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# Construction and Validation of the Proposal for Safety and Emergency Material and Equipment in Mountain Sports

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**Keywords**
Proposal validation · Mountain sports · Emergency · First aid · Safety

**Abstract**
***Introduction:*** This study aimed to build and validate a proposal for safety and emergency material and equipment adjusted to the practice of mountain sports in Portugal. The proposal was developed through documentary analysis, literature review, and expert consultation. ***Methods:*** The validation of the contents of the proposal was carried out using the Delphi technique, with the participation of 30 experts, male ($N = 18$) and female ($N = 12$), aged between 32 and 61 years ($M = 42.50$; SD = 7.29), with a mean of 16.63 ± 5.60 years of experience, divided into 4 groups: (i) pre-hospital trainers; (ii) pre-hospital nurses; (iii) pre-hospital physicians; (iv) higher education teachers in the field of mountain sports. The 1st version of the proposal was structured in 7 areas and included 29 items (material and/or equipment). The final version of the proposal was structured in 8 areas (general material, measuring equipment, burns, trauma, respiratory, medication, communications, and survival kit) and included 44 items (material and equipment). ***Results:*** The proposal showed Content Validity Index (CVI) values of 100%. Concerning the reliability and validity of the proposal, intraclass correlation coefficient values of 0.986 (excellent) were found for technical importance and 0.983 (excellent) for contextual fit. All values show a high level of inter-expert agreement. ***Conclusion:*** The validated proposal will be an appropriate tool for mountain sports technicians to use in order to promote safety, reduce accidents and their consequent morbidity, and reduce the activation of rescue teams.



**Construção e validação da proposta de material e equipamento de segurança e emergência em desportos de montanha**

**Palavras Chave**
Validação de proposta · Desportos de montanha · Emergência · Socorrismo · Segurança

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**Resumo**

***Introdução:*** O objetivo deste estudo foi construir e validar uma proposta de material e equipamento de segurança e emergência adequada à prática de desportos de montanha, em Portugal. O desenvolvimento da proposta realizou-se mediante análise documental, revisão de literatura e consulta de especialistas. ***Métodos:*** A validação de conteúdo da proposta efetuou-se recorrendo à técnica Delphi, com a participação de 30 especialistas, do sexo masculino ($N$ = 18) e do sexo feminino ($N$ = 12), entre os 32 e 61 anos de idade ($M$ = 42,50; SD = 7,29) com uma média de 16,63 ± 5,60 anos de experiência, divididos em 4 grupos: i. Formadores do pré-hospitalar; ii. Enfermeiros do pré-hospitalar; iii. Médicos do pré-hospitalar; iv. Docentes do ensino superior da área dos desportos de montanha. A 1a versão da proposta, estruturada em 7 áreas, incluiu 29 itens (materiais e/ou equipamentos). A versão final da proposta estrutura-se em 8 áreas (material geral, equipamento de medição, queimaduras, trauma, respiratório, medicação, comunicações, kit de sobrevivência) e inclui 44 itens (material e equipamento). ***Resultados:*** A proposta evidenciou valores de Índice de Validade de Conteúdo (IVC) de 100%. Em relação à confiabilidade e validade da proposta, verificou-se valores de ICC de 0.986 (excelente) na importância técnica e de 0.983 (excelente) na adequação ao contexto. Todos os valores demonstram alta concordância entre os especialistas. ***Conclusão:*** A listagem validada será um instrumento adequado para utilização pelos técnicos de desportos de montanha de modo a promover a segurança, a diminuir acidentes e consequente morbilidade e a diminuir a ativação de equipas de socorro.



## Introduction

Nature sports activities, such as hiking, canyoning, climbing, mountaineering, and mountain biking, among others, are becoming increasingly popular around the world. Burtscher et al. [1] and Mata and Carvalhinho [2] stated that the development and growth of national tourism have led to an increase in the practice of mountain sports, which are characterized by their risky and unpredictable environment. The concept of risk depends on the environment in which it is inserted and on the individual's perspective.

According to Haegeli and Pröbstl-Haider [3], the benefits associated with risk can be significant on a personal and social level. Although mountain activities present an increased risk of accidents and injuries, this risk also acts as a stimulus and source of strong emotions for mountain sports practitioners [2, 4]. In this regard, technicians need to acquire experience and knowledge to develop adequate prevention and safety measures to reduce accidents and emergencies during sports activities [1].

