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Safety in Sports

General Guidelines
for the Development and Implementation
of Sustainable Safety Management Schemes
in High Risk Sports
in the EU Countries (D11)

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1. Introduction and Problem

Physical exercise is an essential component of a healthy lifestyle. It has been proved that lack of physical activity is a risk factor for the development of a number of chronic illnesses, including cardiovascular diseases which are a main cause of death in the Western world.

Sport helps to strengthen important values such as team spirit and solidarity, and contributes to personal development and fulfillment. Sport has strong social and economic implications, also within a European and even broader global context. Sport contributes to increased solidarity and prosperity in countries and among populations.

But certainly sporting also holds a risk of injury due to accidents related to sports or due to overexertion. Although the net health gains from regular physical activity exceed the risk of injury (BMSG, 2000; BASPO, 2001), the burden of injuries related to sports and physical activities is substantial (Engebretsen & Bahr, 2009). About one in five injuries treated at emergency departments in hospitals is related to sporting activities. For the EU-27 region alone, the total number of sports related injuries that need to be treated in hospitals, is estimated at around 5 million cases a year. Team sports are accounting for about 40% of this number of injury cases (EuroSafe/KfV, 2009)

Of course, not all injuries are equally severe but a significant proportion of these injuries, for instance concussions and knee injuries, are serious. Serious injuries often result in long-term absence from work and sport and in chronic problems such as an early onset of osteoarthritis (Meeuwisse & Bahr, 2009).

Fortunately, there are many possibilities to prevent sports injuries, for instance by making sports infrastructures and equipment safer, prescribing the use of protective equipment such as helmets, adapting rules of the game, and by making injury prevention a core component in training methods and in educating coaches and trainers (Steffen et al, 2010).

Thus, injury prevention in sport has great benefits for individuals engaged in sports and physical activities, such as greater health in individuals and enhanced sport performance, and for society at large as it enhances the sustainability of active lifestyles in populations and reduces the costs of the health care system and of employers.

However, there seems to be the perception that, if physical activity advocates were to talk about safety issues, people would not become active. In fact, the contrary is true as unsafe activity is one of the major barriers towards ongoing physical activity.

Purpose

The purpose of this document is to convey the message that injuries are preventable to a substantial extend. Higher safety level helps to promote physical activity and therefore combining physical activity promotion and injury prevention will increase the resulting health benefits. Safety promotion objectives should therefore be incorporated into policy and practices of sports organisations and into national and local government policies related to sports and the promotion of physical activities. This document aims to assist policy makers and officials in developing safety management programmes at national and local level and to promote sustainable implementation of those programmes. In view of that, we will summarise a couple of basic frameworks for addressing the issue of sports injuries, and present some examples of applying a systematic approach in enhancing safety in team sports. The document will conclude with guidelines as to how to develop and implement safety management programmes in sports, which can be used as a kind of checklist for programme developers.

This document has been developed for sports policy makers as well as decision makers in international and national sports federations (and their member organisations), and sports education agencies. As the risk of serious injury is relative high in organised team sports, we will exemplarily focus on this category of physical activity.

Definitions

Commonly “injury” is defined as the physical damage that results when a human body is suddenly and unexpectedly subjected to intolerable levels of external energy or forces (Baker, 1992). The time between exposure to the external energy or forces and the appearance of an injury is relatively short. However, overuse injuries that result from longer term exposure to external forces represent a significant part of the entire spectrum of sports related injuries and therefore should not be overlooked. The difficulty here is that, due to the longer term exposure effect, the cause-effect relation is not always obvious. These injuries are neither accurately reported in surveys nor in medical records (Verhagen & Van Mechelen, 2009).

“Sports injuries” are commonly being defined as any physical complaint sustained by a player that results from a match or training. Furthermore, if a player receives medical attention, injuries are referred to as “medical attention injury”, whereas an injury that causes a player to miss at least a full part in future training or match play is constituted as “time-loss injury” (Fuller et al., 2006, 2007a). Bahr (2009) points out that the time-loss definition is probably the most commonly used, as it at least covers the most relevant injuries. In addition, time-loss injuries are quite comprehensible, in particular when recorded retrospectively. If not mentioned specifically, the time-loss definition is applied for any injuries.

Furthermore, there is generally a clear distinction between acute and chronic injuries. Corresponding to the above-cited consensus documents an acute injury results from

a specific, identifiable event whereas chronic injuries are caused by repeated micro-trauma without a unique identifiable event responsible for the injury. Hospital records, insurance statistics or national surveys that are mainly used for data collection tend to focus on acute injuries. Overuse injuries are mostly underrepresented in the resulting statistics (Myklebust, 2010). Therefore most of the research into sports injuries relate to acute injuries.

The context of organised sports'

In most countries there are national policies in place as to the promotion of sports and physical activities, endorsed by national and local authorities and the sports sector. However, only a few counties seem to have an explicit national strategy in place for safety in sports.

The organised sports sector is being characterised by a hierarchical structure from grassroots amateur level of playing to elite level competition, with strong vertical coordination mechanisms between the different levels and operators within the boundaries of each of the individual sport categories, i.e. the individual sport federations.

Each sport has its own specific game characteristics and as a result, its own characteristic injury profile which requires a custom-made set of measures to reduce the risk and burden of injuries in the respective sport. The complexity of organisational structures within the sports sector and the huge variation in professionalism among sports organisations and between amateur and elite level of play, has also led to huge differences between the various actors and organisations in their appreciation of the importance of the safety issue in sports and their responsibility to act.

The challenge today is to deliver concurrent policy and practices for promoting 'safe sports' and 'physical activities'. Governing bodies of sports organisations have a major responsibility for identifying and managing the risks associated with their sports and for implementing the latest state of art in measures to control them.

2. Systematic Frameworks for Sports Injury Prevention

Safety Management

"Management" comprises activities of planning, organizing, staffing, leading and controlling of activities of an organization, in order to accomplish specific goals of this organization. Management refers to all constituent aspects of business as production, human resources, marketing, or finances, as well as to more specific aspects which are essential for certain types of business: knowledge management, project management, quality, or risk management. Frequently, management has been described as "art of getting things done through and with the people in formally organized groups". Today, management is less considered as an "art" which requires extraordinary talented persons, but more as a "craft", which can be well described and trained to a large extend. The various business sectors have developed their own strategies and tools of management in order to meet their specific demands as manufacturers, traders or non-profit organizations, public services or communities. The number of textbooks, qualification curricula and trainings for the various aspects of management and for management in the various branches appears as almost infinite.

