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Title: **Current practice for safe return-to-play after lateral ankle sprain: A survey among French-speaking physicians**

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TITLE PAGE

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ABSTRACT:

Background: Recommendations are available for assessment criteria for safe return-to-play (RTP) after a lateral ankle sprain. However, their current use among physicians is unknown.

Methods: French-speaking physicians in Belgium, France and Switzerland were asked to complete an online survey and report their clinical assessment of selected RTP criteria.

Results: The respondent sample (n=109) included physicians with and without Sports Medicine education, varied level of experience and proportion of athletes in their practice population. Pain was the most selected criterion for safe RTP (90% of physicians), followed by ability to engage in functional tasks (82%), functional instability (73%), range of motion (61%), proprioception (47%), mechanical instability (39%), strength (38%) and swelling (31%). A low proportion of physicians use quantitative measures to assess these criteria (between 4% to 53%).

Conclusions: A large proportion of physicians consider the recommended criteria for RTP decisions. However, physicians do not frequently use quantitative measures.

Keywords: surveys and questionnaires, ankle sprain, assessment, sports medicine, rehabilitation

MAIN TEXT:

1.INTRODUCTION

Ankle injury is the most common musculoskeletal injury in the active and sports populations, reported in 34.2% of injuries among 24 sports [1]. Lateral ankle sprain (LAS) is the primary ankle injury, accounting for 73.9% of all ankle sprain [2]. In about 70% of cases, individuals with history of LAS still have at least one residual long-term symptom (1.5 to 4 years follow-up) [3]. Pain, instability, proprioception deficit, strength deficit or/and range of motion deficit could contribute to the high risk of re-injury after a LAS, and previous ankle sprain is the main risk factor [4]. Moreover, LAS is defined as a continuum of disabilities that often leads to chronic ankle instability and early ankle osteoarthritis [5]. The 2019 Rehabilitation-Oriented ASsessmenT (ROAST) establishes the diagnostic elements, and the mechanical and sensorimotor impairments that should be objectively assessed by clinicians [6]. Although clear evidence-based criteria for return-to-play (RTP) after an ankle sprain are not yet established in the literature, narrative reviews and clinical experts' consensus describe the contents of RTP decision-making (i.e., pain, ankle perception including proprioception, ankle impairment, sensorimotor control system and sport testing) [7,8]. Thus, recommendations regarding the assessment and follow-up of LAS are available. However, their translation to clinical practice is unknown. The purpose of this study was therefore to investigate physicians' self-reported daily practice in light of these recommendations by investigating which criteria they deem more important and how they evaluate them. We hypothesized that physicians are not yet using published recommendations to make a RTP decision.

2.MATERIALS AND METHODS

A team of two physiotherapists (author 1 and author 2) and two physicians (author 7 and author 8) collaborated to develop a survey, based on rehabilitation-oriented assessment guidelines [6]. This survey was submitted to an expert committee of five physicians from our institution.

The final version was accepted by our institutional ethical committee. After validation, the survey was available through https://www.sondageonline.com and was online from December 2018 to February 2019. The French-speaking physicians from Belgium, France or Switzerland were recruited via professional mailing lists from four health professionals (Author1, Author2, Author7, Author8). A number of approximately 500 health care professionals were contacted by an e-mail containing an electronic link to the survey. The inclusion criteria were specified in the e-mail invitation: speaking French, being a physical and rehabilitation physician or orthopaedist physician or sport physician or general physician (see Appendix A1). A number of 122 respondents visited the first page of the survey but 12 were excluded because they did not fill the entire survey and one did not fill a physician's specialisation, leading to a completeness rate of 89%.

The survey was divided into three parts and laid out as described below. The first part consisted of setting the criteria for a RTP decision: "In your daily practice, which parameters do you consider in determining whether a patient is able to return to competitive sport after a conservatively treated lateral ankle sprain?" This was a closed-ended question where physicians were invited to select a maximum of five items among the nine suggested: "pain, swelling, ankle range of motion, ankle muscle strength, functional ankle instability (perceived instability), proprioception (deep sensitivity), ability to engage in functional tasks (balance, jumping, running, cutting movements, ...), mechanical ankle instability (pathological laxity), and other criteria". In the second part, details about each selected aforementioned criterion

were collected. The last part focused on respondents' demographics, including years of practice, their specializations and the proportion of athletes treated (see Appendix A2).

Each physician was instructed to answer all the questions that related to their clinical practice with patients conservatively treated for both first LAS and recurring LAS. To be time-efficient, the online survey incorporated a limited number of answers and the use of branching logic. The total number of questions answered by each physician was therefore slightly different according to their individual practice habits. The participation was completely anonymous because no identifying information was collected on any participants. The additional Checklist for Reporting Results of Internet E-Surveys (CHERRIES) was used to ensure the quality of reporting for the findings of this study (see Appendix A3).

2.1.Data analysis

Statistics were performed using SAS studio University edition 2.8 9.4 M6. We calculated the frequency distribution of the answers using percentages. Then, the relationship between the selection of a criterion and the characteristics of the physicians (Sports Medicine education, experience and percentage of athletes treated) was analyzed by means of a Chi-squared test. The same analyses were performed for the choice of functional tests and the use of quantitative measures in relation to the characteristics of the physicians. Results were considered significant at $p \leq .05$.

3.RESULTS

Among the 122 respondents, 109 completed both the survey and selected a physician specialization. Our three main demographic variables of interest were the presence of Sports Medicine education, the years of experience (time of medical practice) and the usual proportion of athletes treated among their patient population. The physicians were free to

estimate the number of patients they considered as athletes, including recreational and professional athletes. The respondent sample included 46% of physicians with sport medicine specialisation (*Spe*). *Spe* could be only specialized in Sport Medicine or they could be specialized in another area (e.g. General Medicine) and in Sport Medicine. A similar proportion of physicians had no Sport Medicine specialisation (*NoSpe*:54%). Likewise, regarding the years of experience, the sample was well distributed between physicians with less than 5 years of experience (*Exp5*: 26%), 5 to 20 years of experience (*Exp5-20*: 37%) and more than 20 (*Exp20+*: 37%). The number of physicians who treat less than 20% athletes (*Ath20*: 46%) and physicians who treat between 20% and 80% athletes (*Ath20-80*: 38%) were larger than those who treat more than 80% athletes (*Ath80+*: 16%). The description of the population is presented in the Table 1.