The study by Mata et al. [4] recommends theoretical and practical training in safety procedures, including first aid and rescue techniques, as well as a regular reassessment of the technician's capacities for risk management and first aid application. These recommendations must comply with the specifications of the environment and the legal guidelines of each country [5]; in Portugal, for example, it is necessary to take into account the indications of the Integrated Medical Emergency System, which includes pre-hospital operations (Dispatch No. 10319/2014, of 11 August) [6]. Métrailler et al. [7] reviewed the mountain emergency course, as well as the necessary material and equipment kit, in order to overcome identified flaws and improve the assistance provided to victims of mountain activities.

In most occurrences, due to the difficult and long-access context of the mountain, the mountain sports coach is the first one to respond and act in an emergency scenario and/or situation. This situation can be extended for some time until the arrival of the rescue teams or differentiated help (pre-hospital doctor and nurse). Elsensohn et al. [5] concluded that there is no overview or recommendations on the material and medical equipment needed to treat victims in the mountain. This is partly due to elements such as national legislation, funding, lack of training in first aid, lack of knowledge of the most recurrent medical emergencies, or the characteristics of the environment (difficult terrain, adverse weather conditions, and inhospitable access) [5, 8]. It is therefore imperative that mountain sports technicians are highly self-sufficient, both in their technical field and in the areas of safety rescue areas, with adequate training, material, and equipment [8].

### *Emergency Supplies and Equipment*

Medical kits used in the mountains must meet several requirements. For better management and organization of the material to be carried, medical items, including medicines, can be divided into three categories: (i) prevention, (ii) diagnosis, and (iii) treatment of injuries and illnesses. Concerning survival equipment, such as the

survival kit and communication devices, although they are not directly used in the diagnosis or treatment of diseases, they undoubtedly contribute to the health and safety of mountain sports coaches and participants [5].

On the other hand, priority should be given to items that are effective in treating probable incidents, such as basic life support equipment [9, 10], bandages and compresses, and blood pressure and temperature gauges. In addition, factors such as the terrain elevation, the season of the year, the experience of the mountain sports coaches, local laws, and the characteristics of the practitioners (technical, physical, and psychological) must be taken into account when preparing the medical kit [8]. It should also be noted that the training standards for the use and maintenance of medical equipment should be applied in the context of mountain sports [11, 12].

According to Quinn et al. [13], first aid training and the correct handling of medical material and equipment are essential for the effectiveness of the victims' assistance, as is the use of medical gloves when providing assistance. On the other hand, antiseptics such as betadine, isopropyl alcohol, and hydrogen peroxide are not useful for cleaning wounds and therefore should not be used for this purpose.

Following the guidelines of the Integrated Medical Emergency System (SIEM), the first intervention on the victim will always be from the responsible technician, who, depending on the situation and the material available, will carry out the detection, alerting, and pre-aid. The rescue may take some time due to the characteristics of the mountain, the difficulty of access to the victim and the availability of pre-hospital medical teams, which can provide differentiated assistance and advanced life support [8].

In line with Groves and Varley [14] and Mata et al. [4], Nature Sports technicians are unaware of and tend to devalue some safety and emergency materials and equipment. To try to reverse this position and face the increase in the number of practitioners (formal and informal) of mountain sports, which will probably lead to an increase in the number of incidents, accidents, and injuries [15], it is absolutely essential to have safety and emergency material and equipment suitable for the mountain context [16]. However, a validated list of materials and safety and emergency equipment suitable for the practice of mountain sports in Portugal was not found in the literature.

In short, this study has as its general purpose the construction and validation of a proposal of safety and emergency material and equipment for the practice of mountain sports. More specifically, it is intended to construct and validate a proposal that is aimed at the practice of mountain sports, taking into account the Portuguese reality and context. Three specific objectives have therefore been defined:

Objective 1: construction and development of the proposal of material and safety and emergency equipment for the practice of mountain sports.

Objective 2: validation of the content of the proposal/instrument.

Objective 3: analysis of the reliability of the proposal/instrument.

## Materials and Methods

Since the purpose of the study was to construct and validate a proposal for safety and emergency material and equipment for mountain sports, a three-stage methodology was developed: (i) construction of the proposal/instrument based on a literature review and document analysis, focusing on the state of the art and consultation with specialists; (ii) validation of the content of the instrument using the Delphi technique and by consensus among specialists; (iii) analysis of the reliability of the instrument with the application of the intraclass correlation coefficient (ICC) [17–20].