Also "sports management", i.e. the management of sport associations, sport events, or series of competitions, has also become a speciality for which specific qualification programmes are needed and widely available. Solid financial management, human resources policies, proper marketing and sponsoring are essentials, but also a deeper understanding of the world of sport, human physics, and enthusiasm of sportspersons and fans is needed (Hoye et al., 2006).

"Safety Management" refers to the duty of organizations of controlling and minimizing the risk of accidents and accidental injuries of employees and customers, and has been elaborated for businesses where accidents can impose serious damages to business interest as in public transport (e.g. aviation), construction and use of buildings (e.g. fire safety), manufacturing of products for vulnerable groups (e.g. toys or medical products), or where the production involves dangerous substances or technologies (e.g. power plants or chemical industry). In professional qualifications, safety management is frequently combined with related areas like security management or health management (Fuller & Vassie, 2004).

Sport injuries are frequent and detrimental to the business perspectives of sport good industry, sports associations and commercial service providers in many respects: Injuries are reducing the chances of winning in competitions, increasing the risk of losing investments into the development of youth squads or into the acquisition of high performers, damaging the reputation of sport as healthy activity, increasing the risk of getting brought to court, and one cause of relatively high insurance rates. Therefore, safety management has become increasingly a part of "sport management" (Frosdick & Walley, 1997, Appenzeller, 1998; Fuller & Drawer, 2004; Spengler, Connaughton & Pittman, 2005; Timpka et al., 2008). Nevertheless, the

importance of injury control in sports management and its potential for enhancing the productivity of sports business still appears as not fully understood.

The reasons are not well investigated yet, but it can be assumed, that there are at least three main factors which hamper the upgrading of “safety management” as constituent and indispensable part of “sports management”: As previously said, physical activities are always associated with a certain injury, and injury prevention is sometimes suspected to promote refraining from sport. The monetary losses or the reduction of chances of winning are rarely calculated. Finally, the potential of injury control programmes (i.e. the cost-effectiveness of safety management schemes) in the real world of e.g. sport clubs appears as quite undetermined and therefore is primarily perceived as additional burden or “costs” and only secondary as realistic chance for a “benefit”.

Safety management as part of sports management can be described as planning, organizing, staffing, leading and controlling of activities of an organization (i.e. of a sport club or sport federation) in order to control injury risks of active members or costumers in such a way that the loss/profit balance is maximized. In most cases this means activities targeting on the reduction of injury risks in terms of frequency and/or severity. Prerequisite is an assessment of the burden of injury of the organization which considers the uptake or enhancement of safety management, and a realistic estimate, how far the situation can be improved in a certain period of time with given resources. In the real world of sport clubs (with all their volunteers) this means rather a ‘democratic process’ of opinion-forming than implementing the conclusions of a scientific study. The current report wants to assist decision makers in sport clubs and federations in this process.

Preliminary theoretical considerations

For all action planning the 'plan–do–check–act cycle', a four-step model for carrying out change, applies. Just as a circle has no end, the PDCA cycle should be repeated again and again for continuous improvement. It starts with recognising opportunities and a plan for change, followed by carrying out a small-scale study. Review the test and analysis of the results will identify lessons learned and help to plan new improvements, beginning the cycle again.

With regard to public health management this basic approach needs to be elaborated more specifically In this model, there are seven distinct steps. The first is identifying the burden of disease and the seventh is evaluating a programme that provides health benefits in the real world (e.g. a prevention program for sports injuries).

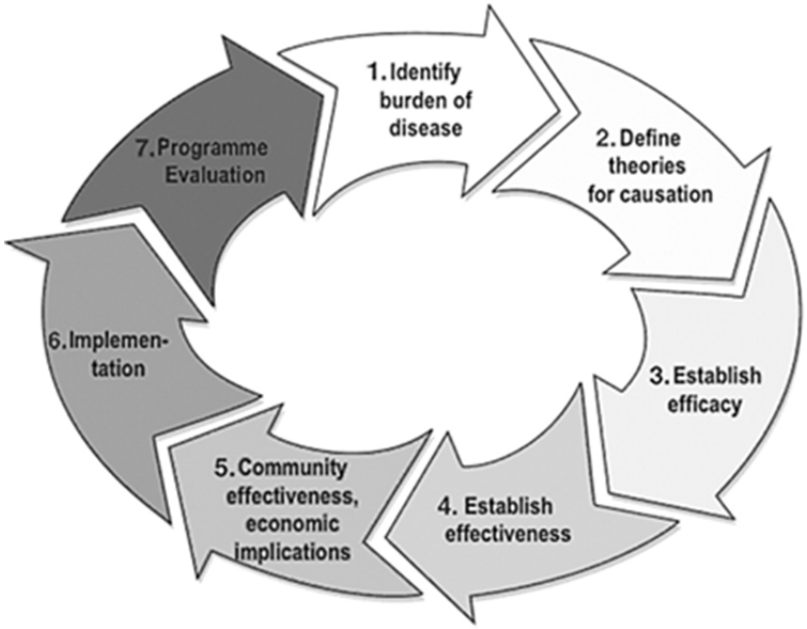


Fig.1. The Research Cycle (Khan & Tunaiji, 2011)

Translating this quite general public health approach into the setting of real world sports injury prevention, the following seven steps have to be considered:

1. Risk assessment, i.e. identifying the burden/magnitude of the problem in terms of 'incidence' and 'severity';

2. Risk factor analysis, i.e. identifying the intrinsic (athletic dependent) and extrinsic (event/ situation dependent) risk factors and the relationship that exist between these factors and injury risks;

3. Risk control identification, i.e. the identification of potential solutions to control risk factors and to develop appropriate preventive measures;

4. Intervention development, i.e. the development and implementation of a 'tailor made' intervention programme adjusted to the local needs and demands;

5. Pilot testing, i.e. test implementation of adjusted intervention into a smaller pilot community

6. Evaluation and impact assessment, i.e. identification of impact of intervention and analysis of motivators and barriers to uptake

7. Sustainability and wider implementation of successful interventions, i.e. measures to ensure compliance to interventions and a wider implementation in relevant settings.

Risk assessment

The purpose of risk assessment is to enumerate the extent of sports related injuries in a given group or population, to compare the incidence between different sports or type of injuries, and/or to identify high risk groups, injury types or injury factors within a specific team, league or sports organisation. The injury risk is being defined as the product of the probability that an adverse event occurs within a specified period of

time -injury incidence- and the average consequence of such adverse events -severity of injury- (Fuller, 2007b).

