact sports is however, limited to what is designated to be legal and legislated in that particular sport. Of the various types of equipment which may be worn for protection, a simple and effective method of reducing injury is for participants to wear mouth protectors. The wearing of a mouth protector has been shown to be clearly beneficial in reducing the incidence of injuries to the mouth, lips and teeth, (Chapman and Nasser 1993; Chalmers 1998; Holmes 2000; Marshall et al., 2005; Chatterjee and Hilton 2007).

The mouth protector can be defined as a resilient devise worn by sports men and women to protect the oral structures against injuries. Mouth protectors are also referred to as mouthguards or gumshields.

Three main types of mouth protectors have been described:

Type I called ñstockò or ñoff-the-shelfò(no longer available).

Type II called mouth formed in two basic formats. The shell-liner version which consisted of hard acrylic resin on the outside and a soft thermoplastic acrylic resin gel or silicone layer on the inside. The second type being the ñboil-and-biteò thermoplastic polyvinylacetate/ polyethylene (PVAc/PE) which is moulded by an individual in their own mouth after placing in hot water.

Type III called ñcustom-madeò which requires an impression of an individualôs mouth and laboratory fabrication of a ómade to measureô mouth protector of PVAc/PE or silicone.

Two types of mouth protector are available for use today, the óboil and biteô and the ócustom madeô types. The latter type offers improved fit and comfort due to it being custom made. It is however significantly more expensive than the ñoff the shelfò type and is less commonly used. The newer improved ñboil and biteò off the shelf mouth protectors are significantly better than their predecessors and do offer an alternative for those individuals who cannot afford the custom made type, (Marshall et al., 2005; Barbic et al., 2005).

For participation in rugby, mouth protectors became compulsory in New Zealand for under 19 age players at the beginning of season 1997, and at all levels of domestic rugby the following season Quarrie (2005). It is interesting that despite on-going oro-facial sporting injuries that no such legislation exists in the UK, although some attempts have been made in this direction. A review of mouth protection in sports in Scotland by Holmes (2000) reported that, the óOral Health

Strategy for Scotlandô(1995) recommended that dentists promote the use of mouth protectors in sport to reduce the risk of injury. In some contact sports such as, ice-hockey, fencing, boxing, and lacrosse the use of mouth protection is compulsory but in others it remains just a recommendation such as field hockey and rugby union.

1.2.2 Mouth protectors (mouthguards) in sports activities.

Many types of sports activities put participants at risk of orofacial injury and three comprehensive systematic reviews of the history of mouth protectorôs use in sports; mouth protector material and construction; and effectiveness of mouth protectors in preventing orofacial injuries and concussions was published in 2007 by Knapik et al., (2007). This work supplemented significant previous personal opinion articles by Ranalli (Ranalli 2000; Ranalli 2002).

Mouth protectors may reduce the likelihood of orofacial injuries through several mechanisms. Firstly, they may prevent fracture and dislocation of the teeth by separating the mandibular and maxillary teeth and absorbing or redistributing shock during direct forceful impacts.

Secondly, mouth protectors may protect against mandibular bone fractures by absorbing shock, redistributing shock and/or stabilising the mandible during traumatic jaw closure.

Thirdly, the mouth protector may reduce the possibility of laceration and bruising of the soft tissue by separating the teeth from the soft tissue, thus cushioning and redistributing the force of impacts.

Finally, it is hypothesised that the mouth protector may reduce the likelihood of concussion due to a direct blow to the jaw by positioning the jaw to absorb impact forces that would normally be transmitted through the base of the skull to the brain (Knapik et al., 2007).

The above arguments and hypotheses have led to the adoption of mouth protectors as mandatory equipment in some sports; Boxing (Ranalli 1991); Ice Hockey (Duffy 2005); LaCrosse (Winters 2005); American Football (Adams 2004); and Rugby Football (Quarrie et al., 2005). This latter reference is from New Zealand and currently New Zealand remains the only country where mouth protector usage is mandatory. The remaining part of the literature review will solely address mouthguard usage in rugby and the research subsequently presented will address mouth protector usage in Junior Rugby in Scotland.

1.2.3 Mouth Protectors in Rugby.

1.2.3.1 Prevalence of injuries.

Some of the earliest papers concerning mouth-guard usage amongst rugby players appeared in the dental literature in 1969. Hawke and Nicholas (1969) investigated by questionnaire the prevalence of dental injuries suffered by adult players at one of New Zealandôs premier clubs. Sixty two percent had suffered injury to teeth, lip, tongue, jaw, or temporomandibular joint and 26% had suffered injuries only to teeth. Of these, three players had lost two teeth each and two other players required anterior crowns fitted to restore fractured teeth. Only 11% of respondents reported that they wore a mouthguard and those players suffered fewer orofacial injuries.

They concluded that the incidence of dental injury was surprisingly high and the percentage of players wearing a mouthguard was correspondingly very low. They suggested that more research needed to be undertaken.

Davies et al., (1977) reported on the prevalence of dental injuries in 1st XV and 3rd XV rugby players in the North of England and their attitude to mouthguards. Two hundred and eighty one players took part in the formal review. There were a number of pre-coded as well as open questions relating to dental injuries received whilst playing rugby and their attitude to mouthguards. Fifteen percent reported that, they had lost one tooth and 28% had lost teeth on more than one occasion. A total of 82 teeth had been lost in this study. The position of the players in the rugby teams who had lost teeth were reported as follows: front five ï 42%; back row -30%; threequarters ï 14%; halfbacks ï 9%; and fullbacks ï 5%. Twenty four percent reportedly wore a mouthguard regularly and of those 55% had it made by a dentist, 44% purchased them from a shop, and one was received by post. This study was the first to report that the prevalence of injuries may be related to the playerôs position within the team.

Upson (1982) undertook interviews at four rugby union clubs on the south side of London to ascertain the attitudes of 100 players to the wearing of mouth protection. All the players were above school age. Sixty six had worn a mouthguard and currently only 38 were wearing a mouthguard. The classification of mouthguards worn during the study were; ñSTò stock or factory type, a ñMFTò mouth fitted type, or an óLMTô laboratory made type which is a thermoplastic sheet adapted over the players stone cast having been poured from a dental

impression. Two MFT types were classified; the first a thermoplastic shell which was softened in hot water and adapted to the upper arch, and the second a plastic shell which was filled with a soft material, inserted in the mouth and allowed to set. It was recommended that both were modified and fitted at chairside.
From this study a number of 16 to 18 year old players who were associated with a club but not a school, but the numbers were too small to be significant. However seven had mouthguards but only two were currently wearing one. It was suggested that further research into the under 18 age group was greatly needed. Twenty four players reported no damage, while 27 had damaged their teeth and this damage involved fractures of at least one tooth. Six had lost at least one tooth as well as fracturing others. Concussion was defined in this article as a player being knocked out and, following attention, not being allowed to continue in the game. Seventeen players had reported being concussed. It was again suggested that, further research was necessary but in the meantime the profession should take the lead in encouraging players to wear mouth protectors.

In the study undertaken by Chapman (1985c) three Australian rugby union teams of increasing standards of play, university club team (C), Queensland team (Q), and the Australian international team (A), were chosen. Each player was given a questionnaire to provide information on orofacial injuries and the use of mouthguards in sport. The study claimed to provide the most comprehensive investigation into the prevalence of orofacial injuries and the second time that international cooperation and evaluation had taken place. The results showed the average age for the three teams was C/Q/A respectively 22/26/24 years. The average age when playing the sport commenced was C/Q/A respectively 12/12/11

years. The percentage number who had sustained orofacial injuries was C/Q/A respectively 16%/25%/ 41%. The percentage number who were not wearing a mouthguard when injury occurred was C/Q/A respectively 75%/50%/50%. The percentage number who believed in the effectiveness of mouthguards was C/Q/A respectively 99%/100%/95%. The percentage number currently wearing a mouth protector was C/Q/A respectively 96%/93%/79%. The percentage number who thought mouthguards should be compulsory was C/Q/A respectively 70%/80%/65%.

The following study is very much at odds with the findings of most of the other research into injuries sustained while playing rugby. Blignaut et al., (1987) wished to compare the wearing and non-wearing of mouthguards in relation to previous studies which had shown a higher prevalence of head and neck injuries when mouthguards were not worn. The research compared the pattern of injuries to those of previous studies. Three hundred and twenty one (321) university students participating on 555 player occasions were studied in a cross-sectional survey. No statistically significant differences were found between the wearers and non-wearers of mouthguards with respect to head and neck injuries in general and to oral injuries in particular. They concluded that, injuries sustained at rugby in this study were not associated with the use or non-use of mouthguards.

Kay et al., (1990) used a first division Scottish rugby union club which is affiliated to the Scottish Rugby Union. One was selected to undertake a retrospective questionnaire study to clarify the nature and severity of orofacial injuries amongst rugby players. Secondary aims were to examine the influence of

position and standard of play on injury rates. The questionnaire which was sent to each of the 99 players at Stewarts-Melville rugby club with a covering letter from the Scottish Rugby Unionôs medical and dental advisors, and a reply paid envelope. A telephone follow up was used to stimulate further response. The questionnaire asked players about their rugby careers and details of any orofacial injuries sustained during their participation in the game. Questions also concerned dental work carried out as a result of injuries. The players were also asked about their use of mouthguards and their reasons for wearing or non-wearing of a mouthguard. Sixty four percent returned the questionnaire. The average length of time a player had been playing rugby was 15 years, and the age range was between 14 ï 40 years with an average age of 26 years. Soft tissue injuries were common with 40% (25) players) of the participants having required sutures to either their face or head. Forty four percent (28) players had suffered a significant nasal injury to bone or cartilage. Thirty percent (19) players had fractured their teeth, 19% (12) players had teeth completely avulsed and 5% (3) players had fractured their mandible. Forwards and those playing in the higher standard teams were more likely to receive dental and facial injuries. Sixty-three percent (40) of the players reported that they now regularly wore a mouthguard and the majority of these, 66% (26) players were custom made.

The study was both retrospective and observational and reporting bias was acknowledged as players were asked to think back on their playing careers for these significant events. They indicated that, this was the first report of orofacial injuries in adult club level rugby in Scotland and the results therefore warranted attention. Due to the rising cost and difficulties in successfully treating dental injuries it was clear from this study that, a mouthguard was an essential part of a

rugby player's kit and the use of mouthguards as a health orientated behaviour should increase the habit of wearing one. The authors concluded that, junior clubs and schools should insist that all young rugby players use a mouthguard when participating in contact sport.

The second International Rugby Union World Cup in 1991 gave Chapman and Nasser (1993) the opportunity to evaluate the prevalence of orofacial injuries sustained whilst playing Rugby Union and also whether those injuries required medical or dental treatment. The authors also wanted to find out players attitudes to mouthguards and their preferred usage.

The questionnaire was sent to individuals in four international teams: Australia, Scotland, Ireland and Wales. The second author was a member of the Australian squad. Of the orodental injuries sustained, 22% were soft tissue lacerations and 78% were dental injuries. With regard to the dental injuries, 85% involved maxillary teeth and 6% involved posterior teeth. The treatment required varied from minor restorative procedures to extensive endodontics and occasionally extractions. The majority of orodental injuries were sustained by forwards with 59% compared to backs at 2%. While there were 3 instances of a fractured mandible, which interestingly, were all sustained by backs, two in the Australian squad and the other in the Irish squad. There was very little difference between the squads with regard to the average age of players, average age when started playing rugby, percentage who believed that wearing a mouthguard provides protection, percentage who wore a mouthguard, and the percentage who wore custom made mouthguards.

The responses that produced the greatest variation between the four teams were:

average age when a mouthguard was first worn ranging from 13 years for Australia to 18 years for Wales; the average delay from starting to play to first wearing a mouthguard ranging from 3.2 years for Australia to 7.2 years for Scotland; the percentage of mouthguard wearers who would not play without it ranging from 27% for Australia to 55% for Ireland; the percentage of mouthguard wearers willing to play without it ranging from 5% for Australia to 16% for Wales; the percentage of wearers who believed mouthguards should be compulsory for adult rugby players ranging from 46% for Scotland to 86% for Ireland; the percentage of players who sustained an orodental injury ranging from 27% for Ireland to 54% for Wales; the percentage of players who had sustained a fractured mandible ranging from nil for Scotland and Wales to 7.7% for Australia. This study concluded that although the incidence of orofacial injuries sustained when wearing a mouthguard was as high as 36.4% in one team, it was clear that the extent of the injuries would have been far greater if a mouth protector had not been worn. In contrast, none of those injured in another team were wearing a mouthguard at the time of the injury. The findings showed a reversal to previous reported work in that more severe injuries (mandibular fractures) occurred solely in backs.

Ten of the Australian squad in this report were wearing the bimaxillary mouthguard and none of the wearers thought that they would revert back to the original custom made mouthguard by choice as they felt the bimaxillary one provided better protection against both orodental injuries and fractures.

Holmes (2000) reviewed mouth protection in sport in Scotland. The author suggested it was difficult to ascertain the number of dento-aveolar injuries

sustained as a result of sports but acknowledged that some people were at a greater risk than others. In the 1960ôs it was reported that, players at órisk ô could be as much as 10% per season and therefore between 33%-56% at some point in their playing days. Comparably in the 1990ôs there was a report showing 26% of oral injuries were a result of playing sport (Rodd and Chesham 1997).

