Return to sport decisions after an acute lateral ankle sprain injury: introducing the PAASS framework—an international multidisciplinary consensus

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ABSTRACT
Background Despite being the most commonly incurred sports injury with a high recurrence rate, there are no guidelines to inform return to sport (RTS) decisions following acute lateral ankle sprain injuries. We aimed to develop a list of assessment items to address this gap.

Methods We used a three-round Delphi survey approach to develop consensus of opinion among 155 globally diverse health professionals working in elite field or court sports. This involved surveys that were structured in question format with both closed-response and open-response options. We asked panelists to indicate their agreement about whether or not assessment items should support the RTS decision after an acute lateral ankle sprain injury. The second and third round surveys included quantitative and qualitative feedback from the previous round. We defined a priori consensus being reached at >70% agree or disagree responses.

Results Sixteen assessment items reached consensus to be included in the RTS decision after an acute lateral ankle sprain injury. They were mapped to five domains with 98% panelist agreement—PAASS: Pain (during sport participation and over the last 24 hours), Ankle impairments (range of motion; muscle strength; endurance and power), Athlete perception (perceived ankle confidence/reassurance and stability; psychological readiness), Sensorimotor control (proprioeception; dynamic postural control/balance), Sport/functional performance (hopping, jumping and agility; sport-specific drills; ability to complete a full training session).

Conclusion Expert opinion indicated that pain severity, ankle impairments, sensorimotor control, athlete perception/reading and sport/functional performance should be assessed to inform the RTS decision following an acute lateral ankle sprain injury.

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INTRODUCTION
Lateral ankle sprains are one of the most common injuries sustained during sport, but they are often perceived to be minor injuries that heal expeditiously with minimal need for therapeutic intervention. More than half of individuals who sustain a lateral ankle sprain injury do not seek formal medical treatment and many return to sport (RTS) before injury-associated impairments are resolved. In fact, 70%–75% of US high school athletes were sanctioned to RTS within 3 days of incurring an acute lateral ankle sprain, with 95% sanctioned to RTS within 10 days of injury.

There are currently no criteria-based guidelines to inform RTS decisions following an acute lateral ankle sprain injury. A recent systematic review did not identify any studies that have prospectively evaluated RTS criteria for individuals who have incurred an acute lateral ankle sprain injury. Further, a review of expert opinion identified little consensus on domains, specific assessment or cut-off thresholds to inform RTS decisions following acute lateral ankle sprain injuries. Lack of RTS guidelines and appropriate health care may contribute to premature RTS after a lateral ankle sprain injury. We propose that premature RTS may be one factor that contributes to the high prevalence of recurrent ankle problems. To inform the development of criteria to guide the RTS decision in individuals who have sustained an acute lateral ankle sprain injury and provide the basis for prospective cohort studies to test the utility of the criteria, we aimed to collate expert opinion using a Delphi survey process—a process that has been previously used to develop other RTS criteria (eg, following hamstring injury).

We aimed to develop consensus for assessment items that should inform RTS decisions for individuals who have sustained an acute lateral ankle sprain injury. This is the first step for developing RTS criteria for acute lateral ankle sprain injuries.

METHODS
We used a three-round Delphi approach to establish consensus of opinion from a panel of experts on assessment items that should be included to inform the RTS decision after an acute lateral ankle
sprain injury. Items that did not achieve consensus after the third survey round were left undecided. Each Delphi survey round involved: data collection via an online survey platform, analysis of responses and provision of feedback to panellists. We registered the study at the Australian New Zealand Clinical Trials Registry. Trial information was submitted prior to the start of data collection, but it was not approved until data collection had commenced.

Participants
Eligibility criteria for participants (panellists) were: (1) health and exercise professional (eg, physiotherapist, athletic trainer/therapist, sports medicine physician); (2) working with athletes competing in nationally selected representative teams or teams in Tier/Division 1 national competitions (eg, English Premier League, National Collegiate Athletic Association Division 1, Suncorp Super Netball); (3) working in field or court sports in which acute lateral ankle sprain injuries are among the most prevalent injuries; (4) involved in making RTS decisions for athletes with an acute lateral ankle sprain injury; and (5) proficiency in the English language. The sports targeted for this study included: basketball, volleyball, netball, handball, korfball, soccer, rugby, American/Canadian football, Australian rules football, Gaelic football, lacrosse, field hockey, hurling, camogie, tennis, badminton and squash. Health professionals working with Paralympic, Invictus Games or other groups of disabled athletes, or athletes from selective populations (eg, military or World Maccabiah Games) were not eligible to participate in the panel.