Incidence can be defined as the number of new injuries within a given time in a given population and is best suited for describing the rate of acute injuries. It is usually expressed as the number of injuries per 1,000 hours of participation. Incidence can also be expressed in other ways, such as the number of injuries per 1000 skier days or 1000 runs, which are usually used to describe the incidence of injuries in downhill skiing.

The severity of an injury can be described in terms of the type and location of the injury, the type and duration of treatment (e.g. hospital bed days), absence from sport or work, pain, impaired athletic performance and permanent disability, or direct and indirect costs. For example, the incidence of ankle injuries in volleyball is about the same as for knee injuries in team handball among women. But because knee injuries bear a high risk for future loss of function while that risk is much lower for ankle injuries, injuries may be of greater concern to handball teams than to volleyball teams. Injury control measures aim both at reducing the frequency of occurrence of specific events that might lead to injury and at reducing the proportion of these events that result in a serious injury.

Risk factor identification

To prevent sport injuries, it is absolutely essential to have a good understanding of the cause(s) of the injuries.

There are many factors that impact on the potential occurrence of an injury. There are internal, or intrinsic, risk factors that are part of an athlete's characteristics, such as age, gender, general level of fitness and playing skills, and that make them predisposed to injury. And there are external factors related to the environment and equipment/attributes used while playing, that make them susceptible to injury.

These factors, often in combination, will determine whether a specific event will occur and result in an injury. Even in cases in which the cause of an injury appears to be very straightforward, such as a direct kick to another player’s leg, in reality the cause may be complex. In this example, contributing factors could be leg pads that were inadequate in absorbing impact, previous injuries sustained to the leg, or lack of attention due to fatigue in the final part of the game.

Figure 2 presents an instructive model that outlines a number of different variables that may contribute to injury.

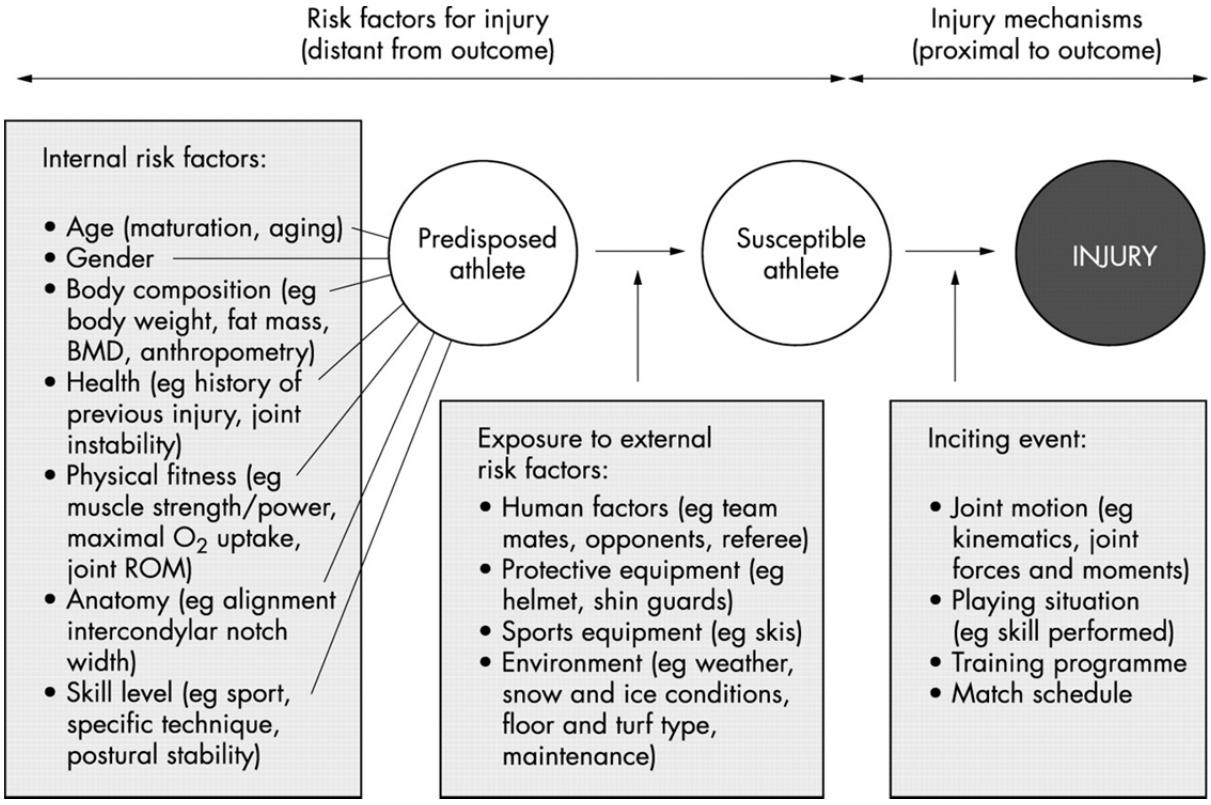


Fig. 2. Comprehensive Model for Injury Causation (Krosshaug & Bahr, 2005)

It starts with the intrinsic factors such as age, maturation, gender, body composition, and fitness level. One factor that fits herein too is 'previous injury', being a significant predictor of new injuries. Often these intrinsic factors interact and may predispose athletes to injury or protect them from injury, such as though improved fitness and technical skills. Extrinsic factors include equipment and field conditions, weather circumstances, footwear and attributes. Extrinsic factors may also reduce injury risks, such as the wearing of protective equipment. The final link in the chain of risk and protective factors is the 'trigger event', i.e. the inciting event that results in an injury, often called 'injury mechanism'. Each sport has its typical injury patterns and it is essential for team medical and coaching staff to fully understand these patterns.

It is important to note that risks will change over time, not only because of external changes such as differences in weather and field conditions, but also due changes as a result of previous training and playing. As strength may increase and technique may improve over time, susceptibility to injury may reduce, but repeated minor injuries may weaken tissue and susceptibility to serious injury.

According to this model the best way to prevent injury is to change or remove one or more risk factors. In case a risk factor, such as age, cannot be modified, it is important to use this factor for targeting measures to those categories of athletes that are at increased risk.

Risk control analysis

The next step is to identify possible strategies for preventing injuries among a relevant target groups that are at increased risk.