### *Subjects*

A sample of 30 specialists, male ($N = 18$) and female ($N = 12$), between 32 and 61 years of age ($M = 42.50$; SD = 7.29) with a mean of 16.63 ± 5.60 years of experience was used for content validation, divided into 4 professional groups as described in Table 1. The established inclusion criterion was a minimum of 10 years of experience.

### *Procedures*

Data collection was carried out with the informed consent of the study participants. All procedures adopted were approved by the Ethics Committee for Scientific Research, in the areas of human health and well-being, of the Universidade de Évora (Évora's University) in document no. 20063.

### *Safety and Emergency Material and Equipment List Building Process*

The researchers used a literary review focusing on the work of Blancher et al. [21], Brandenburg and Locke [8], Elsensohn et al. [5], Pye and Greenhalgh [22], Larsen et al. [23], and a document analysis focusing on the work of Carline et al. [24], DGS [25], and Inem [26]. The first version of the proposal for safety and emergency material and equipment was prepared in collaboration with two specialists.

### *Content Validation*

Communication between researchers and specialists took place via email, with an invitation to participate in the study and a link (Google Forms) with informed consent and identification of the research team. This was followed by the explanatory guide for the

**Table 1.** Characterization of the participating experts

| | *N* | Gender | Academic qualifications | Age, years | Experience, years |
|---|---|---|---|---|---|
| Pre-hospital trainers | 9 | Male, *N* = 5<br>Female, *N* = 4 | Degree, *N* = 5<br>Master's, *N* = 4 | 42.44±7.56 | 17.22±6.96 |
| Pre-hospital nurses | 7 | Male, *N* = 2<br>Female, *N* = 5 | Degree, *N* = 2<br>Master's, *N* = 4<br>PhD, *N* = 1 | 41.29±5.46 | 15.43±5.09 |
| Pre-hospital doctors | 6 | Male, *N* = 3<br>Female, *N* = 3 | Master's, *N* = 5<br>PhD, *N* = 1 | 41.0±7.66 | 14.67±4.45 |
| Higher education teachers (DM) | 8 | Male, *N* = 8 | Master's, *N* = 5<br>PhD, *N* = 3 | 44.75±8.84 | 18.5±5.39 |

Mean and standard deviation for age (years) and experience (years) variables. DM, mountain sports.

evaluation of the instrument. All documents and expert responses were properly stored and protected in Google Docs®.

The process of validating the content of the first version of the proposal began with the use of the Delphi technique based on the data collected, seeking consensus among a group of specialists by carrying out validations articulated in rounds. This process was carried out without direct communication between the experts, so that they could express their opinions individually and independently, only having access to the opinions of other experts as the process progressed [17, 27–29].

The first round of the Delphi technique took place from January 20, 2022, to March 20, 2022. In the first round, the 30 experts evaluated 29 items (materials and equipment) for their technical importance and appropriateness to the context, using a Likert-type scale where 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree [30]. To improve the content of the instrument, a field was provided at the end of each item for experts to contribute with comments or suggestions. After registering the experts' contributions in the first round, 2 items were eliminated due to a lack of agreement and 15 new items were added.

The resulting proposal was sent to the second Delphi round, which started on April 2, 2022, and ended on May 2, 2022. The data collected for each item in the two rounds were analyzed using the Content Validity Index (CVI). The CVI was calculated from the sum of the responses "3" and "4" by each specialist in each item of the proposal, and this sum was divided by the total number of responses (CVI = number of responses "3" and "4"/total number of responses × 100). As an acceptance parameter, a 0.80% agreement was established for the CVI in the evaluation of each criterion, as well as for the general evaluation of each item [18, 19].

*Reliability Analysis*

The internal consistency and reliability of the proposal for safety and emergency material and equipment in mountain sports were analyzed by studying the homogeneity of responses from different evaluators. To analyze the rate of agreement between experts, the ICC was used, selecting the two-way mixed effects model, with the average type of k evaluators, with a definition of consistency [30], considering the values: 0.5 = poor, 0.5 to 0.75 = moderate, 0.75 to 0.9 = good, and values greater than 0.9 = excellent. Comments and suggestions from experts were taken into account.

## Results

The first version of the proposal for safety and emergency material and equipment in mountain sports was structured into 7 areas: (i) general material, (ii) measuring equipment, (iii) burns, (iv) trauma, (v) breathing, (vi) medication, (vii) communication. Each area contained several items (materials and/or equipment) out of a total of 29. After the first Delphi round, and with the contributions of the experts, items 8 and 12 (adhesive strips for suturing wounds and a box of contaminants) were removed, and 15 items and one area (survival kit) were added, as shown in Table 2.