While there do not appear to be clear recommendations for the ideal number of panellists in a Delphi survey process, it has been suggested that having more participants is associated with greater reliability and judgement of data. It is recommended that panels be heterogeneous with individuals of different personalities, perspectives and backgrounds, and include those with clinical and scientific expertise in the area of study. To ensure heterogeneous panel recruitment, we targeted individuals from different geographical locations, health professions, research and clinical degrees, and types of sports. Authors identified potential panellists (based on eligibility criteria) from their geographical region and sent invitations to eligible individuals between December 2018 and March 2019. Individuals were given 2 weeks to accept or decline the invitation to participate and were reminded via email after 1 week.

Online surveys
Data collection consisted of online surveys (online supplemental appendices 1–3) which included closed-response and open-response questions informed by a review of the literature and international expert consensus research on lateral ankle sprain assessment. Panelists were asked to indicate ‘Yes’, ‘No’ or ‘Unsure/I do not know’ to a statement such as: ‘Do you feel the assessment of ankle range of motion should be a criterion to support the RTS decision after an acute lateral ankle sprain?’ RTS was defined as ‘sanctioned for unrestricted training and cleared/available for match play/competition selection’ and was based on definitions of time loss injury from Fuller et al and RTS from Ardern et al.

A panellist’s opinion to include a RTS assessment item was defined as selection of the ‘Yes’ answer option, and an opinion to exclude a RTS assessment item was defined as selection of the ‘No’ option. Panelists were asked to provide reasons for their responses in the form of free text. To increase richness of data, surveys included open-response questions (eg, ‘Is there anything else you feel should be a criterion to support the RTS decision after an acute lateral ankle sprain?’). Based on Delphi guidelines, we made an a priori decision that consensus was reached when >70% of respondents either included or excluded an RTS assessment item. Assessment items that reached consensus were removed from the following survey.

Prior to sending the first round survey to panellists, it was piloted on sports physiotherapists involved in making RTS decisions for individuals recovering from an acute lateral ankle sprain injury. This step was undertaken to improve clarity of questions and identify any ambiguities. No changes were required to the survey after pilot testing.

Procedures
For each of the three Delphi survey rounds, panellists were sent an email invitation with a link to the online survey. They were given approximately 4 weeks to complete the survey, with reminders sent after 1 and 3 weeks. Percentage agreement was calculated and reported to panellists for items that reached consensus after each survey round. For items that did not reach consensus, the percentage of panellists who selected the ‘Yes’, ‘No’ and ‘Unsure/I do not know’ responses and the key reasons for responses, determined by thematic analysis of free text responses, were reported to panellists in the subsequent round. Reasons for responses were also used to rephrase the original question in the final survey round. New RTS assessment items suggested by panellists in the first survey were checked against previously included items and developed into questions for the second survey.

After the second survey, RTS assessment items that had reached consensus were mapped to domains representing separate aspects of RTS. This was provisionally undertaken in a meeting of three authors (MDS, BV, ED) and then presented to the authorship team for consideration and agreement. The domains and mapped RTS assessment items were presented to panellists as part of the third Delphi round. Panellists were asked to indicate if they agreed or did not agree with each of the domains and mapped assessment items.

Data analysis
Survey data were exported from SurveyMonkey for calculation of achievement of consensus. Level (%) of agreement was calculated for each item. For items that did not reach consensus after the final Delphi survey round, the percentage of panellists who selected each answer option (‘Yes’, ‘No’ or ‘Unsure/I do not know’) is reported. Content analysis was used to identify themes from open-response questions. Responses were initially read for familiarisation and then re-read for identification of themes. Once themes were identified, data were categorised. Themes and categorisation of data into themes were discussed between three researchers (MDS, ED, BV—one female and two male physiotherapists with 18–41 years of experience) to ensure agreement. This culminated in a thematic summary of explanation of responses and a list of new RTS assessment items which were included in subsequent surveys.