In France an epidemiological questionnaire survey was undertaken by Muller-Bolla et al., (2003), in relation to orofacial trauma and rugby in France. This was undertaken with the best French rugby players from three different groups and assessed the prevalence of trauma to the lower or middle third of the face and the frequency of wearing mouthguards. It was found that 30% of players had already been affected by a facial injury with older forward players being more at risk. It was felt that an increasing number of competitions per year and hours per week training were important factors. Only some 64% of players used a mouthguard. This frequency increased with the number of competitions and with those who had experienced a previous trauma, especially with scrum players who had been playing longer.

A pilot study undertaken by Jagger et al., (2010) looked at the prevalence of dental, orofacial, and head injuries with use or non-use of mouthguards among schoolboy rugby players. A questionnaire was sent to all first and second XV players at two English and one Australian school. All 178 children completed questionnaires with a 100% response rate. One hundred and twenty five, therefore 70% of players reported having sustained at least one injury. Orofacial injuries were common with dental injuries being the most prevalent injury and reported by

26% (46) of players. Fractured teeth were reported by 20 (11%) of players and avulsed teeth by 7 (4%) of players. There was a difference between schools in the prevalence of injured players (P=0.014), but among those reporting injuries there was no difference between the three schools in the number of injuries (P=0.95). All players indicated that they used a mouthguard regularly.

The authors concluded that the mouthguard may not prevent injury in all instances but it does reduce the severity of the trauma. They also stressed that it was important that trained personnel were in attendance at matches and training to provide early management and advice on trauma treatment and further management.

1.2.3.2 Effectiveness of mouth protectors.

The research study undertaken in South Africa by de Wet et al., (1981) reported the provision of custom made mouthguards to 75 primary schoolboys in South Africa attending five different schools and compared these to an identical number in another five schools where the players were not provided with mouthguards. The aforementioned authors showed that, oro-facial injuries were significantly reduced, and tooth injuries and concussions were reduced to zero amongst the players in the primary school teams where mouthguards were worn. The aim of the study was to find out if the school boys would wear their mouthguard and accept it as an integral part of playing the sport on each occasion they played. The 2mm mouthguard material was adapted onto the players own dental cast and was kept 2mm up from the vestibular sulcus depth. On the palatal side it covered the vertical portion of the palate and was therefore ñhorse shoeò in design. It did not reproduce the imprint of the mandibular teeth. The boys had a very positive

attitude to wearing the mouthguard and 98% accepted that the mouthguard was effective in reducing dental injuries. Thirty percent did feel that the mouthguard became loose after a while and this was mainly due to exfoliation, eruption or movement of teeth. This was thought to present the biggest problem and indeed may never be able to be solved.

In the rugby union playing season of 1983/84 a dental examination was conducted on 120 players and all were fitted with one of two types of mouthguards (Upson 1985) . Fifty five (55) were fitted with the mouth fitting type and 65 had an impression taken and were fitted with a laboratory made mouthguard. At the end of the season the study recorded that, 98 players understood and accepted the two types of mouthguard. Variation in the attitude of the players to each type of mouthguard was recorded. A second dental inspection showed that there was no damage to the teeth, irrespective of type of mouthguard worn.

To expand on the procedures mention in the introduction the following researchers Chalmers 1998; Newsome et al., 2001; Marshall et al., 2005, published reviews of the protective effects of mouthguards with particular reference to rugby union and defined the mouthguard as ña resilient device or appliance which is worn inside the mouth protecting against injuries to the teeth, lacerations to the mouth, dislocations of the jaw and fractures to the jawò. Chalmers (1998) indicated that, there was clear support in the literature for the wearing of a mouthguard whilst participating in contact sport and that there was also evidence to support the wearing of a mouthguard to protect against

concussion and injury to the cervical spine. There was a high level of acceptance by players, especially among elite players.

The aforementioned author also reported strong support amongst players and researchers for mouthguards to become compulsory. It is generally recommended that:

- mouthguards should be worn for training and playing
- the habit of wearing a mouthguard should begin at an early age
- mouthguards should be regularly replaced while children are still growing
- adult players should replace their mouthguards at least every two years

Newsome et al., (2001) researched the literature in relation to the usage of mouthguards in the prevention of sports-related dental injuries. Five different aspects were covered:

- The risk of dental injury while playing sport
- The role of the mouthguard in preventing injury
- Types of mouthguards for sports personnel
- Implication for patients undergoing orthodontic treatment
- Behavioural aspects towards mouthguards

They concluded that participation in sports provided considerable risk of sustaining dental injury and was present in non-contact sports, like basketball and not just in contact sports like rugby and hockey. The majority of studies found that mouthguards were an effective way of preventing dental injury and it was clear that the custom-fabricated mouthguard and in particular the pressure-laminated variety afforded the most protection. Players with orthodontic appliances were at greater risk due to tooth movement and problematic

mouthguard design. Mouthguard usage was not as common as the dental profession would like. They felt that the profession could do more to promote the greater use of mouthguards in a wide variety of sports.

Marshall et al., (2005), again in New Zealand, looked at the effects of protective equipment in reducing injuries in rugby union. A cohort of 304 rugby players in Dunedin, was followed weekly during the 1993 playing season. Adjustments for covariates were made with regard to level of competition, playing position, and injury history.

The use of mouth protectors appeared to lower the risk of orofacial injuries. Other protection such as padded head gear tended to prevent damage to the scalp and ears, and support sleeves tended to reduce the risk of sprains and strains. However, the risk of concussion was not lessened by the use of padded headgear. They felt that the protective equipment used in rugby union has limited effectiveness in preventing injuries, but that the results did support the role of mouth protectors and padded headgear in prevention of orofacial and scalp injuries, and for support sleeves in preventing sprains and strains.

A study from Ontario, Canada by Barbic et al., (2005) compared mouthguard designs and concussion prevention in contact sports. They compared the effectiveness of the WIPSS Brain-Pad mouthguard to other currently used mouthguards in the prevention of concussion injuries in university students from five universities playing football and rugby. The study took place during one playing season in 2003 and was monitored by their respective athletic therapists, trainers, and sports physicians who diagnosed and recorded the incidents of

concussion and dental trauma. Concussion symptoms were recorded at the time of injury.

The main outcome was to measure concussion events as defined by the American Academy of Neurology Concussion Guidelines. The secondary end point was dental trauma and observed concussion symptoms.

There was no significant difference in the number of concussions observed between the intervention and control arms of the trial. No dental trauma events occurred. The five most common symptoms experienced by concussed players were:

- Dizziness
- General headache
- Nausea
- Loss of visual focus
- Personality changes

In addition concussion rates were not significantly different for football or rugby players who wore the WIPSS Brain-Pad mouthguard compared to other types of mouthguard.

Porter and OôBrien (1994) discussed the design of the ñBi-Maxò mouthguard with regard to the protection it provided orally, peri-orally and cerebrally in contact sports.

This type of customised mouthguard encompasses both dental arches and is articulated to maintain the ñheavy breathingò position. It is suggested that the ñBimaxillaryò mouthguard which links the lower jaw to the upper jaw diminishes concussive forces and provides more cerebral protection.

Jennings (1990) used a retrospective questionnaire to study the number of orofacial injuries sustained and the incidence of concussion suffered by samples of English club rugby players at both senior and mini levels. The senior players were from London South West Division 3 and the study was conducted over two Saturdays in March and April 1990. Three clubs were involved who both had first, second and third team players. The sample included players from both ends of the division. The other age group was 11 to 12 year olds who were participating at a Surrey rugby union mini festival in April 1990. He chose this age group because the senior teams had indicated that this was the age at which they had started playing.

Two questionnaires were devised one for mouthguard wearers and the other for non-wearers. Similar questions were asked to the ñChapman studyò of rugby league teams in 1884. These included: age, playing position, age when first started playing, attitude to effectiveness of a mouthguard, whether they wore a mouthguard or had tried to wear one, previous orofacial injuries, type of mouthguard, who influenced the decision to wear a mouthguard, willingness of wearer to play without a mouthguard, whether they thought that a mouthguard reduced the risk of injury, and should the wearing of a mouthguard be made compulsory.

One hundred and fourteen senior players were included with an average age of 25 years, and 69 junior players with an average age of 11years. Seventy two percent of senior players had sustained previous orofacial injury compared to 56% of junior players. Seventy nine percent of seniors and 88% of juniors thought that wearing a mouthguard would reduce injury and 28% of seniors and 64% of

juniors thought that wearing a mouthguard should be compulsory.

Jennings concluded that, the wearing of a mouthguard was beneficial in reducing the incidence of injury as there were fewer injuries to the mouth, lip, and teeth of the wearersô. The incidence of concussion and loss of consciousness was also less in wearers than non-wearers. He also stated that, some effort was being made to encourage mini rugby players to wear a mouthguard, although he admitted that this could be improved. Well organised clubs did recommend mouthguards and club coaches often gave talks to the players and parents at the start of the season.

The selection of a mouthguard will depend on a number of factors including the age of the individual, effectiveness and cost and the author concluded that, although the boil-and-bite type could be effective, they recommended that custom made mouthguards are recommended for higher grade players and those playing in more vulnerable positions.

Most experimental studies which have demonstrated the effectiveness of mouthguards have involved the custom made type.

A research project undertaken in France with high school pupils by Brionnet et al., (2001) compared the comfort of two bimaxillary custom-fitted mouthguards. One was constructed with silicone rubber and the other with methylmethacrylate (acrylic).

The study incorporated a cross over design within the clinical trial with 52 high-school rugby players. Following a random allocation of the 2 groups to either the silicone or acrylic mouthguard for the first 4 months, then there was a cross over for the following four 4 months. The study assessed comfort, bulkiness, stability, hardness, ability to talk and to breathe, oral dryness, nausea, inclination to chew

by a visual analogue scale for the two different mouthguards at the end of each 4 month period.

There was no significant difference concerning comfort, bulkiness, ability to talk and to breathe, oral dryness and nausea between the silicone and acrylic mouthguards. Acrylic mouthguards were however more stable and harder than the silicone ones. Tendency to chew was greater for the silicone appliance. For stability, hardness, and inclination to chew, there was no significant difference in the response of the players based on the sequence of use of the 2 types of mouthguard during the survey. At the end of the survey, 56% of the players preferred to keep the acrylic mouthguard and 44% chose the silicone one. This choice did not vary between the groups with regard to which mouthguard was worn first or second during the survey. Silicone rubber mouthguards were well accepted by the players but technical improvements in silicone materials are needed to improve hardness and stability of silicone mouthguards before they can be recommended for sport.

1.2.3.3 Prevalence of use of mouth protectors.

Clegg (1969) in one of the first recent day articles on the topic in the British Dental Journal described the types of mouthguards available for the rugby player and elaborated on the construction of a laboratory made mouthguard.

Morten and Burton (1979) reported an initiative to provide mouthguards amongst high school rugby players in New Zealand. Teams of dentists visited the eight schools involved and took upper impressions of 272 pupils. The final year dental students then provided a dental examination and completed the questionnaire with the pupils.

Out of the 272 players, 221 were available for the follow up survey. One hundred and thirty five reported that, they wore their mouthguards regularly. The remaining 86 gave various reasons for wearing them only occasionally or not at all. Thirty one players reported receiving a blow causing damage to the mouth. Of the 31 players, 20 were wearing the mouthguard at the time of the accident and only 5 had fractured teeth. The remaining 11 injured players who were not wearing mouthguards suffered 13 tooth fractures between them.

A retrospective questionnaire similar to the one previously used on the Australian Rugby League team was in turn undertaken with the Great British Rugby League touring team in Australia in 1984 (Chapman 1985a). The aforementioned author investigated both the usage and the attitude of players to the wearing of mouthguards at this the highest level of Rugby League. The study looked at four main areas: The usage of mouthguards; the players attitude to mouthguards; whether sports medics need to emphasise to players and team doctors the reduction in concussion forces when a blow to the jaw is received and a mouthguard is being worn; the cost of expensive treatment for largely preventable dental injuries. It was shown that there was an awareness that mouthguards provide protection against concussion injuries and that the age of commencement for wearing a mouthguard should be at the playerôs first encounter of contact sport. This would usually mean the wearing of mouthguards from 10 and 12 years of age. Mouthguards should also be worn during each training session. Twenty eight players completed the questionnaire. The average age of the players was twenty four years. All players agreed that custom made mouthguards could reduce injuries to the teeth and the soft tissues around the mouth. Twenty six (92.8%)

stated that, mouthguards should be made compulsory, rather than it being left to the individual. Seventeen (60.7%) had suffered dental or intra-oral injuries previously. At the time of injury, only one of the seventeen (5.8%) was wearing a mouthguard.

Chapman (1985b) undertook a study of the 1984 touring Australian ñWallabiesò Rugby league team to record orofacial injuries and the wearing of mouthguards. A retrospective questionnaire was used with the 30 squad members to seek the playerôs attitudes to the wearing or non-wearing of a mouthguard. It also undertook to seek details of orofacial injuries sustained while playing rugby which had required dental or medical treatment. Eighty per cent wore mouthguards and of those players who wore a mouthguard 75% believed that the wearing of a mouthguard should be made compulsory. There was a recognition that players at senior level are more likely to sustain orofacial injuries, particularly forwards, but because of previous injuries earlier in their career, they were more likely to wear a mouthguard. Thus the players felt that fewer of them suffered serious orofacial injuries which required dental or medical assistance. The players also felt that they were protected against concussion and that the wearing of mouthguards in contact sport should be strongly recommended.