The most selected ankle-related RTP criteria and the percentage of selected quantitative measures of these criteria are presented in Figure 1. Pain and functional ankle instability were selected by a large number of physicians (90% and 73%, respectively). In the second part of the survey, only half of the 90% of physicians (53%) selected a quantitative pain scale (visual pain scale) and only 4% of the 73% of physicians selected a quantitative scale of functional ankle instability (questionnaire). Ability to engage in functional tasks was the second most selected ankle-related criteria by the physicians (82%). However, only 31% of these 82% of physicians used the previous measures and/or reference measures of hop tests, balance test, gait and sports movement analysis. More details on the ability to engage in functional task responses are available in the supplementary material (see Appendix A4). Ankle range of motion was selected by 61% of physicians, but only 27% of these 61% of physicians selected a goniometer and/or a measurement tool to assess this criterion. Proprioception was selected by 47% of physicians, but only less than half (18%) of these 47%

of physicians selected a goniometer and/or an isokinetic machine and/or the Myolux® to assess this criterion.

Conversely, the ankle muscle strength was only selected by 38% of physicians and 20% of these 38% of physicians selected a quantitative measure (isokinetic and/or the Myolux® and/or hand-held-dynamometer tool). Likewise, mechanical ankle instability was selected by 39% of physicians and 17% of these 39% of physicians selected the anterior drawer test and/or varus test with quantitative measures to assess it. Similarly, ankle swelling was selected by 31% of physicians, and 24% of these 31% of physicians selected a measurement tool and/or the Esterson figure-of-8 quantitative measure to assess it.

A summary table of the selected criteria and measurement methods used by physicians in light of the published recommendations is available in the supplementary material (see Appendix A5).

The influence of the physicians' demographic on the criteria selection is presented in Table 2. Ability to engage in functional tasks and ankle range of motion criteria were significantly more commonly selected by the *Spe* group as compared to the *NoSpe* (*Spe*:94% vs. *NoSpe*:71%, $\chi^2 = 9.40$, p=0.002 and *Spe*:72% vs. *NoSpe*:51%, $\chi^2 = 5.07$, p=0.02, respectively). The selection of ability to engage in functional tasks and ankle range of motion criteria was, however, not significantly influenced by physicians' experience ($\chi^2 = 0.51$; p=0.77 and $\chi^2 = 1.50$; p=0.47, respectively) nor by the proportion of athletes treated ($\chi^2 = 0.76$; p=0.68 and $\chi^2 = 1.93$; p=0.38, respectively). Mechanical ankle instability was selected significantly less by the *Spe* and *Ath80+* subsamples (*Spe*:26% vs. *NoSpe*:51% $\chi^2 = 7.00$; p=0.01 and *Ath80+*:22% vs. *Ath20-80*:29% vs. *Ath20*:54% $\chi^2 = 8.45$; p=0.01) and this criterion was not influenced by the physicians' experience ($\chi^2 = 0.13$; p=0.94). Regarding the ankle swelling criterion, *Ath80+* selected this criterion less than *Ath20-80* and *Ath20* (*Ath80+:*11% vs. *Ath20-80*:41% vs. *Ath20*:30%, $\chi^2 = 5.43$; p=0.07).

The *Spe* group selected the visual pain scale significantly more than the *NoSpe* (*Spe*:64% vs. *NoSpe*:41%, $\chi^2 = 5.09$; p=0.03). The other physicians' demographics did not significantly affect the choice of use of quantitative measures, as reported in the supplementary material (see Appendix A5).

4.DISCUSSION

The aim of our study was to evaluate whether physicians used LAS assessment recommendations in determining a safe RTP. Findings from our study have revealed that physicians' daily practices were inconsistent with the guidelines in the available literature [6-8] for our sample population. Although a large proportion of physicians seem aware of the criteria for pain, the ability to engage in functional tasks, functional ankle instability and ankle range of motion criteria described in the recommendation-oriented assessment for LAS [6], few of them are using recommended measurement tools in their daily practice. Furthermore, a low proportion of physicians considered mechanical ankle instability, ankle muscle strength and ankle swelling. The use of quantitative measures is similarly low with respect to these recommended criteria [6]. Our study further revealed that physicians with a Sports Medicine specialisation (*Spe*) use more pain assessment scales, assess the ability to engage in functional tasks and ankle range of motion more, while assessing the mechanical ankle instability less than the physicians without Sports Medicine specialisation (*NoSpe*). On the other hand, the years of experience and the percentage of athletes treated do not seem to have a significant influence on physicians' choices.

4.1.Pain perception

Pain is one of the most frequent residual symptoms after a LAS which could explain why physicians often have to deal with pain in a RTP decision context [9]. In general, the

most common scales used are the visual analogue scale (VAS) and the numeric rating scale for pain (NRS). VAS is a continuous scale comprised of a line usually measuring 10 cm where 0 is described as no pain and 10 as the worst imaginable pain [10]. NRS is a segmented numeric version of the VAS [10]. In our study, a large proportion of physicians selected pain (90%) and the *Spe* group seem more aware of the need to use these pain scales (p=0.03). They should not only be used for safe RTP decision, but also for patient follow-up and treatment adjustments during rehabilitation.

4.2.Functional ankle instability perception

Another way to follow and adjust the patient's rehabilitation is to objectively assess functional ankle instability with the use of validated questionnaires [6]. The Functional Ankle Ability Measure (FAAM), the Cumberland Ankle Instability Tool (CAIT) and the Ankle Instability Instrument (AII) are appropriate evaluative instruments to quantify functional ankle instability after a LAS [11-13]. Although the functional ankle instability RTP criterion was frequently selected by physicians, only 4% of them are using a questionnaire. This discrepancy could be explained by two factors. First, the validated French versions of these questionnaires are rather recent (less than 10 years for the FAAM and less than one year for the CAIT and the AII) [14-16] and the delayed transfer of research knowledge into daily practice is an unfortunate and common challenge. Secondly, these scales could be cumbersome in daily practice when physicians often have a limited amount of time with their patients [17].