Similar to infectious diseases, the occurrence of an injury can also be described as the result of interplay between the host (the participants), the vehicle (the sports activity) and the environment (both physical and sociocultural) in which the activity takes place. Three different types of strategies are linked with each of these three categories of causative factors. Education and behaviour change strategies primarily target changes in individual ("host") risk behaviours, while policy and control strategies try to improve safety aspects in the sports physical and sociocultural environment through rules, regulations and compliance measures. Engineering strategies aim at improving the quality of equipment and attributes in such a manner that they provide maximum safety and protection in case an adverse event occurs.

The other dimension of the so-called Haddon-injury prevention matrix relates to whether the intervention is designed to avoid accidents to occur ('pre-crash' measures), to avoid injury or reduce the immediate severity of injury in case an accident happens ('crash' measures), or whether it aims to minimise the consequences of a sustained injury ('post-crash' measures) (Haddon, 1980)

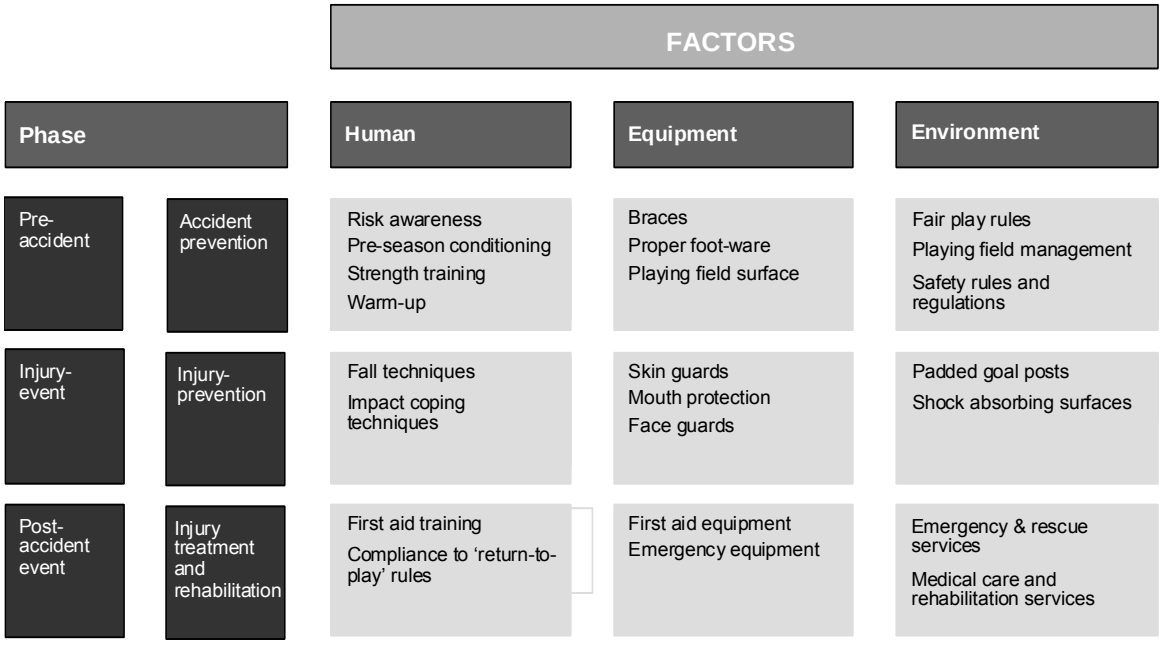


Fig.3. Haddon Intervention Matrix with Examples of Sport Injury Prevention Measures

The benefit of applying the Haddon matrix to the prevention of sports injuries is that it helps to establish a comprehensive view of relevant measures to take in preventing accidents to occur and in minimising the severity, respectively the outcome of injuries in case an accident occurs. It helps to identify a multi-axial strategy for prevention, thus addressing multiple risk factors at the same time.

Intervention development and implementation

There is abundance of studies on sports injuries and their prevention. However, the majority of publications report on incidence and aetiology. Studies reporting on preventive measures and efficacy are less common and those investigating implementation and effectiveness are even rare. (cf. figure 4)

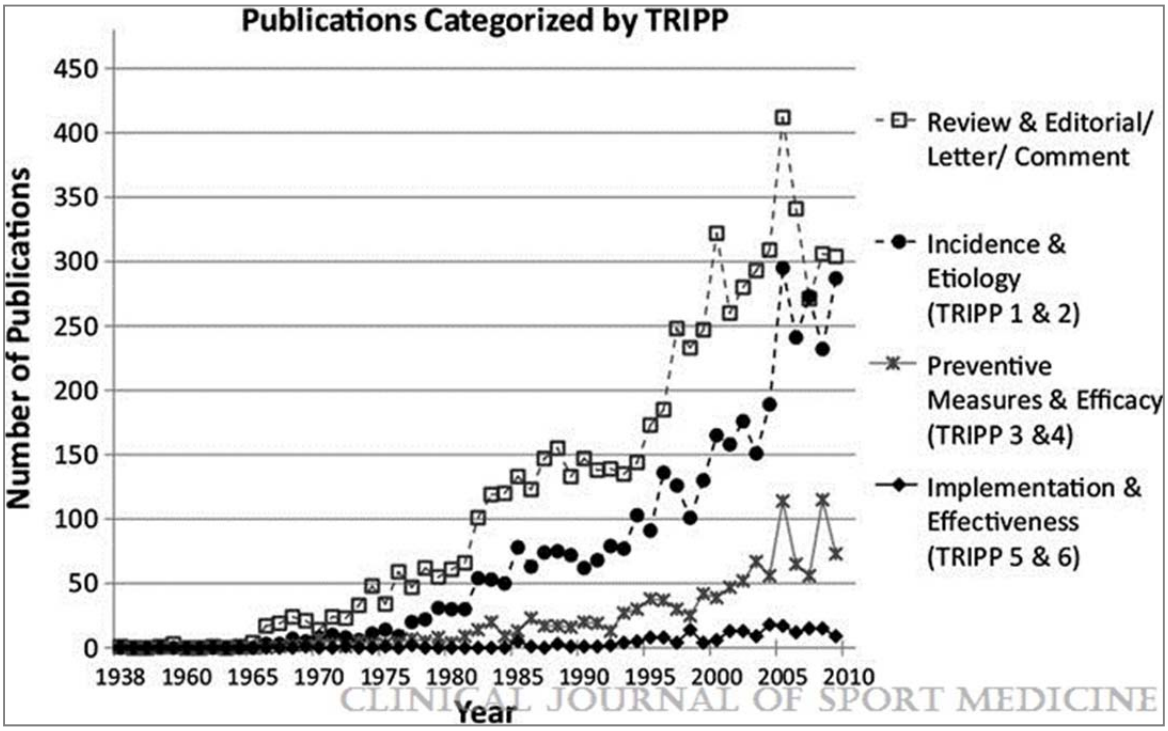


Fig. 4. The Prevention of Sport Injury: An Analysis of 12 000 Published Manuscripts (Klügl et al., 2010)

This is a result of the fact that many of the interventions used today have not been subjected to rigorous trials and have been entrenched as common practice often without formal scientific evaluation. Nevertheless, and despite these evidence challenges, several effective measures have been identified and shall be included into intervention programmes when appropriate. And, of course, it makes sense to rely on consensus by experts in the field as a valid way to address issues when evidence is lacking.