The pattern of use of mouthguards in the Australian rugby league touring team in 1986 was reported by Chapman (1988). He aimed to compare the results to that of his study undertaken in 1984, with the British rugby league touring team. A questionnaire which had been used by the author previously was completed retrospectively by 28 players in the squad. The playerôs average age was 24 years. All believed that, wearing a mouthguard was an effective thing to do. Twenty six

(96%) were currently wearing a mouthguard. Ten (36%) had previously sustained an orofacial injury with only two (20%) wearing a mouthguard at the time. Seven (87%) of those previously injured, now wear a mouthguard.

The most vivid difference was the percentage of players who wore a mouth protector. In the Australian squad it was 92.8% while in the Great Britain (GB) squad it was only 25%. This would have attributed to an orofacial injury incidence rate in the GB squad of almost double that of the Australian squad. The study reinforces the importance of mouth protectors in contact sports in reducing the risk of orofacial injuries.

Chapman (1989) once more used a retrospective questionnaire with the 1987 United States Rugby Union Football team to ascertain the wearing or non-wearing of a mouthguard and to evaluate the number of orofacial injuries sustained. The questionnaire was used to seek playerôs attitudes to wearing a mouthguard, as well as, details of any orofacial injuries sustained whilst playing rugby which had required dental or medical treatment. Although 95% of players in this US squad believed that a mouthguard can provide local protection only half actually wore one. Ninety one percent (91%) of those who did wear one refused to play without it and 54% believed that wearing a mouthguard should be made compulsory in Rugby Union Football. Approximately 33% of the squad had sustained an orofacial injury in the past, that required medical or dental treatment and none were wearing a mouthguard at the time of the incident. The author concluded that, mouthguards do improve player safety in contact sport and although little protective equipment is worn in rugby, players should wear a mouthguard and

preferably a professionally made one as the wearing of a mouthguard minimises the risks of orofacial injuries.

Ishijima et al., (1989) in Japan were aware that recent reports had shown an increase in oral and maxillofacial injuries while playing contact sport and that European and American countries had published studies, recommending the use of mouthguards as a measure against this type of injury. They investigated the incidence of oral and maxillofacial injuries caused by contact sport, the usage and the evaluation of mouthguards and the interest in mouthguards in Japan. Questionnaires were sent to 244 Rugby football teams in Aichi prefecture and 27 American football teams in the Tokai area. The response was one hundred and fifty three (62.7%) replies from the rugby teams and seventeen (62.9%) replies from the American football teams.

Oral and maxillofacial injuries occurred in 5% (239 out of 4,721) of rugby players and 5% (22 out of 428) of American football players. Only 13% (20 out of 153) of rugby teams used mouthguards compared to 94% (16 out of 17) of American football teams. Most of the teams used commercially available mouthguards. Almost all of the teams were not satisfied with their mouthguards and complained of speaking difficulties, discomfort, and easy dislodgement. Almost all the teams wanted improved mouthguards. Teams with no experience were very interested to find out more information. The authors concluded that, players and their instructors have to be enlightened and spread the positive word about the use of mouthguards in contact sport.

Chapman in 1990 used a retrospective questionnaire with 30 members of the touring British Lions rugby union team (Chapman 1990). This was to ascertain the wearing or non-wearing of a mouthguard and to evaluate orofacial injuries sustained by this international rugby union team. The questionnaire which had only been used on two previous occasions (1984 and 1987) was used to seek playerôs attitudes to wearing a mouthguard as well as details of any orofacial injuries sustained while playing rugby which had required dental or medical treatment.

The results from this questionnaire can be compared to the two other results from 1985 (Chapman 1985a) and 1989 (Chapman 1989). The results are very similar to the previous two studies with the Australian and US teams, except that the British Lions team had a much lower percentage who thought that wearing a mouthguard should be compulsory in adult rugby.

All 30 participants believed the wearing of a mouth protector provided protection and 21 wore a mouth protector of which 19, were professionally fitted. All 9 who did not wear one now, had done so previously, and some of the reasons for discontinuing were nausea, difficulty with speech, difficulty with breathing and dryness of the mouth, and one lost mouthguard. Of the 21 who were wearing a mouthguard 14 would be unwilling to play without one and a further 6 would be very reluctant to play without their mouthguard. The player who lost his mouthguard just before a match described his feeling during the match as a ñnightmareò. Twelve (12) of the British Lions team had sustained an orofacial injury in the past and only one had been wearing a mouth protector at the time. Chapman (1990) again concluded that, mouthguards do improve player safety in

contact sport and although little protective equipment is worn in rugby the players should wear a mouthguard and preferably a professionally made one.

Chapman and Nasser (1996) undertook a questionnaire study with 130 subjects, aged between 13-16 years attending a private school in Brisbane, Australia. The questionnaire sought information about attitudes to the wearing of a mouthguard as well as details of any orofacial injuries while playing rugby union and if any treatment from a medical or dental professional was required. Every player, 100% believed that wearing a mouthguard provided protection. Overall 97% wore a mouthguard. Two thirds of mouthguards worn were professionally made and of those who were not currently wearing: 2 boys were not wearing a mouthguard due to a cold; with 2 others not wearing because they were mouth formed (ðboil and biteö) and hurt. The overall average delay from a player starting to wear a mouthguard was 1 year. Fifty nine percent thought that the wearing of a mouthguard should be compulsory. Only 30% were willing to play in a match without wearing one. Nine players (7%) had sustained an orodental injury which needed professional assistance. Five players had sustained an upper incisal injury and of these 5 only 1 was wearing a mouthguard at the time. Four had sustained a laceration and 2 of these related the injury to lower teeth trapping the lower lip against the mouthguard.

This study showed a very high usage of mouthguards and a very low incidence of orofacial injury albeit a smaller sample than the previous comparisons in high schools reported 15 years earlier in the early 1980ös. Of interesting note to the author of this thesis was the Director of Sports at this school was a Mr Michael Broad (no relation).

Rodd and Chesham (1997) undertook their research to primarily determine the frequency of use of mouthguards for sports in some secondary school children in Sheffield. Information was also sought regarding the prevalence and aetiology of: oral trauma; sports most frequently played; source of mouthguard; reported problems with use; attitudes towards mouthguards. Five hundred and fifty seven questionnaires were completed (average response rate of 72.3%) from 770 male and female pupils aged between 14 to 15 years.

An orofacial injury where the tooth injury (44%) or lip/mouth injury (54%) was reported and was significantly more prevalent among males. Just over 26% reported oral trauma was attributed to sports-related accidents, but the aetiology varied significantly according to gender and social class. There was a wide range of sporting activities with 57% of boys frequently playing rugby and soccer. Girls most often participated in netball with 16%, and hockey at 10%. Statistical analysis revealed only a significant effect of social class (as measured by school type and location) on the sport most frequently played by girls.

Approximately 14% of pupils professed to have worn a mouthguard when playing sport at some point, although less than 6% were currently wearing one when playing sport. Gender and social group had a significant effect on the reported use of a mouthguard, with lower usage in girls and those from lower socio-economic groups. Nearly 70% of secondary school pupils thought that wearing a mouthguard would help in preventing oral trauma and the majority of respondents would consider wearing one, although girls were significantly less willing to use a mouthguard than boys. The authors concluded that in view of the evidence for the protective attributes of the mouthguard there is considerable scope for promoting

their wider use, especially among girls and children from lower socio-economic backgrounds.

A pilot campaign sponsored by health and dental companies for the wearing of mouthguards when playing junior basketball and rugby was conducted in Perth, Western Australia in the winter playing seasons of 1997 and 1998. It had the catchy slogan of ñPLAY HARD GET A GUARDò (Foster and March 1999). This study examined the use and type of mouthguards and had parental input.
Many parents thought that mouthguards should be compulsory for competition and the majority also thought they should be compulsory for training. However, only 77% of children wore a mouthguard for playing, with even fewer, 29% wearing one for training.
It was concluded that any similar campaign needed to concentrate on the promotion of wearing mouthguards for training and playing. Greater education was required for everyone involved including players, coaches, and parents. It was this latter group who needed to ensure mouthguards were worn, not the referee.

Jalleh et al., (2001) reported these findings from another promotional campaign to try to increase the wearing of mouth protection when playing junior rugby and basketball (the intervention groups) both for playing and training in Western Australia.
They used a quasi-experimental (resembling but not actually an experimental) field design to assess the impact of the mouthguard campaign on the usage during training and playing. Observational data was gathered both pre - and post campaign on behavioural change at a rugby and basketball competition and at a

training session. Junior Australian Rules Football players were used as a control group. The pre - and post observational surveys showed a significantly greater increase in mouthguard usage in competition games among rugby union, 77% to 84%, and basketball players, 23% to 43%, compared to the control group with 72% to 73%. All codes showed a post-campaign increase in mouthguard usage at training, but the increase of the intervention groups (rugby and basketball) were greater than the control (rules football) increase, (rugby union: 29% to 40%; basketball: 11% to 36%; football: 34% to 40%).

The authors concluded that the campaign had been successful. It had a significant and substantial effect on behaviour and provided evidence of the benefits of leveraging a sponsorship to modify the behaviour of the target group.

Marshall et al., (2001) reported on the use of protective equipment in a cohort of rugby players in New Zealand. They followed 327 players (male and female) throughout a playing season and interviewed them weekly about their participation in their sport and the protective equipment which they used. The main outcomes were expressed as the percentage of all player-weeks and follow-up for each equipment item used.

Mouthguards were the most commonly used piece of equipment which were worn for 64.9% of player weeks. The usage range for mouthguards was from 55% player-weeks in school-girl grade up to 73% player-weeks in senior óAô competitions. The next most common item was taping of body joints 24% (player-weeks), the ankle, knee and hand being the most common areas taped. All other equipment was below 15% (player-weeks). The most common self-reported reason for wearing and using protective equipment was to prevent injury and

because of a past history of injury. Players did show a considerable week-to-week variation in their usage of protective equipment.

In general protective equipment usage was highest in those at greatest risk of injury, namely forwards, male players, and senior grade players. The high voluntary use of mouthguards was encouraging and indicative of a broad base of player support for their role in this contact sport.

Duarte-Pereira et al., (2008) in Barcelona, measured the comfort, wearability, physiological effects, and influence on athletesô physical performance when wearing custom made against self-adapted mouthguards. Particular reference was made to the athleteôs ability to breathe effectively.

Eleven rugby players were placed under similar conditions when playing to ascertain forced expiratory air volume, expiratory flow rate peak and forced vital capacity. Each player was doing one of three things (variables) during each of these trials ï either

1) wearing a commercially available ñboil-and-biteò mouthguard,

2) a custom made mouthguard, or

3) no mouthguard at all (the control).

A subjective visual analogue scale questionnaire was used to evaluate the performances before and after the exercises was undertaken for the three variables for each player. This took into account ï comfort, adaptability, stability, tiredness, thirst, oral dryness, nausea, ability to talk, breathe, and drink. All were evaluated. The wearing of the custom made mouthguard showed significant improvement in the expiratory flow rates. However, there was no significant difference regarding the other spirometer parameters. The customised mouthguard showed superior

properties in comfort, adaptability, stability, ability to talk and to breathe. The ñcustomisedò mouthguard showed the smallest range of changes in playersô performance, and suggested improved fit, comfort, and acceptance compared with the ñboil-and-biteò type. The customised mouthguards greatest advantage was its ability to be individualised to the playerôs anatomy of their oral cavity. The authors concluded that greater efforts must be made to improve the comfort of mouthguards if their use is to be increased.

1.2.3.4 Regulations regarding the use of mouth protectors.

The Oral Health Strategy for Scotland (1995) recommended that, dentists promote the use of mouth protection in sport to reduce the risk of injury. There is compulsory mouthguard as previously mentioned in some sports including ice-hockey, fencing, boxing, lacrosse and some forms of autocycling. In cricket, face protection appears to be compulsory at international level but in the UK this does not seem to be always enforced at club level. Players of contact sports, such as rugby and hockey, are considered to be more at risk of dento-alveolar injury and although the governing bodies of these sports recommend that players at all levels wear mouth protection they have not made it mandatory.

Recommendations put forward by Dietzen and Topping (1999) were based on evidence from Physical Medicine & Rehabilitation Clinics of North America and were related to the professional support required at matches and training sessions. Rugby Union is increasing in popularity in the USA both as a spectator sport and for playing by men and women. There has been a considerable growth in high

school rugby clubs in recent years and therefore, it is important and essential that great effort is put into controlling both the injury rates and severity of injuries sustained. Players and coaching staff must have good knowledge of the rules of the game and referees must strictly enforce the laws of the game. Medical and dental professionals should be involved in educating parents, coaches, players, and school officials about the inherent risks of injury and the means to prevent injury. Additionally, the authors suggested that, medical personnel should also educate players in the use and abuse of alcohol. Rugby players should be encouraged to use the limited protective gear permitted: wraps; tape; joint sleeves; scrum caps; and facial grease. Mouthguards are strongly recommended at any level of play and should be mandatory. The use of helmets, face masks, and shoulder pads has been suggested by some authors, Dietzen and Topping (1999), Marshall (2005), but these rule changes could have an opposite effect from protection and be used as weapons and therefore increase the likelihood of injury. It was recommended that rugby clubs should have appropriate equipment to practise scrummage skills and coaches be experienced and attend clinics or complete video courses on medical emergencies and safe techniques of the game. Injury frequencies can be decreased by better pre-season training and conditioning: Proper tackling and falling techniques; the strengthening of neck muscles; and allowing only experienced fit players in the front row.