Using scales in daily practice could help to obtain quantitative scores of ankle instability perception but also of pain perception. These reports are required to make more relevant RTP decisions for the patients. The majority of physicians orally assess the perceived ankle instability and the perceived pain during their medical consultation, but the subjective

perceptions from both patient and physician can be discordant, especially during recovery, due to the patient's fear of re-injury [18]. The use of a questionnaire or a scale will help physicians to be more objective but will also be more relevant in the RTP follow-up process. These assessments do not always require the presence of physicians. To save time, a questionnaire of functional ankle instability could be implemented in the waiting room or, for instance, with an online questionnaire a day before the consultation.

4.3.Ability to engage in functional tasks

The functional assessment is not just about the perception of the ankle. During rehabilitation, therapists also consider the ability to engage in functional tasks. Sports Medicine education (*Spe*) appeared to enable physicians to be more considerate in assessing these abilities ($p=0.002$). Hence, it seems to play a role in knowledge and possibly application of these assessments. However, only 31% of physicians are using the previous measures and/or reference measures of hop tests, balance test, gait and sports movement analysis. Several recommended functional assessments are reliable and valid (e.g. Y Balance Test, Hop test) [19]. Nevertheless, space and/or materials are often required to assess the ability to engage in functional tasks, further limiting the assessment.

4.4.Range of motion

LAS often leads to a decrease of ankle range of motion that negatively impacts functional ability [20,21]. Moreover, this limitation (particularly in dorsiflexion) increases the risk of being re-injured [22]. In our study, only 27% of surveyed physicians selected a goniometer or other measurement tool to assess this ankle range of motion, although it is advised that dorsiflexion range of motion is assessed with a measurement tool – the weight-bearing lunge test (WBLT) [6]. The WBLT is a reliable and valid measurement tool, which

can be easily implemented in daily practice. In a RTP context, it is recommended that a full range of motion is recovered [23]. For example, for the WBLT, a difference of 2-3 cm between the right and the left ankle is considered to be normalized asymmetry [24]. As for the ability to engage in functional tasks, a higher proportion of the *Spe* group selected ankle range of motion criteria for their RTP decisions compared to the *NoSpe* (72% vs. 51%, respectively, p=0.02). However, in this case, the range of motion could almost always be assessed early in the rehabilitation, and the required materials and/or space are not as extensive when engaging in functional task assessments.

4.5.Strength

Muscle weakness, similar to the limitation of range of motion, can negatively influence the ability to engage in functional tasks [22]. However, only 38% of the physicians selected strength for their safe RTP decision. Moreover, muscle weakness could also be a risk factor for LAS [4]. Muscle strength seems to be more widely studied for knee injury rehabilitation and RTP decision making [25,26]. The lower consideration of the level of ankle muscle strength could be explained by the lack of clear consensus on its assessment. Although isokinetic-dynamometer assessment is well described in the literature, the ROAST recommendations suggest a hand-held dynamometer assessment [6]. However, despite being validated with good intra-rater reliability, it is not as specific as the isokinetic-dynamometer and requires more studies on the inter-rater reliability [27,28].

4.6.Mechanical ankle instability

In the acute phase of LAS, a mechanical ankle instability evaluation is recommended to help clinicians diagnose an injury, but the ROAST did not include this specific assessment during rehabilitation [6]. In our study, few physicians assess mechanical ankle instability for a

RTP decision as well (39%). Moreover, mechanical instability is not only selected less by *Spe* compared to *NoSpe*, but it is also selected less by the *Ath80+* compared to the *Ath20* (p=0.01 for both). Thus, Sports Medicine education and treating a large proportion of athletes appear to influence the low consideration of the mechanical ankle instability criterion in a RTP decision. Although the mechanical ankle instability could be considered as a non-modifiable criterion with conservative treatment, this is an area of concern as mechanical instability could (in association with other factors) be a predictor for re-injury [31].

4.7.Swelling

Swelling assessment, which is not only recommended in the acute LAS phase but also during the rehabilitation process, was the criterion least selected by the physicians (31%). Moreover, only 24% of physicians use the Esterson figure-of-8 test recommended by the ROAST [6]. Swelling can be a recurrent residual symptom that requires objective testing [3]. The low consideration of some criteria and the low application of recommended measures further underline the discrepancy between the available guidelines and reported field practice.

4.8.Limitations

This study includes several limitations which should be considered before generalizing the results. Only French speakers' physicians were surveyed; however, the sample is representative of three countries: Belgium, France and Swiss. The entire survey is available and could be translated in other language to other community. Secondly, participants were asked to select a maximum of five of the most important criteria, which could have impacted the low proportion of some criteria selection but allow to decrease the time necessary to answer the entire questionnaire. Finally, proprioception (deep sensitivity) is one component of global postural ability. This is not mentioned in the ROAST recommendations but the

proprioception (deep sensitivity) could be assessed and could be considered as potential criterion to RTP [30].

5. CONCLUSION

Although French speaking physicians seem aware of assessing the important ankle-related criteria to select a safe RTP after a LAS, few of them are using the ROAST recommendations in their daily practice. Assessing patients with quantitative and qualitative measures could be of great help to physicians making a RTP decision. Nonetheless, so far, few physicians surveyed seem to use quantitative measures with patients. Sports Medicine education appears to be a factor that increases the use of quantitative methods, but this is not true for all criteria. Additionally, it is surprising that the strength criterion is given so little attention, especially because it could be considered a modifiable risk factor to avoid re-injury.