There are three areas of information to be considered when selecting possible intervention strategies for action planning:

- *Is there evidence that strategies have been effective elsewhere?*

Are there the prevention strategies that have been accepted as evidence-based good practice? If there are not, and a decision is made to proceed with one or more interventions that are based on expert opinion or common sense, then from the perspective of responsible use of resources, it should be considered to set up an evaluation of the strategy that will answer the effectiveness question, or at least will add to the existing information.

- *Is the current political and organisational environment ready and able to take on the injury prevention strategy?*

This involves an assessment of the transferability of a strategy to a new setting. Transferability relates to the conditions that should be present to increase the likelihood of success of a strategy in a new setting. It includes things like adequate political support, strong leadership, stable infrastructure, adequate resources and capacity, social climate in favour of the strategy and time to take on and complete the strategy from planning to evaluation.

- *Is there a realistic chance that the proposed strategy is acceptable for those concerned, i.e. the teams and players involved?*

Actual transfer and implementation of any strategy will only be successful when the teams and athletes are willing to accept these measures and committed to continue to apply the recommended practices and to comply with these practices by routine.

3. Methods - “Safety in Sports” Approach

In view of the preliminary theoretical considerations in chapter 2, this section gives a brief description of the stepwise methodology that was developed, applied and tested in the course of the “Safety in Sports” project.

3.1 Injury Risk Identification & Risk Factor Analysis

The very first step to start with is the selection of “worthwhile” working areas, i.e. high risk sports, which by definition have a high absolute number of participants and a high incidence of injuries. In general, team sports, where physical contact during frequent one-on-one situations is common (e.g. football, handball, basketball, ice-hockey, hockey, rugby and volleyball) are typically widespread and popular European sports with increased injury incidences. Due to the limited resources of the project, handball and basketball were chosen as role models for elaboration, testing and evaluation of sports safety management schemes.

Where available, injury databases (e.g. German club sports & professional) were analysed, enhanced by recent scientific literature to detect the specific injury risk, to describe the epidemiology and to identify potential risk factors. In this context the burden of injuries resulting from playing handball and basketball was finally estimated by multiplying absolute numbers of participants (data from sports federations), average exposures and incidences. Epidemiological data gave additional information on severity and focal points for targeted injury prevention.

3.2 Identification of Potential Prevention Measures and Current Knowledge

Having described the problem, it is essential to search for potential solutions to solve the problem. Therefore, an inventory of existing injury preventive measures and safety promotion strategies was compiled, to illustrate the current knowledge of science and practice within each sports community (i.e. handball and basketball).

For this purpose a structured database and literature search for relevant publications (not older than 1990) was performed. Major databases such as PubMed, the Cochrane library, SportDiscus, BISp databases and EMIP were browsed, using multiple combinations of the keywords INJUR*, PREVENT* and “*SPORT”*. In addition to the database research a multi-lingual web search using the internet search engine Google.com was conducted. Languages of prime interest for the respective sport (i.e. great number of participants, high international sport ranking) were used. Following these two initial literature searches, the reference lists of the retrieved articles were browsed for further information. Additionally, available authors and co-authors were contacted for complementing the findings with articles from their personal archives

Figure 5 illustrates the complete search strategy including all reviewing steps.

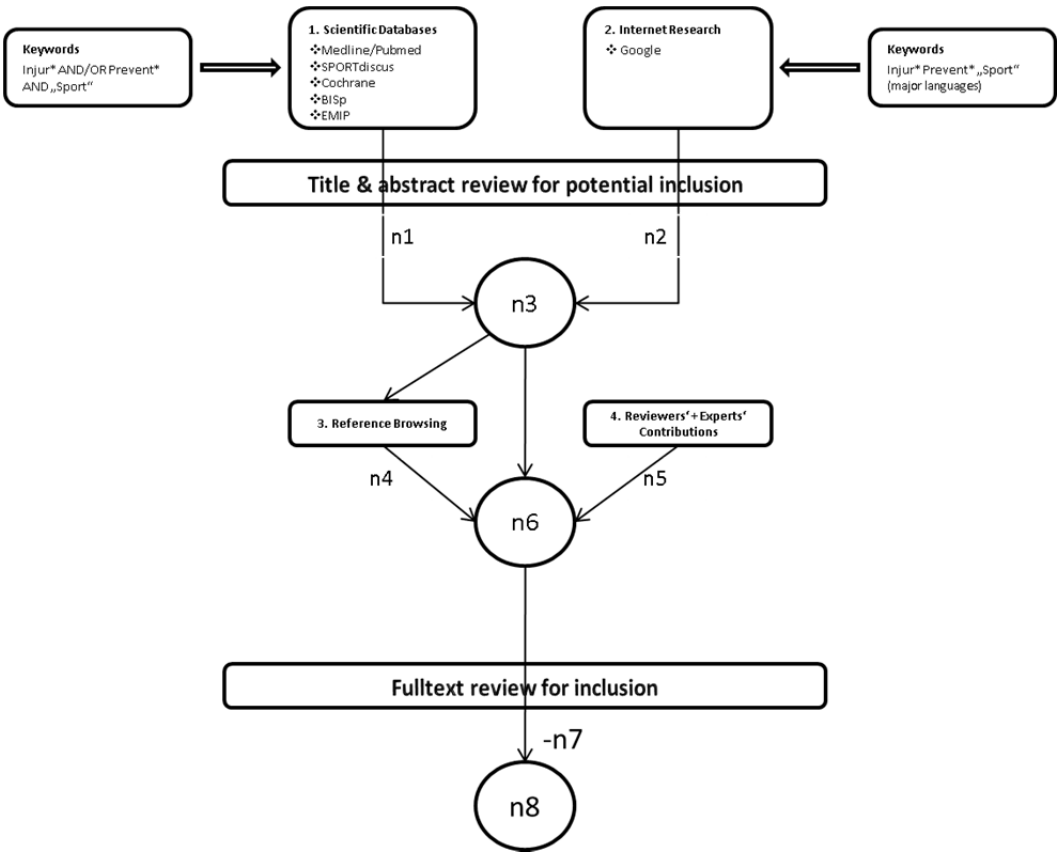


Fig.5. Literature Flow of the Inventory Considering Applied Search Strategies and Reviewing Processes

A subdivision into major fields of prevention was essential to finally allow a plain comparison of the presented preventive ideas during further progress of the projevt methodology.