RESULTS
The three rounds of this Delphi survey occurred from December 2018 to February 2020.

Participants
Invitations to participate in this study were sent to 250 individuals. Of these invitees, 198 (79.2%) accepted the invitation
Original research

and were sent the link to the first Delphi survey (figure 1). A total of 155 panellists (78.3%) completed round 1 of the survey, defined as completing the questions on RTS assessment items. Round 2 and round 3 of the survey were completed by 137 and 119 panellists, respectively (88.4% and 76.8% of panelists who completed survey 1). Demographics of panellists who completed survey 1 are presented in table 1. There were minimal differences in age (<2 years), sex (≤1%), profession (≤5%) and sports (≤6%) between panellists who completed the three surveys (online supplemental appendix 4)—implying a similarity in these participant features across all surveys.

Consensus on assessment items to support the RTS decision

After the three Delphi survey rounds, 16 of the 35 assessment items presented to panellists reached consensus (>70% agreement) to be included in the RTS decision-making process after an acute lateral ankle sprain injury (table 2), and 17 assessment items reached consensus to not be included (table 3). Two assessment items, intra-articular swelling and static postural control/balance, did not reach consensus after the third and final round of the Delphi survey process (table 4).

Consensus on RTS domains and mapping of assessment items

Based on the agreed-upon RTS assessment items, five domains were created and proposed to the panellists. They were Pain, Ankle impairments, Athlete perception, Sensorimotor control and Sport/functional performance (PAASS); 99% of panellists agreed with these domains. The mapping of assessment items to domains was agreed on by 98% of panellists, with two panellists (2%) not in full agreement (figure 2).

DISCUSSION

Our international multidisciplinary Delphi survey study developed consensus for assessment items that should and should not be included in the RTS decision-making process for individuals who have sustained an acute lateral ankle sprain injury. Tables 2–4 show the list of items.

The PAASS framework for RTS decisions

Expert opinion indicated 16 items that should be used to assess pain severity, ankle impairments, sensorimotor control, athlete perception/readiness and sport/functional performance to inform the RTS decision. Assessment items were organised into the PAASS framework (figure 2) based on agreed-upon domains. Overall, assessment items included were those that expert panellists felt directly influenced sport-specific function and/or contributed to risk of injury recurrence. Along with physical tests of sport/functional performance, sensorimotor control and ankle function, the importance of considering the athlete’s perception of their ankle (eg, perceived confidence/reassurance and stability) and readiness to RTS were recognised as an essential part of the RTS decision-making process. This confirms the importance of obtaining input from the athlete and shared decision-making in determining RTS ability.12 13

Assessment items not included in the RTS decision

Expert panellists agreed that 17 of the assessment items presented should not be included in the RTS decision after an acute lateral ankle sprain injury. First, items were excluded if they were not considered to influence RTS ability. Assessment of structural integrity of ligaments on imaging, ligamentous laxity and pain...
severity on palpation, which may be important for injury diagnosis, were excluded from the RTS decision-making process as they were thought to resolve in parallel with functional gains and not to be linked to sport-specific function. Similarly, panelists felt that foot mechanics and lower limb/trunk kinematics would not influence the RTS decision-making process. Second, experts felt that general measures of patient-reported foot and ankle function (e.g., health-related quality of life, Foot and Ankle Ability Measure or Foot and Ankle Outcome Score) were not sufficiently sensitive to assess RTS requirements. Thus, it was felt that the athletes’ opinion on their ability to RTS was captured through the assessment of perceived ankle stability, ankle reassurance/confidence and psychological readiness. Third, the perceived relatively quick RTS, progression of ability and resolution of impairments after an acute lateral ankle sprain led to the exclusion of items that were assessed over longer timeframes (e.g., pain severity over the last week) and those with deficits associated with time away from sport and exercise (e.g., aerobic and anaerobic fitness). While evidence suggests loss of fitness occurs