The paper by Dietzen and Topping (1999) was the first paper to recommend that, significant medical surveillance must be improved at matches and at training sessions because when the paper was published it was common for no emergency medical personnel or physician to be present at matches in the USA. Better case

registers were necessary to monitor rugby injuries and more medical professionals must become involved in the sport to obtain useful data. It was concluded that, rugby players would respect the advice of medical advisors provided they are knowledgeable and even though this is a ñhardyò group of athletes with a cavalier approach and great camaraderie, their sport could be made safer without diminishing their enjoyment.

Chapman (1990) commented on another preventive measure, namely the assessment of the mandibular third molar. Experimentally, it has been shown that the presence of impacted third molars can significantly weaken the angle of the mandible. The aforementioned author advised that, for those involved in contact sport the prophylactic removal of impacted mandibular third molars should be arranged at 18 years of age.

He also suggested that, when a team is planning an overseas trip, a dental examination and provision of a mouthguard should be undertaken. Dental emergencies in foreign countries can pose practical problems as well as incapacitating a player for part of the tour.

The extraction of unerupted and impacted third molar teeth should be reviewed according to the Scottish Intercollegiate Guidelines Network (SIGN) Guidelines 2000, Section 2.2, ñFor which patients is removal advisableò. The prophylactic removal of impacted mandibular third molars at 18 years of age as advised by Chapman (1990) is not recommended in the SIGN guidelines for the ñManagement of Unerupted and Impacted Third Molar Teethò (2000).

Quarrie et al., (2005) documented the effects of compulsory mouthguard wearing on rugby related dental injury claims made to ACC, the administrator of New Zealandôs Accident Compensation Scheme. This is the first study that has tried to quantify in monetary units the effect of dental traumatic injuries. An ecological qualitative study was conducted by gaining estimates of mouthguard wearing rates available from prospective studies conducted in 1993, in 2002, and in 2003, rugby related dental injury claims available for the period 1995 ï 2003, and player numbers available from 1998. Mouthguard wearing was made compulsory during matches for rugby players at under 19 age level at the beginning of the 1997 season, and for all grades of domestic rugby at the beginning of the 1998 season. Greater powers of enforcement were provided to referees at the beginning of the 2003 season.

The self- reported rate of mouthguard use was 67% of player-weeks in 1993 and 93% in 2003. A total of 2644 claims were reported in 1995. There was a 43% (90% confidence interval 39% - 46%) reduction in dental claims from 1995 to 2003. On the reasonable assumption that the number of player-matches remained constant throughout the study period, the relative risk of claims for non-wearers was 4.6 (90% confidence interval 3.8 - 5.6) times that of wearers. The cumulative savings in claim costs compared with the cost per year if claim numbers had remained constant from 1995 is 1.87 million New Zealand Dollars (NZD). Although ecological studies have acknowledged weaknesses the findings provide evidence that mouthguard use is a simple and effective injury prevention strategy for rugby players. The use of mouthguards for all players in both match and contact situations was strongly recommended.

Chatterjee and Hilton (2007) assessed the knowledge of professional rugby players with regard to the benefits of wearing a mouthguard and the importance they put upon it for playing the game. They then compared the view point of parents and children who were starting to play rugby at a club in close proximity to the professional club.

A questionnaire and covering letter was sent to the parents of children aged from under 7 - 8 years and upwards and a similar questionnaire and letter to the professional first team squad of the ñZurich Premiershipò rugby union club. The questionnaire had a series of questions relating to use of mouthguards and their importance in preventing injuries.

There was an overall response rate of 76%. Seventy four of the 100 sent to parents and 25 of the 30 sent to professional players were completed and returned. Both the professional players and parents thought mouthguards were essential when playing rugby but the professionals seemed to have a greater understanding of the benefits of wearing a mouthguard. Parents did think that children should begin to wear mouthguards as soon possible, although very few actually did wear a mouthguard. This was partly due to financial reasons as well as difficulties in taking the child to the dentist.

If the results from this small study are representative of the current national situation with regard to wearing or non- wearing of a mouthguard both by professionals and children then there is a need to ensure that rugby playing children all wear a mouthguard. Rugby clubs should consider appointing an honorary dental adviser and devise systems to ensure that cost is not a factor in preventing children from wearing mouthguards.

Chalmers et al., (2004) reported the results of a national 5 year rugby injury prevention programme in New Zealand which commenced in 1995. The programme had been set up to address the high incidence of injuries sustained in rugby and was known as ñTackling Rugby Injuryò. It was concluded that it was important to base injury prevention strategies on scientific evidence rather than on popular belief and in addition it was also important to have a formal agreement between partners in the implementation of the program. The central role of coaches in promoting injury prevention strategies was highlighted, as well as their role in monitoring injury outcomes and changes in knowledge, attitudes and behaviour.

In the research undertaken during the second half of the Scottish schools rugby season 2008-09, Nicol et al., (2011) confirmed that a community-based rugby injury surveillance system in Scottish schools is both feasible and should be strongly encouraged. The current injury surveillance system was not picking up injuries when a player attending an Accident and Emergency (A&E) unit due to an injury was not admitted. Information is recorded by the Information Services Division of NHS Scotland, only if there is an admission to hospital.

They also used data champions at each of five Scottish schools to record injuries during matches. An injury was defined as in accordance with the International Rugby Board (IRB) Consensus statement as ñAn injury occurring during rugby, training or playing, that results in a player being unable to take a full part in future rugby training or match playò.

With regard to protective equipment, the authors indicated that if the evidence is

available, perhaps the wearing of mouthguards should become mandatory for all rugby players in schools.

This literature review has shown that despite the clear benefits of the use of some form of mouth protection for the contact sport of rugby there is great variability in the uptake of this simple protective measure. It was also suggested in the research that coaches players and parents felt that a mandatory wearing of mouthguards for training sessions and on match days would be beneficial.

1.3 Aim of Study.

The aim of this study was to determine:

- The policies of individual Scottish Rugby Union clubs regarding the use of mouth protectors by their Junior players when attending training sessions and playing on match days.

- The availability of medical, dental, and first aiders (health professional personnel) at Junior player training sessions and during match day games.

Chapter 2

2.1 Materials and Method.

2.1.1 Study design.

The prospective study was to evaluate the policies and advice provided by Scottish Rugby Union (SRU) affiliated clubs where Junior players were members and the provision of medical, dental and first aiders (Health Professionals) at either or both training and match days.

2.2.2 Sample Selection.

The Scottish Rugby Union offices provided a file containing the affiliated clubs and their contact address. Within this file there was no data indicating those clubs supporting a junior rugby section. However, from comments from clubs after the first batch of contact and additional assistance from the SRU on receipt of their recent SRU club handbook which provided current telephone contact details, the sample of affiliated clubs with junior players was identified.

2.2.3 Materials.

1. A self- reporting questionnaire (Figure 2.1) was used for this research. The initial part of the questionnaire included an administrative section followed by 37 individual questions. Twenty nine of the questions required Yes/ No/ Donôt know (Y/N/D) responses and the remaining 8 invited comments or further clarification. The questionnaire was designed

such that, the response time should be no more than ten minutes. Replies from the individual clubs remained the confidential property of the research investigator. It had been reviewed and amended upon discussion with three main interested parties namely:

- Dr Andrea Sheriff, the statistician at Glasgow Dental Hospital & School, University of Glasgow.
- Dr James Robson, the Head of Medicine Services, Scottish Rugby, Murrayfield, Edinburgh.
- Professor Richard Welbury, Chair of Paediatric Dentistry, Glasgow Dental Hospital & School, University of Glasgow.

2. A letter from the researcher, Mr Mike Broad and Professor Richard Welbury providing an explanation regarding the research (Appendix 2).
3. A Scottish Rugby (SRU) letter of support from Dr James Robson (Appendix 1).
4. A database of club contact details provided by the Scottish Rugby (SRU).
5. SRU club manual

2.2.4 Method.

The questionnaire, the letter of explanation of the research by Mr Mike Broad and Professor Richard Welbury, and the letter of support from Dr James Robson with his personal encouragement for each affiliated club to participate in this questionnaire, was enclosed with a stamped addressed reply envelope and sent to each affiliated Scottish Rugby Union Club by Royal Mail. The size and weight of

the postage was determined by the post office to enable the appropriate stamp to go on the outward and returning envelopes.

Each club was given a code number for identification. Each page of the questionnaire was coded and numbered appropriately. Additionally the return envelopes were stamped with the appropriate study code for each club address for identification purposes.

A closing response deadline date was identified. For the non-responders a second batch of letters from the aforementioned correspondence, which included an amended letter by the researcher, Mr Mike Broad and Professor Richard Welbury (Appendix 3) and Dr James Robson, was sent out by Royal Mail.

Again a closing response deadline was identified for the second batch. The non-responders from the second wave were contacted by phone by the researcher, on the advice of the statistician. This was now possible resulting from the provision of the recent SRU club manual providing telephone contact details in addition to the addresses.

2.2.5 Data Collection.

The responses of the questionnaire from the clubs were tabulated on a database using Microsoft Excel and collated. The database was amended to identify and analyse the responses of those clubs supporting junior clubs only.

2.2.6 Statistical Analysis.

The results are presented by descriptive statistics and will subsequently be shared with the Scottish Rugby Union (SRU).

Figure 2.1 Questionnaire.

Mouth Protectors in Junior Scottish Rugby

Name of club: é é é é é é é é é é é é é é é .

Address of club: é é é é é é é é é é é é é é é .

Post code é é é é é é é

Club secretary: é é é é é é é é é é é é é é é .

Telephone : é é é é é é é é é é é é é .....

Email address: é é é é é é é é é é é é é é .....

Web address: é é é é é é é é é é é é é é ..

Key to the three boxes:

Y = Yes, N = No, D = Donôt know

Please tick the appropriate box for each question.

Training age groups: (mini, midi, senior)

under 12:	Y		N		D		
under 14:	Y		N		D		
under 18:	Y		N		D		
18-21:	Y		N		D		

If your Junior training age groups are different please state:

é é ..é .

é é

é é

Playing age groups:(mini, midi, senior)

under 12:	Y		N		D		
under 14:	Y		N		D		
under 18:	Y		N		D		
under 20-21:	Y		N		D		

If your Junior playing age groups are different please state:

é .

é .....

é .....

At what age does tackling commence at your club? é é é é é

Does your club have a policy/advise on mouth protectors for players?

Y ☐ N ☐ D ☐

If there is a policy/advise please attach or state: é é é é é é é é

é .

é .

Does your club advocate shop mouth protectors (boil and bite)?

Y ☐ N ☐ D ☐

Does your club advocate custom made mouth protectors (by Dentist)?

Y ☐ N ☐ D ☐

Is advice given by your club regarding renewal of mouth protectors?

Y ☐ N ☐ D ☐

Does your club arrange a dentist to provide mouth protectors?

Y ☐ N ☐ D ☐

Is a mouth protector advised for training?

Y ☐ N ☐ D ☐

Is a mouth protector advised for playing

Y ☐ N ☐ D ☐

Is there exclusion from training without a mouth protector?

Y ☐ N ☐ D ☐

Is there exclusion from playing without a mouth protector?

Y ☐ N ☐ D ☐

Do you recall any injuries to the mouth and teeth when a mouth protector has not been worn in the last 5 years?

Y ☐ N ☐ D ☐

If so, what sort of injuries:

é ..

é .

é .

Do you recall any injuries to the mouth and teeth when a mouth protector has been worn in the last 5 years?

Y ☐ N ☐ D ☐

If so, what sort of injuries:

é é

é é

é ...

Are there any other comments you wish to make regarding mouth protectors?

é ..

é ..

é ..

Is a dentist present on match days?	Y		N		D		
Is a dentist ñon-callò on match days?	Y		N		D		
Is a doctor present on match days?	Y		N		D		
Is a doctor ñon-callò on match days?	Y		N		D		
Is a first aider in attendance on match days?	Y		N		D		
Is a dentist present on training days?	Y		N		D		
Is a dentist ñon-callò on training days?	Y		N		D		
Is a doctor present on training days?	Y		N		D		
Is a doctor ñon-callò on training days?	Y		N		D		
Is a first aider in attendance on training days?	Y		N		D		

Are there any other comments you wish to make regarding this questionnaire or mouth protectors in Junior Rugby?

é é

é .é é é é

é é

é ....

Thank you for your co-operation in completing this questionnaire.