The specific divisions of injury prevention as illustrated in Fig. 4 were defined as:

(1) Training & Physical Preparation

e.g. balancing exercises, stabilization, strengthening, agility, coordination, stretching

(2) Technical & Political Approaches

e.g. fair play campaigns, coaches education, behaviour and rules modification, refereeing

(3) Equipment & Facilities

e.g. taping, orthoses, mouth guards, protectors, floor conditions, venues, shoes

(4) Medical & Non-medical Support

e.g. physiotherapy, pre-participation-examinations, medical screenings, massage, psychological support

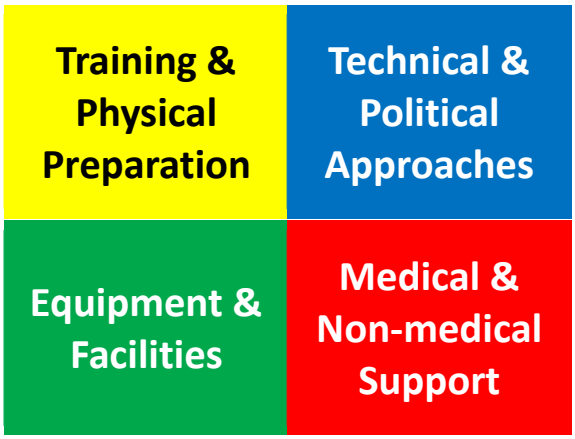


Fig. 6. Fields of Injury Prevention

3.3 Selection of Best Prevention Measures and Promotion Strategies

Having identified existing potential countermeasures to tackle the described injury problem, it is necessary to proceed with a critical evaluation of the achieved findings. The advanced methodical steps that are described here mainly focus on consensus building processes to finally select the most valuable measures and most promising implementation strategies from the earlier established inventory.

Typically, the evaluation of scientific knowledge is done by means of reviews and meta-analyses, which follow strict methodical guidelines to aggregate and evaluate the relevant information. This is, on the one hand, quite advantageous as in the end there is a clear evidence statement towards the effectivity of the analysed measure or intervention i.e. effectivity of prevention measures in reducing the frequency or severity of injuries. On the other hand the fact that an intervention works fine in a clinical setting does not consequently allow the conclusion that it is perfectly suited for the demands of the real (sports) world. Indeed, a lot of scientifically proven prevention interventions are hardly applicable and thus lack in acceptance and compliance within the target groups. Additionally, the sports sector appears different from other areas of public health with regard to the availability and nature of preventive contents. Preventive measures and safety recommendations are predominantly published in the so called “grey literature” or in the internet. Scientific publications are only a quite small share. Beyond that, there is a lot of sport-specific expert knowledge that is not officially published at all. The scientific evidence level of “grey literature” and – roughly speaking – “Expert Opinions” is in general too low for the realisation of meta-analyses or scientific reviews, even though the promoted information is commonly based on scientific findings or results from long-term experience of (sport-specific) experts. Nevertheless, this information should not be neglected, as – despite lower evidence levels – these recommendations eventually have a high relevance for practicable prevention work in sports communities.

The heterogeneity in scientific evidence, publication forms, level of sport-specific background etc. precludes from performing a meta-analysis or a systematic review. For this reason a consensus based process was chosen as methodical approach for the evaluation of identified prevention measures. The following preparatory activities were undertaken prior to the actual consensus building process

1. Preparation of structured summaries of the original sources
2. Subdivision of the original sources into the main fields of prevention
3. Classification of the original sources into levels of validation
4. Extraction of the preventive recommendations of each publication
5. Definition of evaluation criteria
6. Development of a web-based evaluation tool
7. Nomination of an expert panel for the online evaluation

During the actual consensus building process which was accomplished with the help of a web-based rating tool the expert panels reviewed each of the identified final preventive recommendation on these three criteria:

→ potential **EFFECTIVITY** in terms of reducing injuries (i.e. injuries become less frequent or less severe)

→ potential **APPLICABILITY** in terms of required effort for realisation (i.e. low time,financial, material and personnel expenditures)

→ potential **ACCEPTANCE** within the sports community (i.e. execution in compliance with athletes, coaches and associations)

As a result of this process a ranking was established, that finally ranked the preventive recommendations from very promising to unpromising.

3.4 Adaptation to National Demands and Implementation

To bridge the evidence-to-practice translation gap and thus to define the best injury prevention measures in a specific sport, it is obligatory to involve the respective community into the process of identification and to acknowledge the individual and exclusive demands and settings of the sports communities. It is important, therefore, not to neglect the sports communities' perception and knowledge of the injury problem itself as well as their perspectives of handling the problem within their own organisational structures and with regard to their capacities. The most effective practices will not prevent any injuries if they are not accepted and furthermore not applied. Thus, it is of utmost importance to comprise the factors that affect athletes, coaches and sports functionaries to accept, apply and sustain prevention measures.

The results of the literature search and the experts' consensus led to a proposal of very promising preventive approaches. This so-called "Draft Prevention Toolbox", at least selected parts of it, was destined to become test implemented in two collaborating national sport federations. As an advanced step of systematic consensus building, multiple meetings with experts and persons in charge from the pilot federations and from the European sports federations were hold to tailor the implementation according to respective national demands, capacities and requirements. This adaptation process should work out focal areas for targeted injury prevention as displayed in the so called prevention matrix (figure 6). This matrix serves as an easy-to-use tool to identify more specific working areas with respect to the needs and resources of the federations. It can be discussed into which of the potential target subgroups (separated by gender, ager, performance level) which promising measures (separated by main fields of prevention) can be implemented. Furthermore, potential ways of dissemination and media forms have to be discussed