In the second Delphi round, we obtained consensus from all the experts for 44 items (material and equipment) and 8 areas (general material, measuring equipment, burns, trauma, respiratory, medication, communications, and survival kit). The existence of agreement among the experts was verified, with a representative value of 100% for each item as well as for the whole proposal, as shown in Table 2. In this way, we concluded the rounds using the Delphi technique.

Concerning the internal reliability of the proposal, the results obtained by analyzing the ICC of the data collected in the second round of the Delphi technique showed the reliability and validity of the instrument, verifying an ICC value of 0.986 (excellent) in terms of technical importance and of 0.983 (excellent) in adequacy to context. All values show a high level of agreement among the experts (Table 3).

**Table 2.** CVI of the proposed safety and emergency material and equipment in mountain sports

| Suitcase/backpack 1st aid, general material items | Technical importance IVC | Technical importance ICC | Adaptation to the context IVC | Adaptation to the context ICC |
|---|---|---|---|---|
| 1 Gloves | 1.0 | 0.986 | 1.0 | 0.983 |
| 2 Saline | 1.0 | | 1.0 | |
| 3 Antiseptic spray | 1.0 | | 1.0 | |
| 4 Band aids | 1.0 | | 1.0 | |
| 5 Scissors | 1.0 | | 1.0 | |
| 6 Adhesive tape (small) | 1.0 | | 1.0 | |
| 7 5 cm sticky tape | 1.0 | | 1.0 | |
| 8 Bandages (various sizes) | 1.0 | | 1.0 | |
| 9 Tweezers | 1.0 | | 1.0 | |
| 10 Gauze | 1.0 | | 1.0 | |
| 11 Sterile compresses (various sizes) | 1.0 | | 1.0 | |
| 12 Isothermal sheet | 1.0 | | 1.0 | |
| 13 Cold pack | 1.0 | | 1.0 | |
| 14 Heat bag | 1.0 | | 1.0 | |
| 15 Trash bag | 1.0 | | 1.0 | |
| Measuring equipment | | | | |
| 16 Blood pressure meter | 1.0 | | 1.0 | |
| 17 Oximeter ($SPo_2$) | 1.0 | | 1.0 | |
| 18 Blood glucose meter | 1.0 | | 1.0 | |
| 19 Flashlight pupils | 1.0 | | 1.0 | |
| 20 Thermometer | 1.0 | | 1.0 | |
| Burns | | | | |
| 21 Burn gel | 1.0 | | 1.0 | |
| 22 Fat gauze | 1.0 | | 1.0 | |
| 23 Sheet for burns | 1.0 | | 1.0 | |
| 24 Sunscreen | 1.0 | | 1.0 | |
| Trauma | | | | |
| 25 Neck collar (adjustable) | 1.0 | | 1.0 | |
| 26 Splints (various sizes) | 1.0 | | 1.0 | |
| 27 Bandages (various sizes) | 1.0 | | 1.0 | |
| 28 Tourniquet | 1.0 | | 1.0 | |
| 29 Demographic pen (allows you to write on the skin) | 1.0 | | 1.0 | |
| Respiratory | | | | |
| 30 Pocket mask (PCR) | 1.0 | | 1.0 | |
| 31 Oropharyngeal tube set | 1.0 | | 1.0 | |
| Medication | | | | |
| 32 Paracetamol | 1.0 | | 1.0 | |
| 33 Sugar or sugar gel | 1.0 | | 1.0 | |
| 34 Antihistamine (e.g., cetirizine) | 1.0 | | 1.0 | |
| 35 Insect repellent | 1.0 | | 1.0 | |
| Communications | | | | |
| 36 Cell phone | 1.0 | | 1.0 | |
| 37 Portable walkie talkie | 1.0 | | 1.0 | |
| 38 GPS | 1.0 | | 1.0 | |
| 39 Solar panel | 1.0 | | 1.0 | |
| Survival kit | | | | |
| 40 Whistle | 1.0 | | 1.0 | |
| 41 Flashlight (front) | 1.0 | | 1.0 | |
| 42 Knife | 1.0 | | 1.0 | |
| 43 Tablet for water purification | 1.0 | | 1.0 | |
| 44 Stone lighter | 1.0 | | 1.0 | |
| Total CVI of the proposal | 100% | | 100% | |

CVI, Content Validity Index; ICC, intraclass correlation coefficient.