**Table 1** Demographics of panellists who completed survey 1 (n=155)

| Sex, male | 122 (78.7) |
| Age (years)* | 41.3 (8.7) |
| Clinical experience (years)* | 16.1 (7.9) |
| Profession |  |
| Physiotherapist | 82 (52.9) |
| Athletic trainer | 28 (18.1) |
| Sports medicine physician | 27 (17.4) |
| Athletic therapist | 7 (4.5) |
| Exercise physiologist/sports scientist | 5 (3.2) |
| Strength and conditioning coach | 4 (2.6) |
| Other | 2 (1.3) |
| Highest education level |  |
| Postgraduate | 124 (80.0) |
| Bachelor’s degree | 19 (12.3) |
| Certificate/diploma | 8 (5.2) |
| Not stated | 4 (2.6) |
| Sport working in |  |
| Soccer/football | 54 (34.8) |
| Basketball | 26 (16.8) |
| Rugby | 25 (16.1) |
| Volleyball | 12 (7.8) |
| American/Canadian football | 10 (6.5) |
| Handball | 6 (3.9) |
| Netball | 5 (3.2) |
| Field hockey | 4 (2.6) |
| Other | 13 (8.4) |
| Country |  |
| Australia | 11 (7.1) |
| Belgium | 14 (9.0) |
| Brazil | 11 (7.1) |
| Canada | 7 (4.5) |
| China | 11 (7.1) |
| Denmark | 7 (4.5) |
| France | 6 (3.9) |
| Ireland | 5 (3.2) |
| Italy | 9 (5.8) |
| Japan | 4 (2.6) |
| New Zealand | 7 (4.5) |
| Nigeria | 1 (0.6) |
| Norway | 10 (6.5) |
| Qatar | 2 (1.3) |
| South Korea | 10 (6.5) |
| Switzerland | 6 (3.9) |
| The Netherlands | 8 (5.2) |
| UK | 10 (6.5) |
| USA | 16 (10.3) |

Data are presented as number (n) and percentage (%) unless otherwise stated.

*Data are presented as mean (SD).
after 2 weeks of detraining,36 panellists indicated that subtle deficits in aerobic or anaerobic fitness or a suboptimal acute:chronic workload would not stop clearance of an athlete for RTS after an acute lateral ankle sprain. Fourth, items were excluded if it was thought that limitations would be captured with other assessment items included in the PAASS framework. Experts felt that meaningful deficits in ankle muscle length and ankle joint arthrokinematics would be identified when assessing ankle range of motion, and similarly hip and knee muscle strength/endurance deficits would be identified during hopping, jumping and sport-specific tests. They felt that straight-line running would be included within the assessment of sport-specific activities (when required by the sport). Panellists also indicated that it was not required, or possible, to clinically assess ankle muscle reaction time separately from dynamic balance and agility.

Assessment items that did not reach consensus

Of the 35 items presented to panellists in this study, only two items did not reach inclusion or exclusion consensus: intra-articular swelling and static postural control/balance. Key reasons provided by panellists for the inclusion of intra-articular swelling were that swelling can impair muscle, joint, proprioceptive and sport-specific function, and intra-articular swelling is an indication of joint/cartilage damage that may affect long-term joint health. Panellists who indicated that intra-articular swelling should not be included felt that intra-articular swelling is not related to pain or dysfunction, and it is not reasonable to delay RTS based on the presence of swelling, as long as function is restored and impairments have resolved. Close to equal numbers of panellists voted for the inclusion and exclusion of static postural control/balance in the RTS decision. Panellists who thought static postural control/balance should be included felt that it was an important part of understanding function and ability. The following reasons were provided by panellists who indicated that static postural control/balance should not be included in the RTS decision-making process: it is superseded by dynamic postural control/balance when determining ability to RTS, and assessing dynamic postural control/balance provides the necessary information to determine RTS.

RTS compared with initial assessment items

There are some commonalities between assessment items in the PAASS RTS assessment framework and impairments suggested to be important to include in the initial assessment of acute lateral ankle sprain injuries.29 Assessment of pain, ankle joint range of motion, ankle muscle strength and dynamic balance were identified as important to include in both the RTS decision-making process and initial injury assessment. Swelling, ankle joint arthrokinematics, static postural balance, gait, physical activity level and patient-reported foot and ankle function were recommended to be assessed after an acute lateral ankle sprain injury but did not reach consensus for inclusion in the RTS decision-making process. The lack of inclusion of these items in the RTS decision-making process was due to the progressive resolution of deficits and changing focus of management through the rehabilitation continuum, and the specificity of determining RTS ability rather than daily function.