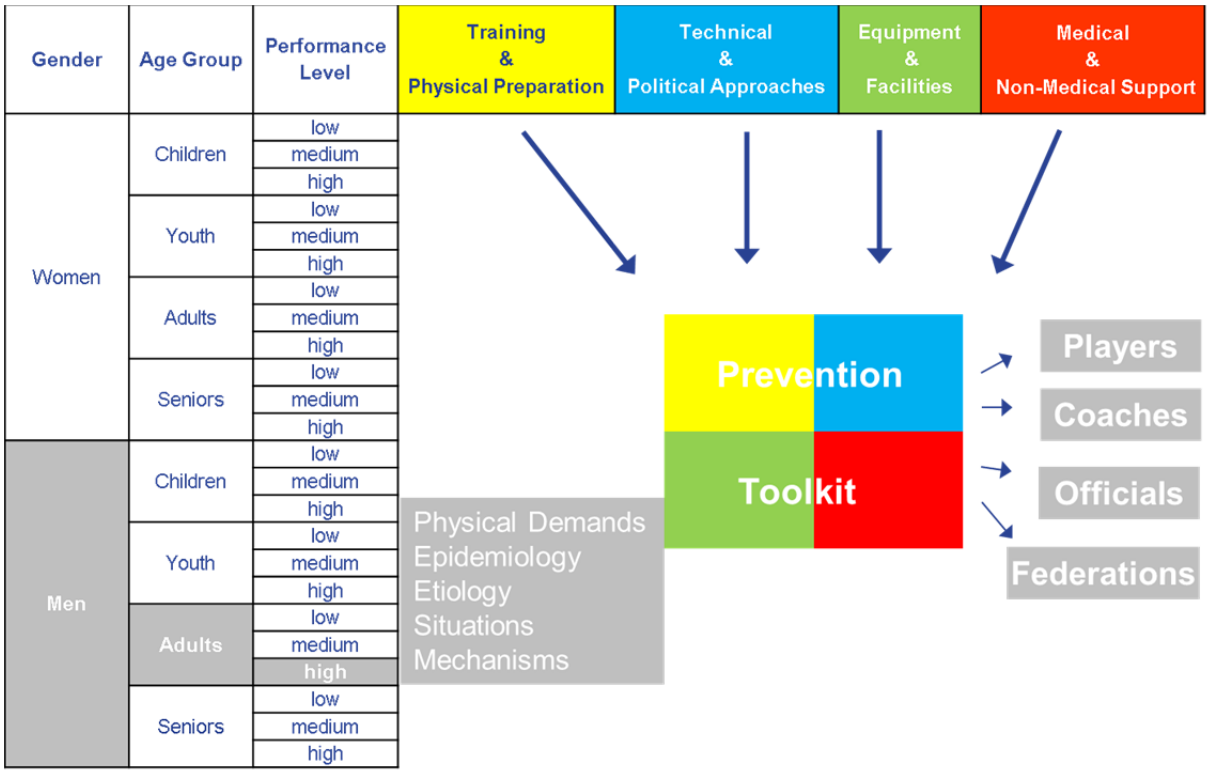


Fig. 7. Prevention Matrix Exemplarily Displaying Male Adults on High Performance Level as Target Group for Best Suited Injury Prevention

In handball and basketball “Training & Physical Preparation” turned out as core area for targeted injury prevention. As this area is an explicit remit of trainers and coaches the respective collaborating federations decided for logical reasons to address coaches and trainers as key target groups. They embody the link between theoretical knowledge and practical application. The integration of injury prevention – if not integral part so far – into the regular national coaches’ education or a review and update of the respective education sector was aspired as main

3.5 Evaluation and Refinement

This last passage reflects the methodical pathways which have been provided and tested within the project “Safety in Sports” and gives advice how to evaluate the impact of preventive measures implementations and by this to refine and optimise preventive programs and thereby guarantee sustainability.

From the beginning of the project “Safety in Sports” it was obvious that due to the limited resources of the collaborating sports federations and the relatively short implementation phase a comprehensive methodical approach of testing was not fully realizable. This would have included

- Surveys (baseline, follow-up) of a representative sample of the affected populations (coaches, athletes, officials
- Surveys of the same population samples in the baseline and follow-up surveys
- Surveys of control groups

In fact, the major tools for testing the impact of the project “Safety in Sports” in the pilot associations have been a baseline survey on coaches at the beginning of the

implementation, a follow-up survey on coaches at the end of the implementation and structured interviews with persons in charge of the respective federations during the implementation phase.

A reduction of injuries is more or less a long term aim of preventive programs and hardly to proof within short term activities of 12 month or less and should not serve as justification for stopping or reducing safety promotion activities.

Major overviews of the situation within a national sport federation can be generated by means of standardized surveys via questionnaire. These surveys may show whether the attitudes concerning injuries and their prevention as well as the compliance to preventive programs have changed. In addition, the detection of the actual state of knowledge in the respective federation, applied prevention approaches and available national know-how as fundament for the implementation was essential.

More generally speaking, one has to consider that there might already be thematic emphasis on specific issues (e.g. knee injuries) and that there are different national philosophies (e.g. obligation vs. voluntariness in education) in conveying diverse information (e.g. webpages, education modules, print material).

Moreover, sports communities and federations may have different “languages” and phrasing compared to science-related persons. Therefore sport-specific language and phrasing in all ways of communication as well as contents and materials that have been adapted to the specific needs and demands of respective target groups, even if this means to use different communication channels and promotional materials for athletes, coaches, officials, clubs and federations.

This also means to make all stages of implementation as transparent as possible (e.g. process of choosing the best suiting prevention measures and promotion strategies for each national federation).

4. How to make a change – General Guidelines for the Development of Safety Management Schemes (SMS) in Team Sports

In this last chapter, recommendations are given on major cornerstones of implementing safety management schemes (SMS) in a sports setting. These substantial steps have to be considered when it is planned to elaborate and implement safety-related contents into a sports-related area. The recommendations reflect the experiences that have been made during the course of the pilot project “Safety in Sports” and may assist organisations (e.g. sports federations) during future approaches. As injury prevention and safety promotion is rather specific and therefore needs to be tailored individually, it seems more appropriate to us to keep the recommendations quite general, especially when addressing multiple groups of sport. Thus, each major step contains a kind of checklist with instrumental advices for its successful realization. This leaves enough space for individual adjustment to the specific demands and needs of the respective implementation setting. Sticking to a more formal framework the subchapters follow the categorisation and the ideas of the Recommendation Rec(2001)13 “Developing a Methodology for Drawing up Guidelines on Best Medical Practices” adopted by the Committee of Ministers of the Council of Europe on October 10, 2001.