**Table 3.** Intraclass correlation coefficient (ICC): reliability between experts

| Specialists | ICC | Specialists | ICC | Specialists | ICC |
|---|---|---|---|---|---|
| Esp1 | 0.986 | Esp11 | 0.986 | Esp21 | 0.986 |
| Esp2 | 0.987 | Esp12 | 0.986 | Esp22 | 0.985 |
| Esp3 | 0.986 | Esp13 | 0.986 | Esp23 | 0.986 |
| Esp4 | 0.985 | Esp14 | 0.987 | Esp24 | 0.986 |
| Esp5 | 0.986 | Esp15 | 0.986 | Esp25 | 0.986 |
| Esp6 | 0.986 | Esp16 | 0.986 | Esp26 | 0.986 |
| Esp7 | 0.986 | Esp17 | 0.986 | Esp27 | 0.987 |
| Esp8 | 0.986 | Esp18 | 0.985 | Esp28 | 0.986 |
| Esp9 | 0.985 | Esp19 | 0.985 | Esp29 | 0.985 |
| Esp10 | 0.985 | Esp20 | 0.986 | Esp30 | 0.985 |

## Discussion

The present study aimed to build and validate a proposal for material and safety and emergency equipment suitable for the practice of mountain sports in Portugal. Taking into consideration the literature and documentary consultation, and based on the results of the first version built by the researchers, 7 areas were defined: (i) general material, (ii) measuring equipment, (iii) burns, (iv) trauma, (v) breathing, (vi) medication, (vii) communication. Each area had several items (materials and/or equipment), for a total of 29. At this stage, a proposal to carry out the first round using the Delphi technique was sent to the specialists, who provided important contributions. We would like to highlight the concern of the specialists regarding the appropriateness of their choices to the specificity of the context and the most recurrent situations in emergencies. The second round resulted in a proposal structured in 8 areas (general material, measuring equipment, burns, trauma, respiratory, medication, communications, survival kit) and containing 44 items (material and equipment), with a reliability analysis that showed 100% consensus among specialists. These results were to some extent expected and are in line with the findings of Blancher et al. [21], Brandenburg and Locke [8], Elsensohn et al. [5], Pye and Greenhalgh [22], INEM [26], and Larsen et al. [23]. We emphasize that the areas defined in the proposal for safety and emergency material and equipment respond to emergencies in the mountain context, whether it is an accident or sudden illness, and will allow for an improvement in the effectiveness of the assistance provided to the victim. According to Elsensohn et al. [5] and Métrailler et al. [7], to carry out these actions more safely, it is essential for the mountain sports coach to incorporate a set of techniques.

The plan of action to be carried out in relation to the potential victim will be adapted to the different types of emergencies, whether they are more common everyday situations, such as wounds, burns, or fractures, or priority relief situations, such as cardiorespiratory emergencies, shock, acute poisoning, hemorrhages, or trauma) [26]. In this sense, for ease of use and following Brandenburg and Locke [8], we have structured our list of safety and emergency material and equipment into 8 different areas. The "general material" area will respond to cleaning, disinfection, wound protection, temperature control, and acute treatment of muscle injuries. The area of "measuring equipment" allows the measurement of blood glucose, body temperature, blood pressure, blood oxygen saturation level, and pupillary assessment. The "burns" area contains material for the protection and treatment of burns. The "trauma" area contains equipment for immobilizing and stabilize the victim, such as a cervical collar, splints and bandages, and a tourniquet to control bleeding. In the "respiratory" area, you can find a mask with an insufflation filter (for basic life support) and a set of oropharyngeal tubes to keep the airway clear (in the event of cardiorespiratory arrest). The "medication" area allows you to relieve symptoms or correct deficits in the body, such as hypoglycemia. The "communications" area includes the most common equipment used in everyday life (mobile phone) as a first line; in case of failure, we move to a second line with walkie-talkies and GPS; to ensure the energy supply of the devices, this area also includes a portable solar panel. Finally, there is the "survival kit" area, which is aimed at staying in one place for a long period and even staying overnight in safety (maintaining an inexhaustible form of communication – the whistle), by including a flashlight, a knife, a tablet for water purification, and a stone lighter.