Study strengths and limitations

Our study included diverse geographical, sporting and professional representation. The 155 panellists were from 19 countries, 6 professions and 15 sports, and had a wealth and diversity of clinical experience. This enhances the generalisability of the data obtained and facilitates the utility of the PAASS RTS assessment framework globally. The number of panellists and geographical representation exceeds that of recent consensus statements.12 13 29 37 38 Similar to other consensus papers on RTS criteria13 and management of musculoskeletal/sporting injuries,37 38 the majority of panellists were physiotherapists. The inclusion of panellists working in a range of different sports provides a list of assessment items that can be used generically across different sports. However, there may be items specific to individual sports that were not identified in this study. The panellists in this study were all health and exercise professionals, and we did not include athletes to gain their perspective. This is an important consideration for future research.

While consensus was obtained on assessment items that should be used to inform the RTS decision, we did not investigate specific tests for the agreed-upon assessment items. For
example, we did not ask experts to nominate the test(s) they would use to assess an athlete’s dynamic postural control/balance or pain severity. Thus, while this study provides clinicians with items to assess, it does not specify how clinicians should assess these items. Further, there are no data on cut-off points for measures that indicate if an athlete should or should not RTS. For example, we do not know what deficit in perceived stability is acceptable to sanction an athlete as being ready to RTS. These are important future research directions and we encourage researchers to hypothesise and test thresholds for assessment items in the PAASS RTS assessment framework. We aimed to obtain consensus on assessment items to inform an athlete’s ability to RTS, defined as ‘sanctioned for unrestricted training and cleared/available for match play/competition selection’ but not return to performance.31 Panelists may include different outcomes to assess whether or not an athlete is performing at or above their preinjury level.31

Clinical application of findings

The PAASS framework proposed in this study provides clinicians and researchers with expert-recommended assessment items that can be used to inform RTS decisions after an acute lateral ankle sprain injury. Clinicians can use this framework to enhance clinical decision-making when identifying impairments and determining an athlete’s ability to RTS. There are a range of clinical tests that can be used to assess each item, such as a numerical rating scale to measure pain severity, ankle stability and ankle confidence/reassurance,39 or the T-test.40 505 Test41 or V Reactive Agility Test41 to measure agility. We appreciate that RTS decision-making is multifactorial and context specific. Researchers and clinicians should respect the complexity and temporal nature of the assessment items within the PAASS framework. As outlined in the Strategic Assessment of Risk and Risk Tolerance framework, the PAASS items must be considered in context with the other elements of tissue health (eg, age and injury recurrence) and tissue stresses (eg, type of sport and ability to protect the tissues), and risk tolerance modifiers (eg, timing in season).42

CONCLUSION

This international interprofessional Delphi survey study recommends that health professionals should assess pain severity, ankle impairments, athlete perception, sensorimotor control and sport/functional performance to determine an athlete’s ability to RTS after an acute lateral ankle sprain injury.

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Introduction

Lateral ankle sprains are the most prevalent musculoskeletal injury sustained by individuals who participate in sports; they also account for the highest proportion of all musculoskeletal injuries presenting to US emergencies departments. Furthermore, lateral ankle sprains have the highest recurrence rate of all musculoskeletal injuries. It is estimated that up to 74% of individuals who sprain their ankle will experience recurrent sprains and/or ongoing symptoms of pain, swelling, instability and “giving way”. Return to sport (RTS) times vary for individuals who have sustained an acute lateral ankle sprain injury. At the moment, there are no clear criteria to guide RTS decisions after lateral ankle sprain.

The aim of this study is to use a Delphi approach to develop consensus for RTS criteria for individuals who have sustained an acute lateral ankle sprain injury.

You have been identified as having expertise in RTS decision making for athletes that commonly sustain acute lateral ankle sprain injuries. Your participation in this Delphi study will involve completing surveys about RTS criteria after acute lateral ankle sprain injury. Your anonymous responses will be used to develop expert consensus.