4.1 Topic Selection

SMS topics should be selected systematically. The necessity of developing SMS for sports injury prevention in a specific sport setting should keep the number of participants, the incidence and especially the prospective compliance of the target group in mind. The existence of presently available (evidence-based) injury prevention measures and safety promotion strategies should be considered in the prioritisation of topics. Moreover, the epidemiology, the etiology and the demands of the sports activity have to be regarded. A first literature review and a discussion of different models can help:

- 'Start with the end' - What do you want to achieve (mission statement) ?
- List the major issues that need to be addressed (size and severity of issues)
- Assess how far the business of your federation and your member clubs is narrowed by injuries and their consequences
- Assess what actions can make a difference (effectiveness) Summarise, what safety measures and/or safety programmes are already in place and what benefits you want to achieve by additional efforts in safety management (define the “mission”)
- Assess where you expect the maximum gains under given circumstances?
- Involve and listen to partners (e.g. sports organisations, internal and external stakeholders and experts) and adjust your ideas to the needs of the target groups and/or the main stakeholders
- Be aware of your own know-how and experiences; if possible focus on topics in which you have both
- Conclude on priority list of issues

- Be aware of your own know-how and experiences; if possible focus on topics in which you have both
- Analyse recent trends in the media and of public concern and – if necessary – adjust your topic to ‘surf on a media wave’.
- Make a decision how many resources you want to invest into exploring the opportunities of (additional) safety management and into planning of (additional) programmes.
- Appoint a person or team who should prepare a concept according to the following points.

4.2 Resources, Targets and Realistic Planning

Resources identification, definition of targets and realistic planning are preliminary actions and substantial cornerstones for forthcoming steps of SMS production. As soon as the decision is made to develop SMS carefully plan how to ensure the funding for development, dissemination, implementation, evaluation, and updating. Funding sources may be divers. The source of support must be transparent. SMS should target multiple audiences (athletes, coaches, officials, politicans) and made available in suitable formats for these different groups. The dissemination should be planned, pro-actively with the target group to guarantee sustainability and optimized use of the provided information:

- Set objectives and targets which are realistic under the given circumstances (in terms of programme implementation).
- Define realistic targets as to what realistically can be achieved within the given circumstances
- Consider a step-wise approach (e.g. pilot phase, roll-out phase, evaluation phase).
- Identify resource availability (expertise, manpower, budgets). Is it possible to get external support e.g. from foundations, government, universities, insurers or other sponsors, research fund?
- Provide an adequate system to manage the project and use this system consistently.
- Ensure a common understanding concerning management issues like time and task management, handling of monetary resources, how to carry out meetings, etc.
- List major internal & external stakeholders involved in addressing the issue (who should be involved/ what influence they have?)
- Make a decision how many resources you want to invest into exploring the opportunities of (additional) safety management and into planning of (additional) programmes.
- Appoint a person or team who should prepare a concept according to the following points.

4.3 Methods for Developing SMS

SMS should be produced by multi-professional, interdisciplinary groups in a systematic, independent and transparent fashion, using appropriate quality criteria. End user involvement through a wide review and/or testing of the pilot version is necessary before adopting a SMS for implementation. If SMS are adapted from other countries or areas, they must be re-edited and reviewed or tested for applicability in the new environment:

- Make a problem analysis by means of statistical data, literature studies and expert opinions
- Discuss the problem in an expert panel, with best practises in mind
- Elaborate preventive measures together with sport scientists, physiotherapists, sports physicians, biomechanists and experts in the respective sport
- Analyse the issue as to the relevant risk factors involved and feasible strategies for prevention
- Search for publications that identify evidence or good practices in addressing the issue and select the most promising ones
- Consult a sufficient number of relevant experts and practitioners as to the acceptability and feasibility of implementing such promising interventions
- Consult stakeholders as to the activities that are required for each of the targets (or result areas) and the necessary inputs in terms of budget, staff and expertise
- Design logical action plan including clear indicators for testing effectiveness, feasibility and acceptability
- Also analyse the topic in the subgroups that may exist to make it easy for stakeholders to identify with the problem.
- Analyse the aims and interests of the stakeholders and explain to them why and how SMS supports them to achieve their goals.
- Aim at involving the persons (representing the stakeholders) on different levels (emotional, rational etc.).
- Ensure that all partners involved ‘speak the same language’ (terminology) and adjust the language you use to the target group you are aiming at (especially in products etc.).

4.4 Dissemination and Sustainability

For the most effective implementation of SMS, a systematic approach to managing sports safety and determining those responsible is essential. Various dissemination and implementation strategies should be used in combinations to ensure maximum effect. Professional, organisational, financial, and regulatory incentives and disincentives need to be considered together with other barriers and facilitators of SMS use at both national and international (tailored implementation) level.

- Develop a dissemination strategy, as part of the overall project plan (What you plan to disseminate – the message/ To whom – the audience/ Why – the purpose/ - How – the method/ - When – the timing)

- Present the problem and your recommendations in a sport-specific language
- Take into account that in most cases there is only a limited budget of time for preventive measures
- Measures will likely be accepted if they avoid injuries and improve performance at the same time
- Involve stakeholders in marketing the outcomes (e.g. use existing structures like digital and printed publications, educations/trainings etc.).
- Keep in mind that in order to involve others in marketing, these persons need to be convinced of what has been done and that it is (somehow) beneficial for them.

4.5 Evaluation

Tools for evaluating the quality of the SMS should be used. This may be, for example a checklist, surveys via questionnaires or structured interviews. Well-planned monitoring of SMS effects is essential. Especially the impact of SMS on outcomes in form of reduction of injuries needs further development and evaluation. SMS can include a list of essential indicators that can be used for evaluating the results of implementation:

- Identify key evaluation points
- Formulate evaluation questions, indicators and targets
- Select an evaluation design. Adjust the amount and depth of the evaluation to the dimensions of the project.
- Make sure that needed data can be collected
- Who is to analyze data and to report evaluation findings
- Make sure that all partners understand the importance of evaluation and that they need to support it throughout the project.
- Adjust the amount and depth of the evaluation to the dimensions of the project.
- Start evaluating as early as possible to ensure an adequate process evaluation
- Make sure that the person(s) who evaluate(s) get all relevant information on time.

4.6 Updating and Continuous Improvement

The process of SMS production must include clear policies and responsibilities on updating. Sustainability can also be achieved with help of good and continuous maintenance of the SMS:

- ‘Infiltrate’ existing structures with the new SMS and have the changes achieved put down in writing – because ‘paper does not blush’.
- Have solid agreements concerning when, how and by whom updates will be performed – ensure financing of the updates.
- Find ‘champions’ who constantly hold the topic of SMS within their organisational structures.

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