The proposed safety and emergency material and equipment resulting from the present study takes into account the national emergency response legislation and is in accordance with the Integrated Medical Emergency System (SIEM), Dispatch No. 10319/2014, of August 11th [6], which, due to the specific context of mountain sports, places its coach as the first intervener, whether in detection, alert, and pre-aid [5, 7, 31]. It should be noted that the intervention may still be limited by the lack of adequate training to act according to the pre-hospital protocols, by the legal prohibition of drug administration and advanced life support manoeuvers and also by the material and equipment available to acquire. However, in line with the recommendations of Brandenburg and Locke [8], Métrailler et al. [7], and Burtscher et al. [1], our proposal has taken into consideration all the above-mentioned constraints, creating a proposal for material and equipment to respond appropriately to mountain sports practitioners in the event of an emergency. More specifically, in the pre-aid phase and until the arrival of differentiated teams (which have specific

training, material, and equipment to proceed with the rescue, transport, and treatment of victims), as defined in the Integrated Medical Emergency System, we would also like to point out that this proposal considers the safety of technicians and practitioners of mountain sports and pre-aid for pre-hospital situations during mountain activities, which normally do not exceed 24 h [8].

In short, the proposal of safety and emergency material and equipment developed and validated in the present study fills a gap in the national knowledge on safety and emergency in mountain contexts, taking into account the national legislation and its potential users. Thus, an improvement in rescue is expected and, consequently, a reduction in the morbidity and activation of rescue teams associated with the practice of mountain sports [8].

## Conclusion

From the results, we concluded that our proposal of safety and emergency material and equipment for mountain sports proved to be valid and suitable for use by mountain sports technicians. The final version is easy to implement and adequate, as it is structured in 8 areas (general material, measuring equipment, burns, traumas, respiratory, medicines, communications, survival kit) and includes 44 items (material and equipment).

Until now, no proposals for safety and emergency material and equipment adapted to the Portuguese reality have been found in mountain sports. For this reason, the proposal developed and validated can be considered an added value for the development of this scientific and sporting area. Taking into account the growing participation in Nature Sports, especially in mountain sports, which in itself reveals a high number of incidents, we have verified the need to strengthen this area of study.

In conclusion, the results of the present study fill a gap in national knowledge in the area of safety and emergency, particularly in a mountain context, taking into account national legislation and mountain sports technicians as users. It is expected that the use of this proposal for safety and emergency material and equipment in mountain sports will promote the improvement of rescue, as well as the decrease of morbidity and the activation of emergency teams.

## Recommendations

Based on the foregoing and in agreement with Métrailler et al. [7] and Mata et al. [4], our first recommendation will be to combine practical skills with theoretical knowledge: the mountain sports coach must have, in addition to responsibility, the physical and mental capacity associated with theoretical knowledge. This knowledge must be supported by a good technical capacity of practice and by additional theoretical and practical skills in prevention and first aid intervention.

The second recommendation involves training, skills training, and specific and constant first aid training, which will make a difference in the application of emergency protocols and the use and handling of material and equipment. The third recommendation will be the use of materials and equipment adjusted to the practice and the emergency, following the proposal of Cerqueira et al. [32] indicating that these professionals must also know the location of the material and equipment, its content, as well as checking, replacing, and analyzing the condition of the same, before and after each use.

The fourth recommendation is based on safety and emergency training, that is, training in specific and appropriate first aid for mountain sports technicians, which would respond to the previous recommendations, as well as to the existing gap in the area of mountain sports in Portugal. This recommendation follows the example of Métrailler et al. [7] which revises and improves the rescue course for mountain sports technicians in Switzerland, as well as the necessary first aid kit.

Fifth recommendation, training in rescue, in parallel with specific training in first aid, we consider rescue training to be extremely important since it is often impossible for specialized teams to access the site or because they are at a considerable distance from it, which could jeopardize the well-being of the victim [33–35]. We would also like to point out that in Portugal there are no medical teams specifically trained in rescue and mountain rescue, conditioning the differentiated medical assistance in these places and referring and directing to the technicians and responsible, or to rescue and rescue teams, who also do not have the valence of advanced life support. Finally, the sixth recommendation concerns the need to increase the production of scientific knowledge in the area of safety and emergency in mountain sports, particularly in the area of rescue.

## Statement of Ethics

Data collection was carried out with the informed consent of the study participants. All procedures adopted were approved by the Ethics Committee for Scientific Research, in the areas of human health and well-being, of the University of Évora in document no. 20063.

## Conflict of Interest Statement

The authors have no conflicts of interest to declare.

## Author Contributions

Carlos Mata and Luís Carvalhinho designed the experiments and analyzed the data. Catarina Pereira analyzed the data and prepared the manuscript. All authors approved the final manuscript.

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## Data Availability Statement

The data that support the findings of this study are available on request from author 1 or the corresponding author.

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