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TABLES

Table 1: Characteristics of French-speaking physicians surveyed (n=109)

Age n (%)		
25-40 y	45	(42)
41-60 y	46	(41)
> 60 y	18	(17)
Clinical setting n (%)		
Hospital	54	(50)
Hospital + private office	2	(2)
Hospital + sports club or federation	12	(11)
Private office	23	(21)
Private office + sports club or federation	11	(10)
Sports club or federation	1	(1)
Hospital + private office + sports club or federation	5	(5)
Sports Medicine education n (%)		
Physicians with Sports Medicine education (Spe)	50	(46)
- Sports Medicine education only	24	
- Physical and rehabilitation education + Sports Medicine education	19	
- Orthopedic + Sports Medicine education	1	
- General medicine + Sports Medicine education	6	
Physicians Without Sports Medicine education (NoSpe)	59	(54)
- Physical and rehabilitation education	33	
- Orthopedic education	13	
- General medicine education	13	
Years of experience n (%)		
< 5 years (Exp5)	28	(26)
5-20 years (Exp5-20)	41	(37)
> 20 years (Exp20+)	40	(37)
Percentage of athletes treated n (%)		
< 20% (Ath20%)	50	(46)
20-80% (Ath20-80%)	41	(38)
> 80% (Ath80%+)	18	(16)

Spe: Physicians with Sport Medicine education
NoSpe: Physicians Without Sport Medicine education
Exp5: Physicians with less than five years of experience
Exp5-20: Physicians with between five and twenty years of experience
Exp20+: Physicians with more than twenty years of experience
Ath20%: Physicians who treat less than 20% athletes
Ath20-80%: Physicians who treat between 20% and 80% athletes
Ath80%+: Physicians who treat more than 80% athletes

Table 2: Return-to-play (RTP) criteria selected after ankle sprain according to the physicians' demographics (selected vs. not selected)

Variable	**Pain**		**Ability to engage in functional tasks**		**Functional instability**		**Range of motion**		**Proprioception**		**Mechanical instability**		**Strength**		**Swelling**	
	selected	*p*	Selected	*p*	selected	*p*	selected	*p*	selected	*p*	selected	*p*	selected	*p*	selected	*p*
Sports Medicine education																
yes (n=50)	88%		**94%**		76%		**72%**		50%		**26%**		34%		28%	
no (n=59)	92%	*0.54*	**71%**	***0.002****	71%	*0.57*	**51%**	***0.02****	44%	*0.54*	**51%**	***0.01****	41%	*0.47*	34%	*0.58*
Years of experience																
< 5 years (n=28)	96%		79%		71%		68%		29%		39%		36%		39%	
5-20 years (n=41)	88%		80%		80%		54%		54%		41%		37%		27%	
>20 years (n=40)	88%	*0.41*	85%	*0.77*	68%	*0.40*	63%	*0.47*	53%	*0.08*	38%	*0.94*	40%	*0.92*	30%	*0.54*
Percentage of athletes treated																
< 20% (n=50)	92%		80%		72%		54%		42%		**54%**		42%		30%	
20-80% (n=41)	90%		80%		73%		68%		49%		**29%**		32%		41%	
>80% (n=18)	83%	*0.58*	89%	*0.68*	78%	*0.89*	61%	*0.38*	56%	*0.58*	**22%**	***0.01****	39%	*0.60*	11%	*0.07*

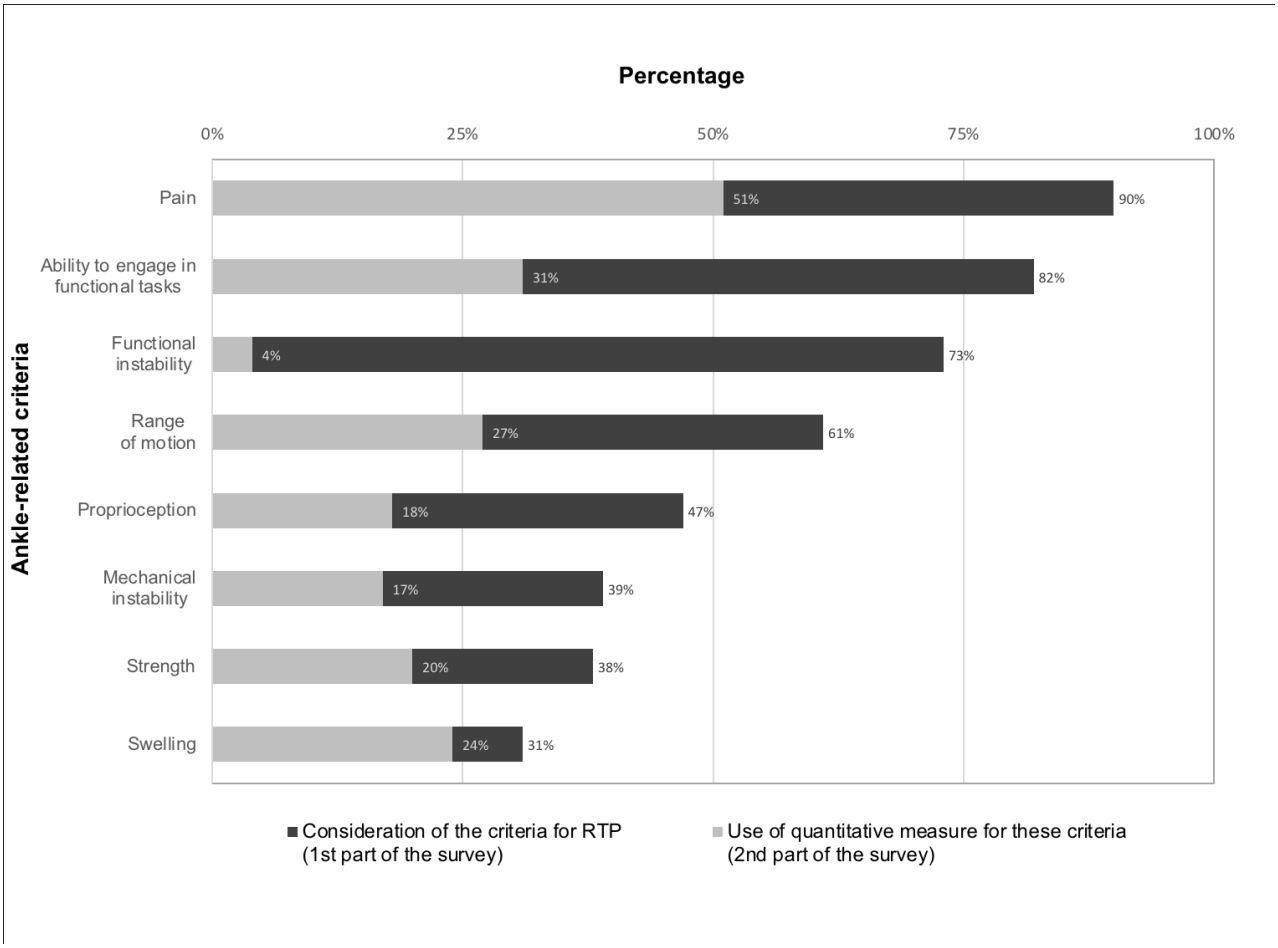
The physicians (n=109) could select a maximum of five RTP criteria among the nine suggested. The physicians' selection was analyzed by means of a Chi-squared test.
* $p<0.05$
** $p<0.01$