Chapter 3

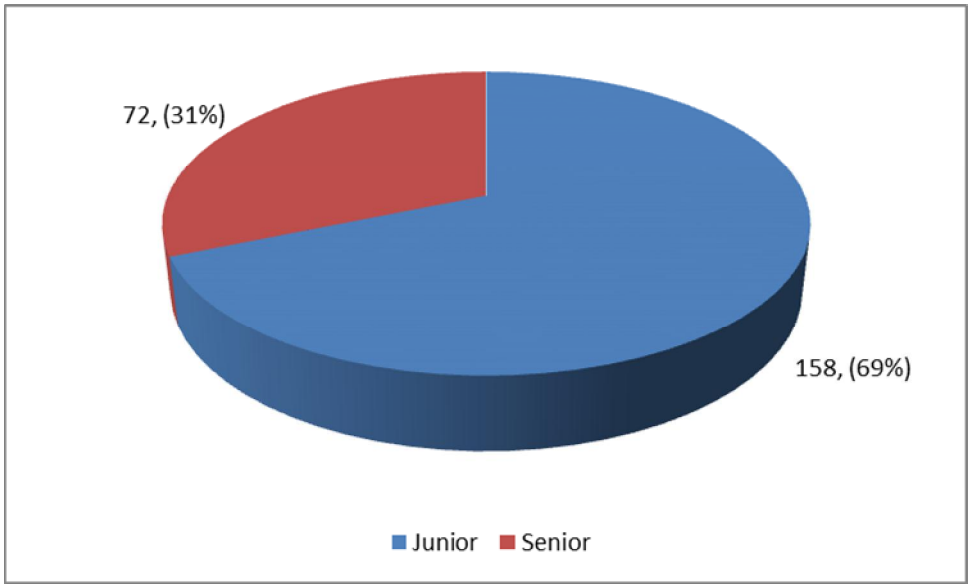
3.1 Results.

3.1.1 Number of rugby clubs.

The total number of SRU affiliated rugby clubs is 230. Through elimination of those with only senior players (n=72), the number of affiliated clubs with junior players was 158, which represents 69% of the total of affiliated SRU clubs.

The initial response from clubs is shown in Table 3.1.

Fig 3.1 SRU affiliated clubs with Senior only and those with a Junior section.



3.1.2 Responses from clubs

The response results from the 158 clubs supporting Junior players after two postal and one telephone round of data collections was 74% (117).

Table 3.1 Initial responses from clubs.

Response	**Number** **n=158**	**Percentage** **%**
First round by postal contact	55	34
Second round by postal contact	20	13
Contact by phone	42	27
void	41	26

Further investigation revealed the exact reasons for the number of voids: 34 failed to respond by either post or phone; six clubs were not in the SRU handbook; and one club was no longer at the address provided. Therefore, seven clubs were unable to be contacted by either post or phone. This brought the resultant total number of clubs able to be contacted to 151. Thus the final response rate was 77% (117) of the 151 affiliated rugby clubs with junior players. The final responses of those clubs are shown in Table 3.2

Table 3.2 Final responses from clubs.

Response	**Number** **n=151**	**Percentage** **%**
First round by postal contact	55	36
Second round by postal contact	20	13
Contact by phone	42	28
void	34	23

3.1.3 Responses to individual questions asked in Questionnaire.

3.1.3.1 Training age groups within the respondents.

The number of training age groups identified by the respondents is shown in Table 3.3

Table 3.3 Training age groups.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing Data** **n (%)**
Under 12	105 (89.7%)	10 (8.5%)	0 (0%)	2 (1.7%)
Under 14	99 (84.6%)	16 (13.7%)	0 (0%)	2 1.7%)
Under 18	101 (86.3%)	14 (11.9%)	0 (0%)	2 (1.7%)
18-21	41 (35%)	74 (63.2%)	0 (0%)	2 (1.7%)

3.1.3.2 Playing age groups within the respondents.

The number of playing age groups identified by the respondents is shown in Table 3.4.

Table 3.4 Playing age groups.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing Data** **n (%)**
Under 12	104 (88.9%)	11 (9.4%)	0 (0%)	2 (1.7%)
Under 14	100 (85.5%)	15 (12.8)	0 (0%)	2 (1.7%)
Under 18	97 (82.9%)	18 (15.4%)	0 (0%)	2 (1.7%)
18-21	34 (29%)	81 (69.2%)	0 (0%)	2 (1.7%)

3.1.3.3 What age does tackling commence at your club?

The age of commencement of tackling identified by the respondents is shown in Table 3.5.

Table 3.5 Commencement of tackling.

Age (years)	**5** **n(%)**	**7** **n(%)**	**8** **n(%)**	**9** **n(%)**	**10** **n(%)**	**12** **n(%)**	**14** **n(%)**	**15** **n(%)**	**18** **n(%)**	**Missing data** **n(%)**
Number of Respondents (n=117)	1 (0.9%)	5 (4.3%)	88 (75%)	5 (4.3%)	5 (4.3%)	4 (3.4%)	3 (2.6%)	2 (1.7%)	1 (0.9%)	3 (2.6%)

75% of respondents reported that the most common age to commence tackling was 8 years of age.

3.1.3.4 Does your club have a policy/advice on mouth protectors for players?

The responses from the clubs regarding policies / advice on mouth protectors is shown in Table 3.6.

Table 3.6 Club policy / advice on mouth protectors.

	Yes **n(%)**	**No** **n(%)**	**Don't Know** **n(%)**	**Missing data** **n(%)**
Number of respondents (n=117)	91 (77.7%)	21 (17.9%)	3 (2.5%)	2 (1.7%)

3.1.3.5 Does your club advocate shop bought mouth protectors (boil and bite)?

The responses with regard to club policy about advocating shop bought mouth protectors is shown in Table 3.7.

Table 3.7 Shop bought mouth protectors.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	81 (69.2%)	29 (24.8%)	3 (2.6%)	4 (3.4%)

3.1.3.6 Does you club advocate custom made mouth protectors (by Dentist)?

The responses with regard to club policy about advocating custom made mouth protectors is shown in Table 3.8

Table 3.8 Custom made mouth protectors.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	47 (40.2%)	63 (53.8%)	4 (3.4%)	3 (2.6%)

3.1.3.7 Is advice given by your club regarding renewal of mouth protectors?

The responses regarding club policy concerning renewal of mouth protectors is shown in Table 3.9

Table 3.9 Renewal of mouth protectors.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	14 (12%)	97 (83%)	4 (3.4%)	1 (0.9%)

3.1.3.8 Does your club arrange a dentist to provide mouth protectors?

The responses regarding club provision of a dentist to provide mouth protectors is shown in Table 3.10.

Table 3.10 Club provision of a dentist to provide mouth protectors.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	7 (5.9%)	105 (89.7%)	2 (1.7%)	3 (2.6%)

3.1.3.9 Is a mouth protector advised for training?

The responses regarding whether club policy is to advise mouth protectors for training is shown in Table 3.11.

Table 3.11 Mouth protectors for training.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	106 (90.6%)	8 (6.8%)	1 (0.9%)	2 (1.7%)

3.1.3.10 Is a mouth protector advised for playing?

The responses regarding whether club policy is to advise mouth protectors for playing is shown in Table 3.12

Table 3.12 Mouth protectors for playing.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	112 (95.7%)	2 (1.7%)	0 (0%)	3 (2.6%)

3.1.3.11 Is there exclusion from training without a mouth protector?

The responses regarding whether there is exclusion from training without a mouth protector is shown in Table 3.13.

Table 3.13 Exclusion from training.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	13 (11.1%)	100 (85.5%)	2 (1.7%)	2 (1.7%)

3.1.3.12 Is there exclusion from playing without a mouth protector?

The responses regarding whether there is exclusion from playing without a mouth protector is shown in Table 3.14.

Table 3.14 Exclusion from playing.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	20 (17.1%)	94 (80.3%)	2 (1.7%)	1 (0.9%)

3.1.3.13 Do you recall any injuries to the mouth and teeth when a mouth protector has not been worn in the last 5 years?

The responses regarding recall of injuries to mouth and teeth when a mouth protector was not worn is shown in Table 3.15.

Table 3.15 Recall of injuries without mouth protection.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	17 14.5%	89 76%	10 8.5%	1 0.9%

3.1.3.14 Do you recall any injuries to the mouth and teeth when a mouth protector has been worn in the last 5 years?

The responses regarding recall of injuries to mouth and teeth when a mouth protector was worn is shown in Table 3.16.

Table 3.16 Recall of injuries with a mouth protector.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Number of respondents (n=117)	6 5%	103 88%	8 7%	0 0%

3.1.3.15 Types of injuries to mouth and teeth in the past five years.

The responses regarding recall of injuries to mouth and teeth in the last five years, both with and without mouth protectors is shown in Table 3.17. overleaf.

Table 3.17 Recall of injuries to mouth and teeth.

Types of injuries	**Wearing a mouth protector n (%)**	**Not wearing a mouth protector n (%)**
Fractured tooth	0 (0%)	3 (14%)
Avulsion of tooth	1 (4.5%)	1 (4.5%)
Loosened teeth	0 (0%)	3 (14%)
fractured and loosened teeth	0 (0%)	4 (18%)
Fractured maxilla	0 (0%)	0 (0%)
Fractured mandible	1 (4.5%)	0 (0%)
Soft tissue injury	1 (4.5%)	5 (23%)
Concussion	1 (4.5%)	0 (0%)
Near inhalation	1 (4.5%)	0 (0%)
Injury not specified	1 (4.5%)	0 (0%)
Total n= 22 (100%)	6/22 (27.3%)	16/22 (72.7%)

3.1.3.16 Presence of health professionals on match days.

Responses regarding presence of health professionals on match days is shown in Table 3.18.

Table 3.18 Presence of health professionals on match days.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Dentist present	2 (1.7%)	113 (96.5)	1 (0.9%)	1 (0.9%)
Dentist "on call"	0 (0%)	113 (96.5%)	2 (1.7%)	2 (1.7%)
Doctor present	23 (19.6%)	91 (77.7%)	0 (0%)	3 (2.5%)
Doctor "on call"	32 (27.3%)	80 (68.3%)	1 (0.9%)	4 (3.4%)
First aider present	111 (94.8%)	4 (3.4%)	0 (0%)	2 (1.9%)

3.1.3.17 Presence of health professionals on training days.

Responses regarding the presence of health professionals on training days is shown in Table 3.19.

Table 3.19 Presence of health professionals on training days.

	Yes **n (%)**	**No** **n (%)**	**Don't Know** **n (%)**	**Missing data** **n (%)**
Dentist present	1 (0.9%)	115 (98.2%)	1 (0.9%)	0 (0%)
Dentist "on call"	0 (0%)	115 (98.2%)	2 (1.7%)	0 (0%)
Doctor present	4 (3.4%)	111 (94.8%)	1 (0.9%)	1 (0.9%)
Doctor "on call"	11 (9.4%)	103 (88%)	3 (2.5%)	0 (0%)
First aider present	101 (86.3%)	12 (10.2%)	1 (0.9%)	3 (2.5%)

3.1.3.18 Are there any other comments you wish to make regarding this questionnaire or mouth protectors in Junior Rugby?

Responses received regarding the comments relating to the questionnaire and mouth protectors in Junior rugby are shown in Table 3.20.

Table 3.20 Further comments on questionnaire.

Some poster material from SRU or elsewhere illustrating importance of m/p would be useful
Wish feedback to questionnaire
GMP present on match days for senior team only
GMP present at all home games

3.1.3.19 Are there any other comments you wish to make regarding club policies / advice on mouth protectors.

Of the respondents, n=90 (60%), provided comments on club policy /advice. Four (3.4%) indicated that they had no policy or advice. The comments have been split into themes for easier reading.

Table 3.21a ï Mandatory.

Table 3.21b ï Club encouragement.

Table 3.21c ï Parent assistance.

Table 3.21d ï Cost implications.

Table 3.21e ï Requesting further information.

Table 3.21f - No policy/advice reported by clubs in questionnaire.

These tables are shown below and subsequent pages..

Table 3.21a Mandatory, (comments 1-21).

1. On policy: welcome pack indicates m/p must be worn
2. Our club policy is that to participate at rugby at junior level then m/p must be used
3. At all times
4. Told to wear one when contact training and playing
5. Must wear one
6. Must wear when ball training and playing
7. Must wear one when ball training. Boil and bite advocated due to cost
8. Should always wear one
9. Essential boots + m/p
10. "play with tackles"
11. Should wear all the time, hard to get
12. Must wear when tackling at training and again on match day
13. Should wear when ball tackling work
14. Must wear at all times, told at start of training session
15. Must be worn at all times for all ages
16. All players should wear one. Important to become accustomed to wearing m/p early on
17. Must be worn for matches, should be worn for training. Dentist made preferred
18. Must wear one, instructed at beginning of season when first time up for training session
19. All age groups should wear them
20. Wearing m/p should be compulsory
21. For playing

Table 3.21b Club encouragement (comments 1-45).

1. Club is supportive and encourages players to wear them. Club advise m/p but type up to individual
2. Should wear one, not enforced
3. Our club has just started and we "verbally" say to parents to get their kids a gum shield
4. Cannot enforce but encourage to wear
5. Discussed at training
6. Recommended
7. Recommended
8. Recommended
9. Youngsters advised to wear m/p
10. Should wear one for playing
11. Recommended for playing. Hope worn at all times, contact training and playing
12. Encourage wearing mp but do not enforce "ruling
13. Advise to wear at all contact times training and wearing
14. All mini coaches are asked to encourage players to wear m/p
15. Advised to wear when both playing and training
16. Some children find wearing m/pôs difficult, m/ps more commonly used from S1 and up
17. Advise all players but not compulsory
18. Should be told at start of season
19. Gum shields advised for players over 8 years of age All players to have m/ps both training and playing. Can't play without one. Dentist's ones are expensive See earlier comment on policy-M/p must be worn. On form nil comment at this Q
20. Told at start of training each year
21. Can't enforce just recommend
22. All players are encouraged to get fitted
23. Advice only not compulsory, who would do it if compulsory regarding cost
24. Advise through coaches and newsletters
25. Can't enforce, good if we could, but who picks up the cost
26. Advice is all we can do
27. Actively encourage m/p wear
28. Ideally custom made but some can only afford boil+bite m/p
29. Not a requirement, more a request or recommendation, we buy in bulk B+B
30. Advise all players to wear them. Change as the players are growing
31. Encourage players to wear m/p
32. Should wear one can't enforce a player or parent just advise
33. Tackling at age 5 very rudimentary ie using tackle bags
34. First time they join the club and beginning of new session
35. Advises but does not advocate type of m/p up to the individual
36. Organiser of the mini rugby is a GMP, strongly advises m/p but not compulsory
37. On policy all players advised on M/p on registration. On m/p wish recommendation on good boil+ bite
38. On policy m/p given out on registration.
39. Under 12 yrs coach is full time dentist. On policy: juniors welcome states m/p are essential
40. Nil serious mouth injuries in past 20 yrs. All players do wear some sort of m/p.