Your participation in this study is voluntary and you are able to withdraw at any time by contacting a member of the research team (details below). If you withdraw, you will not be asked to contribute any further data to the study, but data you have already anonymously contributed will be retained. This is due to the anonymity of responses, which means that we are unable to identify your responses among others in the data already collected. Your privacy will be maintained at all times. Survey data will be stored securely on password-protected hard drives/servers. You may not receive direct benefit from participating in this study, but we anticipate the study findings will inform RTS practices and decision-making processes. We will send you a summary of the study findings on completion of the project.

If you have any questions about this research, please contact Dr Michelle Smith at m.smith5@uq.edu.au or +617 3365 4660. If you would like to speak to an ethics research officer not involved in the study you may contact The University of Queensland Ethics Coordinator on humanethics@research.uq.edu.au or +617 3443 2102.

* 1. Please select one of the options below to confirm your consent to participate in this research project. If you choose to participate in this study and select “yes” then you will automatically be directed to the survey. If you choose not to participate and select “no”, you will be unable to continue.

Circle one:

- Yes, I agree/consent to participate in this study
- No, I do not agree/consent to participate in this study
Demographics

For the purpose of this survey, return to sport (RTS) is defined as “sanctioned for unrestricted training and cleared/available for match play/competition selection”. (This is based on definitions of time loss injury from Fuller et al 2006 and RTS from Ardern et al 2016).

* 2. What is your sex?
   - Male
   - Female

* 3. What is your age?

* 4. In which country do you currently work?

* 5. What is your current profession?
   - Physiotherapist
   - Athletic trainer
   - Athletic therapist
   - Sports scientist
   - Exercise physiologist
   - Sports medicine physician
   - Strength and conditioning coach
   - Other (please specify)

* 6. What is the highest qualification that you have undertaken?
   - Certificate
   - Diploma
   - Bachelor
   - Masters (Clinical)
   - Masters (Research)
   - Doctorate (Clinical)
   - Masters of Philosophy (MPhil)
   - Doctor of Philosophy (PhD)
   - Other (please specify)
* 7. How many years of clinical experience do you have in your field?

* 8. Which elite sport that you are mainly working with, in which athletes experience acute ankle sprains, will serve as the basis for answering the following questions about RTS criteria after an acute lateral ankle sprain?

- Soccer
- Basketball
- Rugby league
- Rugby union
- Rugby 7s
- Touch rugby
- Team handball
- Volleyball
- Netball
- Australian rules football
- Other (please specify)

* 9. How long (in years) have you been working in this sport?

* 10. Please state the level of competition you are working with in this sport (e.g. National Representative Team; National Institute of Sport; English Premier League; NCAA Division 1).

* 11. What sex of athlete are you working with in this sport?

- Males
- Females
- Males & females

* 12. What is the age group of the athletes you are working with in this sport (tick all that apply)?

- Children (12 years and under)
- Adolescents (13-17 years)
- Adults (18 years and older)
- Masters

If you have selected "Masters", please indicate the age athletes become "Masters" in your sport.
Lateral ankle sprain and RTS experience

To remind you, for the purpose of this survey, return to sport (RTS) is defined as “sanctioned for unrestricted training and cleared/available for match play/competition selection”. (This is based on definitions of time loss injury from Fuller et al 2006 and RTS from Ardern et al 2016).

* 13. On average, how many athletes do you manage (assess, treat, rehabilitate, screen, oversee care) with an acute lateral ankle sprain injury each year?

* 14. On average, how many athletes with an acute lateral ankle sprain injury do you manage until they RTS each year?

* 15. What is your involvement in the RTS decision for individuals with an acute lateral ankle sprain injury?
   - Fully autonomous in making the final RTS decision (without advice or consultation with other health professional team members)
   - Make the final RTS decision with advice or consultation with other health professional team members
   - Provide advice to (consult with) the health professional who is making the final RTS decision
   - Collaboratively (share responsibility in) making the RTS decision with other health professional team members
   - Other (please explain)

* 16. On average, in your experience how long (in days) does it take an athlete to RTS after an acute lateral ankle sprain injury?