FIGURE LEGEND

Fig. 1. RTP criteria reportedly used by the surveyed physicians. For each criterion, the proportion of physicians using this criterion for RTP decision is depicted in dark grey while the use of a quantitative measure for this criterion is depicted in light grey. For instance, 90% of the 109 physicians selected pain for their RTP decision and 51% among them use a quantitative measure to assess it.

Consideration of criteria for RTP decision represents the percentage of physicians who selected a maximum of five criteria among the nine suggested in the first question.

Use of quantitative measure for these criteria represents the percentage of physicians who selected a visual pain scale for pain, previous and/or reference measures of hop test, balance test, gait and/or sport movement analysis for functional tasks, questionnaire for functional instability, goniometer and/or a measurement tool for range of motion, Myolux® and/or goniometer tools and/or arthro-motor for proprioception, anterior drawer test and/or varus test for mechanical instability, isokinetic and/or Myolux® and/or hand-held-dynamometer tool for strength and figure-of-8 for swelling. Physicians had access to the quantitative questions only if they selected the item corresponding to the first question.



Appendix

Table A.1. French Survey

Titre du sondage: Critères de retour à la compétition après entorse externe de cheville non-opérée	
Chers confrères, chères consœurs, Le Laboratoire d'Analyse du Mouvement Humain de l'université de Liège ainsi que le CHU de Liège - FIFA Medical Centre of Excellence, souhaiteraient faire un constat des critères utilisés par les médecins en pratique quotidienne pour déterminer si un sportif est apte ou non à recommencer la compétition, après une entorse du ligament collatéral latéral de la cheville non-opérée. Ce constat se réalise au moyen d'un questionnaire en ligne adressé à des médecins pratiquant dans le domaine du sport. Il est important que vos réponses correspondent à la réalité de ce que vous rencontrez dans votre pratique courante et non pas à des connaissances théoriques de ce qu'il est recommandé de faire. Je vous remercie donc tous de bien vouloir compléter ce sondage dans son entièreté en étant le plus honnête possible afin de nous permettre de faire avancer le problème de la prise en charge de l'entorse de cheville dans le monde du sport. Lorsque l'ensemble de vos réponses auront été collectés, celles-ci seront analysées de manière confidentielle et parfaitement anonyme. Une fois les analyses terminées, nous nous engageons à vous envoyer les résultats de ce sondage. Si vous désirez recevoir les résultats de ce sondage avant leur publication, envoyer un mail à l'adresse de contact qui se trouve à la fin du questionnaire. Merci de votre collaboration	
À retenir, Veuillez remplir le questionnaire en fonction de **votre pratique courante**, et non en fonction de vos connaissances théoriques. Gardez à l'esprit qu'on parle ici d'une entorse du **ligament collatéral latéral non opéré** chez des **patients sportifs.** Merci,	
Partie 1 : les critères	
Dans votre pratique médicale quotidienne, de quels paramètres tenez-vous compte pour déterminer si un patient est apte à reprendre la compétition sportive après une entorse externe de cheville non-opérée? (Sélectionnez maximum 5 critères) *# La proprioception fait référence à la capacité du sujet à ressentir le mouvement ainsi que la position articulaire de manière précise.*	• La douleur • L'oedème • La mobilité de la cheville • Les sensations subjectives d'instabilité du patient (instabilité, insécurité, anxiété) • La fonction musculaire de la cheville (force, endurance, puissance) • La sensibilité profonde/proprioception de la cheville # • La laxité articulaire de la cheville • L'aptitude à réaliser des tâches fonctionnelles (équilibre, sauts, course, changement de directions…) Autre critère
Partie 2 : l'évaluation des critères	
La douleur	
Utilisez-vous une échelle d'évaluation de la douleur ?	○ Oui ○ Non

L'oedème	
Évaluez-vous l'œdème:	☐ De manière subjective (visuelle) ☐ De manière objective (mesure)
La mobilité de cheville	
Quelle(s) méthode(s) vous permet de quantifier la mobilité de la cheville dans les différents mouvements réalisés?	☐ Une évaluation subjective (visuelle) ☐ Une évaluation objective (outils de mesure)
Avec quel(s) outil(s) évaluez-vous de manière objective la mobilité de la cheville?	☐ Inclinomètre ☐ Mètre ruban ☐ Goniomètre ☐ Autre
Sensation subjectives (d'instabilité, d'insécurité, d'anxiété)	
De quelle(s) manière(s) évaluez-vous les sensations subjectives du patient (instabilité, insécurité, anxiété)?	☐ Au moyen de questionnaires validés ☐ Verbalement, lors de la consultation ☐ Au moyen d'un questionnaire non validé ☐ Autre
Les muscles de la cheville	
De quelle(s) manière(s) évaluez-vous la fonction musculaire de la cheville?	☐ Manuellement ☐ Avec un dynamomètre isocinétique ☐ Avec dynamomètre manuel ☐ Avec une sandale de déstabilisation (Myolux) ☐ Autre
La proprioception de la cheville *# La proprioception fait référence à la capacité du sujet à ressentir le mouvement ainsi que la position articulaire de manière précise.*	
Avec quel(s) outil(s) évaluez-vous la proprioception de la cheville?	☐ Avec un arthromoteur (appareil d'isocinétisme ou autre) ☐ Avec une sandale de déstabilisation (Myolux) ☐ Avec un goniomètre ☐ Sans outils de mesure, j'évalue la proprioception de la cheville du patient lors d'une tâche de stabilisation simple (équilibre unipodal par exemple) ☐ Autre