Their own preference
41. Main reason our juniors don't wear m/pôs- mouth changing so quickly, either can't afford or can't be bothered going to dentist so often. Boil and bite are generally rubbish
42. Have on call physiotherapist who specialises in rugby type injuries and rehab on call = training +playing
43. Coaches promote their wear, assist in fitting and suggest going to a dentist
44. Recommend head gear, shoulder pads, shin pads but priority given to m/p
45. Last year local dentist sponsored m/pôs for 12-18 age groups, 60 took up offer at £10 each

Table 3.21c Parent assistance (comments 1-8).

1. Advice given to parents and players as to their importance
2. Advise use but leave responsibility with parents
3. Should wear one can't enforce a player or parent just advise
4. We recommend then it is up to parents
5. Should wear one on practise games and on match day, parents responsibility
6. Under 12 yrs coach is full time dentist. On policy: juniors welcome states m/p are essential
7. Players are encouraged and expected to provide themselves
8. Parents should be made aware of benefits of m/p wearing

Table 3.21d Cost implications (comments 1-13).

1. Recommendation, due to cost
2. Recommended, boil and bite due to cost custom once older
3. Should wear one. m/p made by dentists too expensive
4. Must wear one when ball training. Boil and bite advocated due to cost
5. Players dislike boil+bite, custom made expensive and short lived
6. Parents prefer boil+bite as cheaper because of frequent renewal requirement
7. Advice only not compulsory, who would do it if compulsory regarding cost
8. Can't enforce, good if we could, but who picks up the cost All players to have m/ps both training and playing. Can't play without one. Dentist's ones are expensive
9. Ideally custom made but some can only afford boil+bite m/p
10. Increase awareness of benefits of wearing m/p, but problem is the expense of custom made m/p
11. We have to accept boil in bite because of the cost of the dentist fitted type £50-60 It is a lot when often mouth and teeth change so quickly- have known a child to have 2 in one season
12. U15s are ok for boil and bite cost of dentists ones prohibitive
13. Recommend head gear, shoulder pads, shin pads but priority given to m/p

Table 3.21e Requesting information from research (comments 1-21).

1. Is there a good boil+bite M/p because we have not sourced one yet?
2. M/p should be better fitting
3. Leaflet for comments
4. Good to hear end result. Who pays for end result
5. Young players experience breathing difficulties seeking advice
6. On policy all players advised on M/p on registration. On M/p wish recommendation on good boil+ bite
7. General advice once data collated
8. Support this development of policy and advice.
9. Would like to see all players wearing m/p and would support this rule
10. Nil serious mouth injuries in past 20 yrs. All players do wear some sort of m/p. Their own preference
11. We would support compulsory gumshields
12. About time m/p made compulsory and players excluded from play if not wearing
13. Welcome advice on safety
14. Regard this area of protection very important and seek information
15. Main reason our juniors don't wear m/ps- mouth changing so quickly, either can't afford or can't be bothered going to dentist so often. Boil and bite are generally rubbish
16. Club will support any policy requiring m/p
17. Wearing m/p should be compulsory
18. Should be made compulsory
19. Recommend head gear, shoulder pads, shin pads but priority given to m/p
20. Requesting information and feedback
21. Frequency of needing a new one is expensive. Can we provide information to assist players

Table 3.21f No policy/advice reported by clubs in questionnaire.

Nil reported by four

3.2 Summary of Results.

- The response rate of 151 affiliated rugby clubs with Junior players was 77% (117).
- 75% (88) of respondents reported that the most common age to commence tackling was 8 years of age.
- 77.7% (91) of the 117 respondents had a club policy / advice on mouth protectors.
- Responding clubs recommended mouth protectors for both training (90.6%) and playing (95.7%).
- 69.2% (81) were shop bought mouth protectors.
- 83% (97) of clubs allowed players to participate on match day when not wearing any mouth protection.
- 89% (104) of clubs allowed players to participate in training sessions when not wearing a mouth protector.
- Present on match day:
    - First Aider 94.8% (111), Doctor 19.6% (23), Dentist 1.7% (2); ñOn callò on match days Doctor 27.3% (32), Dentist 0%.
- Present on training sessions:
    - First Aider 86.3% (101), Doctor 3.4% (4), Dentist 0.9% (1); ñOn callò on training days, Doctor 9.4% (11), Dentist 0%.

Chapter 4

4.1 Discussion.

The literature has shown that over the years there have been a number of research studies undertaken on mouth protection in rugby using questionnaire based studies, for both senior players and internationals, and junior players. The studies ranging from as early as Hawke and Nicholas (1969) to the more recent studies of Jagger et al.,(2010) and Nicol et al., (2011). The use of questionnaires in this arena of research is therefore well established.

The vast majority of studies have provided information and recommendations to support the wearing of mouth protectors for senior players (Chapman 1985a, 1985b, 1985c, 1989, 1990, 1993) and to strongly endorse the use of mouth protectors by junior players as soon as an individual takes up the sport (Chatterjee and Hilton 2007; Blignaut et al., 1987).

The use of a mouth protector from the earliest days of participation in rugby is therefore universally accepted and highly recommended. Indeed, it has been suggested that, the greater familiarity of wearing a mouth protector for both training and playing will lead to better protection for primary (first) teeth and subsequent secondary (permanent) teeth (de Wet, et al., 1981).

The contact sport of rugby is very popular within Scotland with individuals participating in training at least from a very early age. Despite the clear guidance that the use of mouth protectors is recommended to protect the oral soft tissues

and the teeth from injury during contact sports such as, rugby, their frequency of use within the UK is variable.

The results of this study could then provide further information and guidance for the Scottish Government and the Scottish Rugby Union and help inform health policies. Similar to previous studies, this study was also questionnaire based. One hundred and fifty one Scottish Rugby Union affiliated clubs with junior players and sections were included.

It was pleasing to note that club secretaries had no negative comments with the design of the questionnaire and reported no ambiguity with the questions. Unfortunately the wrong costing was provided by the post office service and the first batch of one hundred with their stamped reply envelope were sent from the post office before this was known. The error was only picked up when the second batch of eighty envelopes were taken to the post office counter and additional stamps had to be applied before posting. The third and final batch was corrected before posting and dispatched accordingly. This resulted in the first batch either not being delivered or a note being put through the recipients door inviting them to go to the collecting office to collect and pay the difference or the post office. There was no way of knowing unless a rugby club indicated on their reply that they had had to pay an additional cost to receive the questionnaire. This issue resulted in a very small return from the first batch sent by the time the deadline had passed, and it was decided to repeat the first batch of 100 with the correct postage on the delivering and replying envelopes. The Post Office Counters

Service agreed to pay for this second batch as they admitted that the researcher had been misinformed about the correct postage for this first batch.

The closing deadline for replies provided information regarding which clubs had replied to the questionnaire and which clubs had not. There was a response of 34% to the first batch of the questionnaire which went to all affiliated clubs on the SRU database. The returns also gave us an understanding with regard to which clubs had players in the ñJuniorò age range that we were specifically enquiring about. As a result the second batch of postal questionnaires with stamped and addressed envelopes for reply along with the letter of support from Dr James Robson and an amended letter from Mr Mike Broad and Professor Richard Welbury encouraging individual clubs to participate.

As previously mentioned, the questionnaire was followed up by telephone interviews for non-responders in order to improve the response rate. Other investigators have used comparable methods with initial postal questionnaires being followed by ótop upô telephone contact (Kay et al., 1990). The response in the latter study was 64% which compared very favourably with the 77% response rate in this study.

A total of 230 rugby union clubs were included in the initial data base received from the Scottish Rugby Union (SRU) but it was unclear how many of them had Junior Sections as this more detailed information was not held by the SRU. Indeed, on receiving initial mail shot responses it became clear that a number of

affiliated clubs did not have junior members. The final corrected database of SRU clubs with Junior sections was 151.

In addition to answering the questionnaire, some clubs expressed their best wishes and felt there was a definite need for greater understanding and information regarding the use of mouth protectors. (See table 6.20 for further breakdown of comments on this questionnaire). Unfortunately there were no responses from 23% of the clubs. Possible reasons for this were: failure to complete óyet another questionnaireô, lack of interest in the study, or possibly not being willing to disclose information from their club.

Training in skills and fitness is an important aspect of rugby, as highlighted by Williams (2002). Players have to be taught the correct skills so they can function properly and safely, as either a back or a forward. In addition, they have to know how to tackle correctly. Skills training serves to minimise injuries both to themselves and their opponents. Physical fitness in any contact sport and certainly a contact sport like rugby is essential to minimise damage to the individual. Training, as in playing in junior rugby, should be conducted within appropriate age groups because children grow quickly and 2 or 3 years can make considerable difference to body mass. Younger children should not be compromised by training and playing with other children who are considerably heavier and larger. This is a critical consideration for all coaches in junior contact sports.

The vast majority of clubs (89.7%) had under 12ôs training at their club. Similarly 84.6% and 86.3% had under 14ôs and 18ôs respectively. However, the 18- 21 age

group were less likely to be kept as a separate age group, with only 41% of clubs facilitating this. In 57.3% of clubs the 18-21 age group were absorbed into senior training sessions. The majority of clubs were involving players aged 18 and upwards in senior training sessions. Two clubs (1.7%) did not respond to this question and no club offered any alternative training age groups when they were invited to do so.

It was difficult to ascertain (from the other published reports) any further information about ages in training at clubs. Most research either used ñsenior teamsò Chapman (1988), or ñschool teamsò (de Wet et al., 1981). Where there was a comparison between senior players and junior players in one club (Jennings 1990), all age ranges responded positively with 4 out of 5 indicating a desire to wear a mouth protector in training.

Playing age groups in clubs was comparable to training age groups with 88.9% having an under 12 playing age group. Some 85.5% of clubs had a 12-14 playing age group and there was a slight decrease in the under 18ôs compared to training with only 82.9% offering a team for this age group. Interestingly, the under 21ôs playing group decreased significantly, with only 29% of clubs offering a team at this age group. The majority of clubs had this age group of over 18ôs participating in their senior teams.

Two clubs did not respond (1.7%). They were the same clubs who left the training response blank. A few clubs did state in the response section that their club used the over 18ôs to play in their senior second or third teams. Chatterjee and Hilton (2007) reported a comparison between training and playing issues involving a professional team in the Zurich Premiership and a neighbouring local team where

players were just starting to play rugby union at ages 7- 8. Both the senior players and the parents of the junior players (with a response rate of 76%) thought it was essential for mouth protectors to be worn. With the professional senior players having a greater understanding of the benefits of wearing a mouth protector, and with the parents thinking that a mouth protector should be worn ñas soon as possibleò this would enhance the desire for these younger players to participate in wearing a mouth protector. However, no previous questionnaires have asked for as much detail as in this study.

Tackling is an integral part of rugby and as previously mentioned the correct skills should be taught at an early age. It is an area of legitimate physical contact between players under the rules of the game and all legislators and clubs should work to ensure that tackling occurs under the correct conditions for all junior players. Size and weight variations among the growing child have already been highlighted as potential danger areas so it is important that children learn to tackle correctly and learn to tackle within their correct age groups.

Eight years of age was the commonest age for most clubs (75%) to commence tackling. Six clubs (5.2%) have tackling commencing below this age and one club indicated that they started tackling at the age of five.

Eight is also the age where the eight permanent incisor teeth will normally have erupted or be erupting and their roots are as yet, not fully grown. If they are unprotected, then these teeth will be very vulnerable to trauma. In addition at this time, the first permanent molar upper and lower teeth in each quadrant should have erupted behind the primary molars. The remaining permanent dentition,

excluding the third molars will usually have erupted by 14 years of age and the third molars, if they are present and not impacted, by 20 years of age.

By 8 years of age, there are enough erupted posterior and anterior permanent teeth to enable construction of a retentive mouth protector. Before this time the crown height of primary teeth and the mobility of exfoliating primary teeth make construction of a retentive mouth protector very difficult. Permanent teeth that have erupted at eight years of age have to be protected from trauma as they need to last for 60-70 years.

Protection of the mouth and teeth is especially important in the period when players are being introduced and learning the skills required to play the game of rugby. Holmes (2000) recommended that mouthguards should be worn and indeed that custom made ones were superior. However, there was a cost implication because mouthguards were not covered by an NHS fee nor were children exempt from charges. Holmes (2000) thought it was possible that mouthguards were not being encouraged either by the profession or by parent/guardians because of cost implications. The afore mentioned author recommended that rugby clubs should have an honorary dentist who would ensure that the most appropriate mouthguard for the level of play was constructed. Chattergee and Hilton (2007) thought that clubs should consider a dental adviser for their club and to devise a system to ensure that cost is not a factor in preventing children from wearing mouth protection. Foster and March (1999), in a campaign to encourage greater awareness and wearing of mouthguards, used a programme of workshops with clubs to deliver the message to targeted audiences. This proved very effective

with a resultant substantial increase in the wearing of a mouthguards by players both for training and playing.