La laxité articulaire	
Comment évaluez-vous le degré de laxité articulaire de la cheville?	☐ Par des tests cliniques manuels ☐ Par des mesures instrumentales ☐ Autre
Quel(s) test(s) manuel(s) utilisez-vous?	☐ Test du tiroir antérieur ☐ Talar tilt test ☐ Test du tiroir antérieur avec une mesure précise du déplacement antéro-postérieur (cf. image "Tiroir antérieur") ☐ Talar tilt test avec une mesure précise de l'angle atteint en varus (cf. image "Varus de l'arrière pied") ☐ Autre
Quelle évaluation instrumentale de la laxité utilisez-vous?	☐ Radio de stress ☐ Ultrason en condition de stress ☐ Utilisation d'un arthromètre ☐ Autre
Les aptitudes fonctionnelles	
De quelle(s) aptitude(s)/performance(s) tenez-vous compte?	☐ Analyse de la marche ☐ Hop test ☐ Analyse de gestes fonctionnels propres à la discipline du sujet (drible, slalom, ...) Analyse de la qualité des sauts et réceptions de sauts ☐ Star excursion balance test (SEBT) ☐ Analyse de la course ☐ Équilibre bipodale (surface stable/instable) ☐ Y balance test (YBT) ☐ Équilibre unipodal (surface stable/instable) ☐ Autre
De quelle(s) manière(s) évaluez vous la capacité du patient à réaliser ces tâches fonctionnelles?	☐ Comparaison à des valeurs d'avant blessure ☐ Comparaison à des valeurs de référence ☐ Évaluation subjective (observation et analyse visuelle) ☐ Pas d'avis ☐ Autre

Partie 3 : Les caractéristiques de la population	
Parmi l'ensemble de votre patientèle, quel pourcentage représentent les patients sportifs, toutes lésions confondues? * *Il s'agit ici d'une estimation*	○ Moins de 10% ○ 10%-20% ○ 21%-30% ○ 31%-40% ○ 41%-50% ○ 51%-60% ○ 61%-70% ○ 71%-80% ○ 81%-90% ○ 91%-100%
Quel est votre spécialisation?	☐ Médecine physique et réadaptation ☐ Médecine du sport ☐ Médecine générale ☐ Chirurgie orthopédique ☐ Autre
Combien d'années d'expérience avec vous dans la prise en charge de patients sportifs?	○ 0-2 ans ○ 3-5 ans ○ 6-8 ans ○ 9-11 ans ○ 12-14 ans ○ 15-17 ans ○ 18-20 ans ○ 21-23 ans ○ 24-26 ans ○ 27-29 ans ○ 30 ans ou plus
Avez-vous des remarques ?	…

A.2. E-mail invitation

"Monsieur, Madame,

Dans le cadre d'un mémoire et d'un doctorat en kinésithérapie réalisés au sein de l'Université de Liège, nous recherchons des médecins qui accepteraient de nous accorder 10 minutes de leur temps pour répondre à un questionnaire en ligne sur les critères de retour sur le terrain après une entorse de cheville. Cette étude supervisée par le Prof J.F. KAUX et le Prof J.L. CROISIER a été acceptée par le comité d'éthique hospitalo-facultaire Universitaire de Liège.

Les critères d'inclusion sont les suivants :

- Être médecin généraliste, médecin orthopédiste, médecin du sport ou Médecin de Médecine Physique.

- Être francophone

Pour répondre à ce sondage, veuillez cliquer sur le lien ci-dessous (ou le copier-coller dans votre moteur de recherche internet) : https://www.sondageonline.com/s/a3d2d3b

Ce sondage sera accessible jusqu'au 28 février inclus.

Bien entendu, les informations recueillies resteront anonymes et ne seront traitées que par les membres du service de recherche de kinésithérapie de l'Université de Liège.

Si vous souhaitez nous aider davantage, vous pouvez également diffuser ce questionnaire à vos confrères répondant aux critères évoqués ci-dessus. Nous vous remercions d'avance pour l'attention accordée à notre requête.

Nous vous prions d'agréer, docteur(e), l'expression de nos salutations distinguées.

Aude Aguilaniu, doctorante en kinésithérapie et réadaptation

Coline Pire, étudiante en master en kinésithérapie et réadaptation"

Table A.3. CHERRIES Checklist

	Checklist for Reporting Results of Internet E-Surveys (CHERRIES)		
Item category	Checklist item	Explanation	Location in the paper
Design	1. Describe survey design	Describe target population, sample frame. Is the sample a convenience sample? (In "open" surveys this is most likely.)	Please see Methods A convenience sample was used.
IRB (Institutional Review Board) approval and informed consent process	2. IRB approval	Mention whether the study has been approved by an IRB.	Yes (X6 see title page)
	3. Informed consent	Describe the informed consent process. Where were the participants told the length of time of the survey, which data were stored and where and for how long, who the investigator was, and the purpose of the study?	The purpose of the study, the approximate length of time and the investigator's details were explained in the invitation email.
	4. Data protection	If any personal information was collected or stored, describe what mechanisms were used to protect unauthorized access.	No personal information was collected
Development and pre-testing	5. Development and testing	State how the survey was developed, including whether the usability and technical functionality of the electronic questionnaire had been tested before fielding the questionnaire.	Please see Methods
Recruitment process and description of the sample having access to the questionnaire	6. Open survey versus closed survey	An "open survey" is a survey open for each visitor of a site, while a "closed survey" is only open to a sample which the investigator knows (password-protected survey).	The survey was a "closed survey", accessed via a link, without a password
	7. Contact mode	Indicate whether or not the initial contact with the potential participants was made on the Internet. (Investigators may also send out questionnaires by mail and allow for web-based data entry.)	Please see Methods (e-mail)
	8. Advertising the survey	How/where was the survey announced or advertised? Some examples are offline media (newspapers), or online (mailing lists – if yes, which ones?) or banner ads (where were these banner ads posted and what did they look like?) It is important to know the wording of the announcement as it will heavily influence who chooses to participate. Ideally the survey announcement should be published as an appendix.	Mailing list of Liège CHU, Huy hospital and other private physicians in Belgium, France and Switzerland. The mailing lists include French-speaking physicians in hospitals and in private practice. No public advertisement was used.
Survey administration	9. Web/e-mail	State the type of e-survey (e.g., one posted on a website, or one sent out through e-mail). If it is an e-mail survey, were the responses entered manually into a database, or was there an automatic method for capturing responses?	Please see Methods (Sondageonline link) + there was an automated method for capturing responses (excel export)
	10. Context	Describe the website (for mailing list/newsgroup) in which the survey was posted. What is the	We used an online survey tool (OnlineSurvey), but

		website about, who is visiting it, what are visitors normally looking for? Discuss to what degree the content of the website could pre-select the sample or influence the results. For example, a survey about vaccination on an anti-immunization website will have different results from a web survey conducted on a government website	the survey was not posted on a website (email invitation).
	11. Mandatory/ voluntary	Was it a mandatory survey to be filled in by every visitor who wanted to enter the website, or was it a voluntary survey?	Voluntary
	12. Incentives	Were any incentives offered (e.g., monetary, prizes, or non-monetary incentives such as an offer to provide the survey results)?	No incentives were used
	13. Time/Date	In what time frame were the data collected?	Please see Methods (December 2018 / February 2019)
	14. Randomization of items or questionnaires	To prevent biases items can be randomized or alternated.	Due to the nature of this survey, including the use of adaptive questioning, randomization of items was not performed.
	15. Adaptive questioning	Use adaptive questioning (certain items, or only conditionally displayed based on responses to other items) to reduce number and complexity of the questions.	Please see Methods
	16. Number of items	What was the number of questionnaire items per page? The number of items is an important factor for the completion rate.	52 questions (1 to 5 items per page) (Not all appeared according to logic branching)
	17. Number of screens (pages)	Over how many pages was the questionnaire distributed? The number of items is an important factor for the completion rate.	52 pages (Not all appeared according to logic branching)
	18. Completeness check	It is technically possible to do consistency or completeness checks before the questionnaire is submitted. Was this done, and if "yes", how (usually JAVAScript)? An alternative is to check for completeness after the questionnaire has been submitted (and highlight mandatory items). If this has been done, it should be reported. All items should provide a non-response option such as "not applicable" or "rather not say", and selection of one response option should be enforced.	Completeness checks were not done. All items provided a non-response option when relevant.
	19. Review step	State whether respondents were able to review and change their answers (e.g., through a back button or a review step which displays a summary of the responses and asks the respondents if they are correct).	Respondents were able to review and change their answers through a back button.
Response rates	20. Unique site visitor	If you provide view rates or participation rates, you need to define how you determined a unique visitor. There are different techniques available, based on IP addresses or cookies or both.	Only cookies limitation, no IP address limitation because physicians in the same hospital have the same IP address.
	21. View rate (Ratio unique site visitors/unique survey visitors)	Requires counting unique site visitors (not page views!) divided by the number of unique visitors of the first page of the survey. It is not unusual to have view rates of less than 0.1% if the survey is voluntary.	Approximately 500 health care professionals contacted by e-mail address. 122/500 = 0.2%

	22. Participation rate (Ratio unique survey page visitors/agreed to participate)	Count the unique number of visitors who visit the first page of the survey (or the informed consents page, if present) divided by the number of people who filled in the first survey page (or agreed to participate). This can also be called "recruitment" rate.	122/122
	23. Completion rate (Ratio agreed to participate/finished survey)	The number of people agreeing to participate (or submitting the first survey page) divided by the number of people submitting the last questionnaire page. This is only relevant if there is a separate "informed consent" page or if the survey goes over several pages. This is a measure for attrition. Note that "completion" can involve leaving questionnaire items blank. This is not a measure for how completely questionnaires were filled in. (If you need a measure for this, use the word "completeness rate".)	109/122 - twelve incomplete - one excluded because he was a sports trainer - we included seven who completed all questions but did not check the last "done" button
Preventing multiple entries from the same individual	24. Cookies used	Indicate whether cookies were used to assign a unique user identifier to each client computer. If so, mention the page on which the cookie was set and read, and how long the cookie was valid. Were duplicate entries avoided by preventing users access to the survey twice; or were duplicate database entries having the same user ID eliminated before analysis? In the latter case, which entries were kept for analysis (e.g., the first entry or the most recent)?	ID navigator for one month
	25. IP check	Indicate whether the IP address of the client computer was used to identify potential duplicate entries from the same user. If so, mention the period of time for which no two entries from the same IP address were allowed (e.g., 24 hours). Were duplicate entries avoided by preventing users with the same IP address access to the survey twice; or were duplicate database entries having the same IP address within a given period of time eliminated before analysis? If the latter, which entries were kept for analysis (e.g., the first entry or the most recent)?	The use of a common IP was allowed because several physicians may work in the same office.
	26. Log file analysis	Indicate whether other techniques to analyze the log file for identification of multiple entries were used. If so, please describe.	N/A
	27. Registration	In "closed" (non-open) surveys, users need to login first and it is easier to prevent duplicate entries from the same user. Describe how this was done. For example, was the survey never displayed a second time once the user had filled it in, or was the username stored together with the survey results and later eliminated? If the latter, which entries were kept for analysis (e.g., the first entry or the most recent)?	N/A
Analysis	28. Handling of incomplete questionnaires	Were only completed questionnaires analyzed? Were questionnaires which terminated early (where, for example, users did not go through all questionnaire pages) also analyzed?	seven didn't completed the survey but we analyzed them because they answered all the questions. It appears they did not check the last "done" button