The literature has shown that injury is common in contact sports such as rugby. Of the many studies, Chapman (1985c) reported that the most common teeth sustaining injuries were the maxillary central and lateral incisors. They had an 83% greater reportage than any other tooth, and the central incisors were reported as sustaining four times more injuries than the laterals. Similarly a review of the previous 12 years of literature for Traumatic Dental Injuries (TDI) by Glendor (2008) found that upper centrals and laterals were the most likely teeth to be involved and this increased with participation in sport. Wright et al., (2007) indicated that falls (49%) produced the highest number of TDI, and sports were the second commonest cause (18%) especially in boys aged 8 to 15. The review undertaken by Newsome et al., (2001) highlighted that sports injuries reportedly accounted for 10-39% of all dental injuries, more so in boys and especially between the ages of 8 and 11. Therefore the need for an upper mouth protector becomes more and more apparent, and especially at the age that tackling commences at all clubs.

Most clubs (77.7%) advised that they had a policy or advised on mouth protectors for players but stated that they also invited parents to decide on what type to wear and when to wear.

Disappointingly only one club enclosed their club policy leaflet for the wearing of mouth protectors (see Figure 4.1 overleaf).

Figure 4.1 The West of Scotland leaflet.

W. S. F. C.

1865

WELCOME TO WEST OF SCOTLAND FC

Junior section

If it's rugby.....it's West!

At West, we aim to help young boys and girls develop their sporting and social potential as individuals and team members. We encourage youngsters to play for fun and we want to nurture their natural enthusiasm; rugby is all about enjoyment! Competition is an important part of life but we measure success in terms of all-round development, not just the number of medals won. We will always try to set realistic targets, as honest effort is just as important as winning. Our three key aims for Junior Rugby are ***participation, development*** *and* ***enjoyment*** *for all.*

KIT

The West jersey (red & yellow), blue shorts and red socks can all be bought at the club

Price lists are available from Mrs Morag Harley who is in charge of kit and is regularly present on Sundays.

Gum shields are mandatory for contact sessions and games. These can also be bought from Morag or supplied and fitted by your own dentist.

Body armour such as shoulder pads are actively discouraged, with the exception of head guards and medically approved padding. Head guards must conform to regulation standard & colour.

Most players wear football boots. Boots with blades are not encouraged & can only be worn if the blades are moulded (ie they cannot be replaced). Nylon football studs should be replaced with kite-marked aluminium rugby studs, sold by the club and sports shops.

Midi players will be expected to wear a Club tie with a white shirt on Match days.

NB please ensure that all boots and clothing are labelled.

WEBSITE

We send out newsletters from time to time, but you can find most information on the Club website.

The address is **www.westofscotlandfc.co.uk**

Once on the site, press *Junior section*. For details of training/ game times, go to the particular day in the *Fixtures/Events/ Updates* diary

Almost a fifth of clubs did not have a policy nor did they advise on mouth protectors for junior players. With 17.9% clearly indicating no, 2.5% not knowing and 1.7% not providing data respectively, it strongly suggested that probably 22.1% did not have a clear policy in place.

While just over three quarters (77.7%) of the responding clubs indicated that they had a policy or advised junior members about mouth protectors there appeared to be a wide variation of how this advice is communicated. This varied from mandatory requirement, to club encouragement, to parental responsibility, with the cost implication being taken into account in decision making.

Compulsory wearing of mouth protectors in rugby was introduced in New Zealand for under 19 year old players in 1997 and for all grades of players in 1998 (Quarrie et al., 2005). It took until the season of 2003 for greater powers to be available for referees to enable players to be sent from the field of play if not wearing any mouth protection. To date, New Zealand is the only country in the International Rugby Board (IRB) where this compulsory legislation is in place.

Many previous investigators have consistently recommended at least a greater awareness of the risks of dental trauma and the need for more encouragement to be given to players to wear a mouth protector for rugby. Glendor (2008) in a review article stated that rugby has a very high rate of TDI. In addition, Jennings (1990) stated ñsurely having no front teeth must detract from the macho image more than wearing a gum shieldò. Therefore, for the benefit of young players progressing in the game as well as senior club teams, county teams, and international teams where greater physical involvement takes place, the wearing

of a mouth protector has to be at least good practice and at best essential. Chapman (1985a, 1985b, 1988, 1989), and Chapman and Nasser (1993) on five occasions has completed questionnaire surveys involving international teams either when on tour or involved in World Cup tournaments, with regard to injuries sustained when wearing and not wearing a mouthguard. The majority of senior players were reported as wishing that they had worn a mouthguard much earlier in their playing careers as they were now aware of what sort of dental injuries can occur, either through personal experience or noting the dental injuries involving other players. Peer pressure plays an important role in team sport behaviour and even when presented with evidence for the use of mouth protectors, a club or a group of players have the ability to believe the ethos of the risk applies only to others. This can propagate a code of conduct which may not involve wearing a mouth protector and it is difficult to change this belief and habit (Newsome et al., 2001).

The majority of clubs (69.2%) indicated that shop purchased mouth protectors were satisfactory for wear and protection. There was a very poor response regarding renewal of mouth protectors with 83% unwilling to give this advice. This could be related to the statistic that 89.9% of clubs did not have any arrangement with a local dentist to provide mouth protectors. Chatterjee and Hilton (2007) indicated that many children did not wear a mouth protector due to financial reasons as well as difficulties in taking a child to the dentist.

A high percentage of clubs (90.6%) indicated that a mouth protector is advised for training and an even higher percentage (95.7%) indicated the wearing of a mouth

protector is advised for playing. Yet when asked if a player would be excluded from training and playing if they werenôt wearing a mouth protector only 11.1% of clubs indicated that a player would be excluded from training and only 17.1% of clubs indicated that a player would be excluded from playing if not wearing a mouth protector. It is disappointing that clubs do not use the training ground sessions as a lever to increase the necessity to wear a mouth protector when training as it is likely that this would increase the wearing of a mouth protector on match days.

Ideally clubs should endorse a policy where the wearing of a mouth protector on training sessions was a club requirement. This could then be followed up with a match day requirement for wearing in order to play for the team. ôNo protector no gameô would be a worthy policy. Indeed a club or SRU campaign slogan could be ñNo protection no participationò. However, it is possible that many clubs feel that the strongest team on the pitch on match day is more important that an individual players safety with regard to the wearing or non-wearing of a mouth protector.

This study also asked the participants about injuries that were sustained whilst playing rugby. Recall of injuries is always a difficult thing to do accurately in an individual, as also found by Kay et al., (1990), but when asking a club secretary to recall injuries there is a significant chance that the resultant recall will not be an accurate representation. However, from the clubs responding when a mouth protector was not worn some 17 (14.5%) recalled an injury and 89 (76%) recalled no injuries. From the clubs responding when a mouth protector was worn these figures improved to 6 (5%) recalling an injury and 103 (88%) recalling no injury.

The injuries recalled when not wearing were 14.5% (17) as against 5% (6) when wearing a mouth protector. While not wearing a mouth protector the largest number of injuries sustained were fractured and/or loosened teeth (32%) and soft tissue trauma (23%). One reported injury sustained while wearing a mouth protector was a fractured mandible. It is arguable that this would have occurred even without a mouth protector and indeed even greater soft tissue or tooth injuries would have occurred.

The injuries sustained through not wearing a mouth guard are well documented. As early as 1969 Clegg, discussed the merits of customised mouth protection for rugby league players and quoted a reduction of 75% in orofacial injuries sustained when this type of mouth protector was worn. Chapman and Nasser (1996) reported the first recorded study involving a high school in Australia that played rugby union and showed a very high (97%) usage rate of mouthguards and a very low (7%) incidence of orofacial injuries amongst the four school teams. Sixty six percent of the mouth protectors worn were customized. Credit was given to the Sports Director at the school and the boys who all (100%) believed that wearing a mouth protector gave local protection. Conversely Jennings (1990) and Chalmers (1998) supported the wearing of standard (non-custom made) mouth protectors by children up to the age of 16 and the wearing of a clinically coordinated mouth protector by a dentist and technician thereafter.

Muller-Bolla et al., (2003) reported that the more frequently a player plays and trains in a season, the greater the chance he has of suffering orofacial injuries, especially if he is a forward in the front five. Despite this some 30% of older

senior players in his study reported having had a facial injury in their career with only 64% of these players either previously or currently wearing a mouth protector. Therefore despite the risk of injury one third were still not wearing any form of mouth protection even with the availability of the improved materials and construction techniques which have greatly enhanced the durability and comfort of mouth protectors.

Unfortunately the non-wearing of mouth protectors is commonly reported within the dental literature**.** Rodd and Chesham (1997**)** in the UK showed that only 9% of boys and less than 1% of girls were currently wearing a mouth guard for contact sports. Their research concluded with the recommendation that innovative educational programmes and cost effective schemes for mouthguard provision need to be developed. More recently Marshall et al., (2001) carried out weekly interviews with his team of researchers amongst 327 New Zealand male and female rugby players and found that protective and supportive devices or equipment varied greatly from week to week. Mouth protectors were the most commonly used item of equipment at 65% of player weeks and mouth protection was used more frequently by senior male players (73%) compared to female school players (55%).

As part of the questionnaire, clubs were invited to make any free comments about mouth protectors, as reported in Tables 3.21a ï 3.21e.

Some clubs responded that their players must wear a mouth protector and that players are told this at the start of a new season both for playing and training.

Other clubs reported that, as there is no mandatory legislation that can be enforced, they only encouraged the wearing of a mouth protector during training and playing but delegated the final decision to parents. Cost implications were stated to be an important factor in deciding between a cheaper boil-and-bite type and a custom made type which were ñprohibitively expensiveò.

It was encouraging that clubs were seeking feedback and further helpful information from this project to both use and pass on to players and parents. Chalmers (1998) highlighted that, as long as there were readily available, mouth protectors from sports outlets at a modest cost then players would use these if their role models were clearly seen wearing a mouth protector at national level. Different types of protective equipment were studied by Marshall et al., (2005) and the use of a mouth protector lowered the risk of orofacial injuries more than the padded scrum cap for scalp injuries or support sleeves for sprains and strains. He concluded that more studies on the effectiveness of protective equipment needed to be undertaken. McIntosh and McCrory (2005) studied protection for head and neck injuries across all sports and reported that a high level of cooperation was received for their study from the Scottish Rugby Union (SRU). The findings revealed that the only two requirements that a selected player had to provide to join the national rugby squad were two pairs of boots and two mouth protectors. All other requirements would be provided by the SRU.

One of the most important health policies for any rugby club is to have trained individuals available to help deal with any traumatic injuries. Section 11 of the questionnaire addressed this issue.

Ninety five percent (111) of clubs reported having a first aider present at match days and 86% (101) during training sessions. A doctor was on-call for match days at 27% (32) of clubs and present on match days at 20% (23) of clubs. Only 3.5% (4) reported having a doctor present at training sessions and 9% (11) being ñon-callò for training sessions.

The lowest health personnel responses were for the presence of a dentist. Only 0.9% (1) of clubs reported having a dentist available or ñon-callò for training sessions and some 1.7% (2) of clubs for matches. A dentist being ñon-callò at match or training sessions was zero. One of the dentists present at training or match days was only because they were also the team coach.

It is very important that club officials who are present at training sessions or at matches are trained to recognise injury problems and are able to assist immediately with appropriate advice and courses of treatment (Jagger et al., 2010). Not long ago, it was common for there to be no doctor or other medical to be present on match days at rugby matches in the United States (Dietzen and Topping 1999). It is hoped that this sort of finding will become more infrequent.

Finally clubs were asked to make general comments about the questionnaire or about mouth protectors generally in Junior Rugby. Only four comments were received and all were constructive. Two requested follow-up information about the subject to use at their club. One of these asked for a poster to illustrate the importance of mouth protectors which could be displayed in the club house, and another requested feedback to the questionnaire from a national level. The other

two explained in more detail the role and use of the General Medical Practitioner (GMP) within their rugby club. One club indicated that the GMP was present on match days for the senior team only while the other club indicated that their GMP was only present at home games.

Some 33% of clubs responded to the final invitation for óany other commentsô with such statements as: ñWe support this development of policy and adviceò; ñwe would support compulsory gumshieldsò; ñwe welcome advice about safetyò; and ñclub will support any policy requiring mouth protectorsò.

These comments clearly demonstrate a constructive willingness to improve safety and hence enjoyment for all players, especially from an early age.

This research project used a questionnaire to find out if Scottish Rugby Union (SRU) affiliated clubs who had Junior players had a policy or gave advice regarding the use of mouth protection for training and playing and how it was implemented. Clubs were also asked to indicate what health professionals were present or ñon-callò at training sessions and on match days.

As previously stated, in total one hundred and fifty one clubs are affiliated to the Scottish Rugby Union with junior teams attached to their clubs.

This represents the findings from 77% of the affiliated clubs with junior players. Almost 9 out of 10 (89%), of these clubs are reported to have players under the age of 12. Either a policy or advice regarding mouth protectors is only provided by 77.7% of the clubs. Mouth protectors are being worn by junior players when both training and playing. Responding clubs stated that, they recommended their use for both training (90.6%) and playing (95.7%). Only 11.1% of clubs do

exclude a player from training if they are not wearing a mouth protector and 17.1% excluding a player from the actual match day.