	29. Questionnaires submitted with an atypical timestamp	Some investigators may measure the time people needed to fill in a questionnaire and exclude questionnaires that were submitted too soon. Specify the timeframe that was used as a cut-off point, and describe how this point was determined.	There was no time restriction for this survey
	30. Statistical correction	Indicate whether any methods such as weighting of items or propensity scores have been used to adjust for the non-representative sample; if so, please describe the methods.	N/A

Eysenbach, G. (2004). Improving the quality of web surveys: the checklist for reporting results of internet e-surveys (cherries). *Journal of Medical Internet Research*, 6(3)e34 doi:10.2196/jmir.6.3.e34 http://www.jmir.org/2004/3/e34/

Table A.4. Details on the ability to engage in functional tasks criteria according to the physicians' demographics (selected vs. not selected)

Variable	**Unipodal balance**		**Sport specific**		**Gait**		**Bipodal balance**		**Hop test**		**Running**		**Dynamic balance**	
	selected	*p*	selected	*p*	selected	*p*	selected	*p*	selected	*p*	selected	*p*	selected	p
Sports Medicine education														
yes (n=47)	89%		64%		51%		28%		47%		26%		34%	
no (n=42)	81%	*0.26*	48%	*0.12*	57%	*0.57*	43%	*0.13*	21%	*0.01**	17%	*0.31*	5%	*< 0.001****
Years of experience														
< 5 years (n=22)	86%		68%		68%		55%		18%		18%		9%	
5-20 years (n=33)	88%		45%		60%		39%		55%		24%		33%	
> 20 years (n=34)	82%	*0.81*	59%	*0.23*	38%	*0.06*	18%	*0.01**	26%	*0.01**	21%	*0.86*	14%	*0.05*
Percentage of athletes treated														
< 20% (n=40)	83%		45%		50%		38%		30%		13%		13%	
20-80% (n=33)	85%		58%		58%		36%		30%		30%		15%	
> 80% (n=16)	94%	*0.56*	81%	*<0,05**	56%	*0.79*	25%	*0.66*	56%	*0.14*	35%	*0.17*	50%	*<0.01***

The physicians (n=89) could select an unlimited number of answers to this question.
The physicians' selection was analyzed by means of a Chi-squared test.
*p<0.05; **p<0.01

Table A.5. Summary Table

Our survey				*Recommendations ROAST* [8]
Criteria (% of physicians)		Measurement methods (% of physicians)		
Pain	**90%**	Numeric rating scale	51%	*Numeric rating scale* *Foot and Ankle Disability Index (FADI)*
Ability to engage in functional tasks	**82%**	Unipodal balance Gait analysis Sport movement analysis Bipedal balance SEBT/YBT Hop Test	32%	*Gait analysis* *Physical activity level* *Postural balance static and dynamic (BESS, FLT, SEBT, ...)*
Functional ankle instability	**73%**	Cumberland Instability Tools (CAIT) Lower Extremity Functional Scale (LEFS)	4%	*Foot and Ankle Ability Measure (FAAM)* *Foot and Ankle Disability Index (FADI)*
Range of motion	**66%**	Goniometer Metric measures	28%	*Weight bearing lunge test (dorsiflexion)* *Posterior-talar-glide test (ankle joint arthrokinematics)*
Proprioception	**47%**	Isometric machine Goniometer Myolux	18%	*No recommendation*
Mechanical instability	**39%**	Anterior drawer test Talar tilt test	16%	*(acute phase:4 to 6 days post injury)* *Anterior drawer test (ATFL)* *Manual stress testing*
Muscle strength	**38%**	Isokinetic machine Hand-held dynamometer Myolux	20%	*Hand-held dynamometer*
Swelling	**31%**	Figure-of-eight Perimetric measures	24%	*Figure-of-eight*

[8] Delahunt E, Bleakley CM, Bossard DS, et al. Clinical Assessment of Acute Lateral Ankle Sprain Injuries (ROAST): 2019 Consensus Statement and Recommendations of the International Ankle Consortium. *Br J Sports Med*. 2018;52(20):1304-1310. doi:10.1136/bjsports-2017-098885

Table A.6. Details on the use of quantitative values to assess each criterion according to the physicians' demographics (quantitative value vs. no quantitative value)

Variable	**Pain (n=98)**		**Ability to engage in functional tasks (n=89)**		**Functional instability (n=80)**		**Range of motion (n=66)**		**Proprioception (n=51)**		**Mechanical instability (n=42)**		**Strength (n=41)**		**Swelling (n=34)**	
	Quanti	*p*	Quanti	*p*	Quanti	*p*	Quanti	*p*	Quanti	*p*	Quanti	*p*	Quanti	*p*	Quanti	p
Sports Medicine education																
yes	**64%**		32%		5%		31%		28%		15%		29%		25%	
no	**41%**	***0.02****	31%	*0.92*	2%	*0.50*	23%	0.51	8%	*0.06*	17%	*0.88*	13%	*0.18*	21%	*0.81*
Years of experience																
< 5 years	56%		18%		0%		21%		0%		18%		10%		9%	
5-20 years	47%		39%		3%		27%		27%		18%		33%		27%	
> 20 years	51%	*0.81*	32%	*0.25*	7%	*0.40*	32%	0.72	14%	*0.19*	14%	*0.96*	13%	*0.23*	33%	*0.37*
Percentage of athletes treated																
< 20%	48%		30%		3%		26%		14%		12%		14%		27%	
20-80%	54%		30%		3%		32%		15%		25%		15%		24%	
> 80%	53%	*0.84*	38%	*0.85*	7%	*0.76*	18%	0.66	30%	*0.52*	25%	*0.52*	43%	*0.23*	0%	*0.71*

Of the total number physicians (n=109), only those who selected the corresponding criteria in the first question could access to the quantitative questions.
The physicians' selection was analyzed by means of a Chi-squared test.
*p<0.05