4.2 Conclusions.

It was concluded:

- Club policies on the use of mouth protectors by Junior players in those clubs when training and playing was 77.7% (91) of the 117 clubs had a policy or provided advise. 89% of clubs allowed players to participate in training and 83% of clubs allowed players to participate on match days without wearing mouth protection.

- Availability of medical, dental, and first aider (health professionals) at Junior Clubs is as follows: Present on match days, First Aider 94.8% (111), Doctor 19.6% (23), Dentist 1.7% (2); ñOn callò on match days Doctor 27.3% (32), Dentist 0% (0). Present on training sessions, First Aider 86.3% (101), Doctor 3.4% (4), Dentist 0.9% (1); ñOn callò on training days, Doctor 9.4% (11), Dentist 0% (0).

4.3 Further Research.

This research, which used a retrospective questionnaire to ascertain Scottish Rugby Union (SRU) affiliated club protocols and advice regarding mouth protectors for Junior players, has provided very useful data on the wearing or non-wearing of mouth protectors.

Further interaction with SRU clubs can be undertaken not only to share the data and provide constructive feedback but also to gain an understanding of cooperation to self-regulate the wearing of mouth protection.

With the dissemination of the data with the SRU through the Chief Medical Officer at the SRU, support and mandatory recommendation for the wearing of mouth protection could be addressed at the governing body level. This could enable representation to the Secretary of State for Health in the Scottish Government to consider support in various ways to provide assistance in the use of mouth protection in junior players. Ultimately a mouth protector for each participant in contact sport at the beginning of each new season provided under the National Health Service (NHS) agreement would be the gold standard for this country. This would be a first in Europe and the second country to do so throughout the rugby playing world. New Zealand being the only country to date where it is mandatory.

As a stepping stone during these procedures being discussed and considered for implementation, further research could be undertaken to pilot a practical procedure for a region or district and target the clubs in that group for support in the wearing of customised mouth protection at the beginning of each age groups

training programme. Regular contact and follow up throughout the playing season would allow for support and advice to be readily available. Initially this could be undertaken by membership of an affiliated club whereby each junior player is provided with a voucher for each participant to receive an appropriate mouth protector.

Role models for junior players to aspire to are essential, not only in skill and team participation, but also in leading by example in the wearing and advocating the mandatory use of mouth protection. A question and answer session with the International teams regarding their positive experiences relating to the wearing of a mouth protector, would then be shared with the junior playing community which would inspire junior players to commit to the wearing of a mouth protector both for training and playing.

The development of a DVD, poster or pamphlet to instruct parent, players, and coaches of the long term sequelae of trauma to the dentition when mouth protection is not worn would be an asset. This could encompass role models advocating the wearing of mouth protectors in the light of their personal experiences of dental trauma resulting from not wearing mouth protection.

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Appendices.

Appendix 1.

Letter from Dr James Robson to Club Secretaries which accompanied the questionnaire.

OUR REF: JPR/JM

Club Secretary, Date as Postmark

Dear Club Secretary

Re: Mouth Protectors in Junior Rugby in Scotland

I am currently working with Mike Broad and Richard Welbury from the Dental School of the University of Glasgow. Our aim is to produce an SRU protocol for the use of mouthguards in Junior Rugby Football Union in Scotland and safeguard our youngsters from injury.

The use of mouthguards in protecting against dental and maxillofacial trauma is unquestioned. There is also evidence to suggest that they reduce sports-related cerebral concussion.

In all age groups dental and maxillofacial trauma can have a lifelong effect on function, psychological development, and aesthetics. However in younger age

groups where oral and dental growth and development is incomplete the effect of trauma can be even more significant.

Our first step in the process of producing an SRU protocol is to collect information about what is happening now at club level. I hope you will take the time (about 5-10 minutes) to complete the enclosed questionnaire and return it to Mike and Richard in the stamped addressed envelope.

Thank you for your help.

Kind regards

James P Robson

Dr James P. Robson

Head of Medical Services

Scottish Rugby

Appendix 2.

Letter of introduction to Club Secretaries, which accompanied the letter from Dr Robson with questionnaire.

Our Reference: MTB/RRW

Club Secretary Date as post marked

SRU Affiliated Clubs

Dear Club Secretary

Re: Mouth Protectors in Junior Rugby in Scotland

We would greatly appreciate your participation in this questionnaire. We are also delighted that the Scottish Rugby Union and Dr James Robson as Head of Medical Services at Scottish Rugby are supporting this research. The SRU have provided us with your club mailing details.

Enclosed with this covering letter are the following:

- SRU support letter from Dr James Robson
- The questionnaire
- A stamped address reply envelope

If you would appreciate a visit by us we will try to accommodate this into an appropriate time frame. To facilitate this, please provide us with two or three dates with times when this would be suitable.

My contact details are as below, but should you wish to telephone me for further information or clarification please call my mobile number which is 0776 965 0553.

My email address is m.broad@dental.gla.ac.uk

My work address is Mr Mike Broad, level 2, Glasgow Dental Hospital and School, 378 Sauchiehall Street, Glasgow, G2 3JZ.

We thank you for your anticipated participation in this research which ultimately will inform the SRU with respect to future mouth protector advice and use in Scotland. We would appreciate the returned questionnaire in the reply post envelope provided at your earliest convenience / or by date specified.

Yours sincerely

Michael Broad
Dental Instructor
Glasgow Dental School
378 Sauchiehall Street
Glasgow G2 3 JZ

Glasgow University

Richard Welbury
Professor of Paediatric Dentistry
Glasgow Dental School
378 Sauchiehall Street
Glasgow G2 3JZ

Glasgow University

Appendix 3.

Second Phase letter to accompany questionnaire.

Our Reference: MTB/RRW

Club Secretary Date as post marked

SRU Affiliated Clubs

Dear Club Secretary

Re: Mouth Protectors in Junior Rugby in Scotland

This is the second phase of this project assessing the use of mouth protectors in Junior Rugby in Scotland. We are targeting the clubs which have not participated in this project, to date. The response to the first phase was 37% and we are grateful to those affiliated clubs who replied. However, to ensure a more meaningful analysis for this research we require well in excess of 60%. Please be assured we are not intending to name and shame any club nor enable subsequent published material to be traced back to any particular affiliated club.

We are encouraged and delighted that the Scottish Rugby Union through Dr James Robson as Head of Medical Services at Scottish Rugby, are fully supporting this research. The SRU have provided us with your club mailing details. The better the response to this fully supported research project by the SRU the better the understanding and support for improving safety in this sport. Therefore we would greatly appreciate your participation in this questionnaire.

Enclosed with this covering letter are the following:

- SRU support letter from Dr James Robson
- The questionnaire
- A stamped address reply envelope

My contact details are as below, but should you wish to telephone me for further information or clarification please call my mobile number which is 0776 965 0553.

My email address is m.broad@dental.gla.ac.uk

My work address is Mr Mike Broad, level 2, Glasgow Dental Hospital and School, 378 Sauchiehall Street, Glasgow, G2 3JZ.

We thank you for your anticipated participation in this research which ultimately will inform the SRU with respect to future mouth protector advice and use in Scotland. We would appreciate the returned questionnaire in the reply post envelope provided at your earliest convenience / or by date specified.

Yours sincerely

Michael Broad	Richard Welbury
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Appendix 4.

Publication – Abstract and Poster for British Society of Paediatric Dentistry Conference

Mouth Protectors in Junior Rugby in Scottish Rugby Union (SRU) clubs.

MT Broad, RR Welbury, JFMcCord.

University of Glasgow Dental School

Objective: To ascertain club policy/advice for mouth protectors in Junior Rugby in Scotland.

Design: Postal questionnaire.

Sample and methods: The questionnaire was sent to each affiliated SRU club with a supporting letter from the Chief Medical Officer of the SRU who had been involved in the questionnaire design. The questionnaire requested details of club policies for training and match days, type of protector used/recommended, and details of any oral injuries sustained in the previous 5 years.

Results: 231 questionnaires were sent with a stamped addressed envelope for reply. Only 27% (n=64) responded, 4% (n=4) were void with questionnaire not completed. Of the respondents (n=64), 57% (n=37) had a policy/advice for the wearing of a mouth protector on training and playing days; this represents only

16% of the total 231 clubs. Most clubs advised or recommend the use of a mouth protector for both training and playing. However only 10/64 (15.6%) excluded players from training without a mouth protector and only 13/64 (20.3%) excluded players from playing without a mouth protector.

Advice given was generally for junior members to purchased a ñboil-in-the-bagò (n=41) and then to have a custom made mouth protector when older (n=36).

12 clubs reported soft tissue and tooth injuries when a mouth protector was not worn. There were no similar injuries when a mouth protector was worn.

Conclusions: 79.3% of respondent clubs permit players to participate in rugby matches without wearing any mouth protector therefore increasing the risk of dental and maxillofacial trauma.

Supporting Agency: This study was supported by the Scottish Rugby Union, Murrayfield, Raeburn Place, Edinburgh.

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Mouth Protectors in Junior Rugby in Scottish Rugby Union (SRU) Clubs.

M.T.Broad, J.F.McCord, A.Sherriff, R.R.Welbury
University of Glasgow Dental School

OBJECTIVE:

To ascertain club policy/advice for mouth protectors in Junior Rugby in Scotland.

DESIGN:

Postal questionnaire, from the data base held by the Scottish Rugby Union of their affiliated clubs.

SAMPLE & METHODS:

The questionnaire was sent to each affiliated SRU club with a supporting letter from the Chief Medical Officer of the SRU who had been involved in the questionnaire design. The questionnaire requested details of club policies for training and match days, type of mouth protector used/recommended, and details of any oral injuries sustained in the previous 5 years.

RESULTS:

231 questionnaires were sent with a stamped addressed envelope for reply.

Initial results: only 27% (n=64) responded, 4% (n=4) were void with questionnaire not completed. Of the respondents (n=64), only 57% (n=37) had a policy/advice for the wearing of a mouth protector on training and playing days; this represents only 16% of the total 231 clubs.

However, the data base revealed rugby clubs with no sections of junior players and a duplication of one club. By eliminating those clubs not deemed eligible [30% (n=69/230)] the corrected response rate was 34% (n=55/162) (Figure 1).

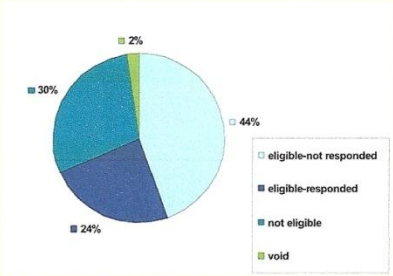

Figure 1. Response of SRU Clubs

Figure 2. shows that most clubs advised or recommend the use of a mouth protector for both training [(89%) n=49] and playing [(93%)n=51].

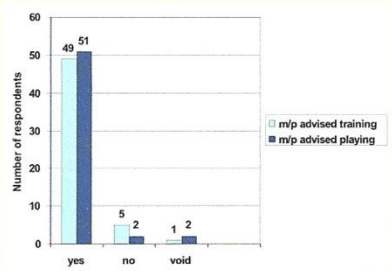

Figure 2. Recommended use of mouth protectors for training and playing.

However only 9/55 (16.4%) excluded players from training without a mouth protector and only 12/55 (21.9%) excluded players from playing without a mouth protector. Therefore, potentially 80% of junior players were unprotected for training and 76% for playing (Figure 3).

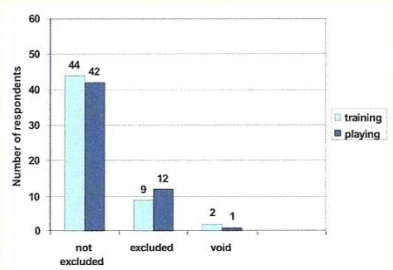

Figure 3. Levels of exclusion / non-exclusion from training or playing without a mouth protector.

Advice given was generally for junior members to purchased a "boil-in-the-bag" 72.7% (n=40/55) and then to have a custom made mouth protector when older 60% (n=33/55). Cost of the custom made mouth protector was noted as a prohibitory factor and was deferred until dental development was complete (Figure 4).

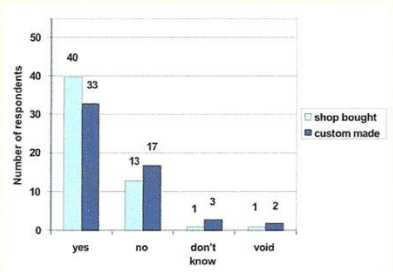

Figure 4. Club advice regarding two types of mouth protectors.

8 clubs reported soft tissue and tooth injuries when a mouth protector was not worn. There were no similar injuries when a mouth protector was worn.

The reported injuries in the last five years when players were not wearing mouth protection was a four fold increase from 3.6% (n=2) to 14.5% (n=8)

CONCLUSIONS:

- 76% of respondent clubs permit junior players to participate in rugby matches without wearing any mouth protector and this is increased to 80% for training, therefore significantly increasing their risk of dental and maxillofacial trauma
- Cost was seen as a prohibitory factor in the provision of custom made mouth protectors

SUPPORTING AGENCY:

This study was supported by the Scottish Rugby Union, Murrayfield, Raeburn Place, Edinburgh.

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