* 17. Have you been involved in the development or implementation of RTS criteria for athletes with acute lateral ankle sprains?
   - Yes
   - No

If yes, please explain.
* 18. Have you been involved in the development or implementation of screening programs to identify athletes at risk of sustaining a lateral ankle sprain injury?
   - Yes
   - No

   If yes, please explain.

* 19. Have you been involved in the development or implementation of an injury prevention program to prevent lateral ankle sprains?
   - Yes
   - No

   If yes, please explain.

* 20. On the below numerical rating scale (where 0=no expertise and 10=highest level of expertise), please rate your expertise in the RTS management of athletes with acute lateral ankle sprains?

* 21. On the below numerical rating scale (where 0=not a problem and 10=worst injury problem), please indicate how much of a problem you think acute lateral ankle sprains are in your sport?
## RTS criteria

To remind you, for the purpose of this survey return to sport (RTS) is defined as “sanctioned for unrestricted training and cleared/available for match play/competition selection”. (This is based on definitions of time loss injury from Fuller et al 2006 and RTS from Arden et al 2016).

<table>
<thead>
<tr>
<th>*22. Do you feel the assessment of swelling should be a criterion to support the RTS decision after an acute lateral ankle sprain?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

Please indicate the reason(s) for your response.

<table>
<thead>
<tr>
<th>*23. Do you feel the assessment of pain severity over the last 24 hours should be a criterion to support the RTS decision after an acute lateral ankle sprain?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

Please indicate the reason(s) for your response.

<table>
<thead>
<tr>
<th>*24. Do you feel the assessment of pain severity over the last week should be a criterion to support the RTS decision after an acute lateral ankle sprain?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

Please indicate the reason(s) for your response.
**25.** Do you feel the assessment of pain severity on palpation should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

<table>
<thead>
<tr>
<th>Reason(s) for response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**26.** Do you feel the assessment of pain severity during sport specific physical activity should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

<table>
<thead>
<tr>
<th>Reason(s) for response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**27.** Do you feel the assessment of ankle range of motion should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

<table>
<thead>
<tr>
<th>Reason(s) for response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**28.** Do you feel the assessment of ankle muscle length should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

<table>
<thead>
<tr>
<th>Reason(s) for response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**29.** Do you feel the assessment of ankle muscle strength should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

<table>
<thead>
<tr>
<th>Reason(s) for response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
30. Do you feel the assessment of **hip/knee muscle strength** should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

31. Do you feel the assessment of **ankle muscle endurance** should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

32. Do you feel the assessment of **hip/knee muscle endurance** should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

33. Do you feel the assessment of **ankle muscle power** should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.
34. Do you feel the assessment of lower limb muscle power should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

35. Do you feel the assessment of ankle muscle reaction time should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

36. Do you feel the assessment of ligamentous laxity should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

37. Do you feel the assessment of structural integrity of the ligament(s) on imaging should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
38. Do you feel the assessment of ankle joint arthrokinematics should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

39. Do you feel the assessment of proprioception (joint position sense, the threshold for the detection of movement and force sense) should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

40. Do you feel the assessment of static postural control/balance (defined as the coordination of muscles to keep the body's centre of mass within its base of support) should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

41. Do you feel the assessment of dynamic postural control/balance (defined as the ability to tolerate separation of the centre of mass and centre of pressure while transitioning from one posture to the next or between a static to a dynamic state) should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
42. Do you feel the assessment of foot biomechanics should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

43. Do you feel the assessment of lower limb and/or trunk kinematics should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

44. Do you feel an individual's performance on The Functional Movement Screen™ should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

45. Do you feel the assessment of anaerobic fitness should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
46. Do you feel the assessment of **aerobic fitness** should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

47. Do you feel the assessment of **straight-line running speed** should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

48. Do you feel the assessment of **hopping** should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

49. Do you feel the assessment of **jumping** should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
* 50. Do you feel the assessment of agility should be a criterion to support the RTS decision after an acute lateral ankle sprain?

[ ] Yes

[ ] No

Please indicate the reason(s) for your response.

* 51. Do you feel the assessment of sport specific tasks should be a criterion to support the RTS decision after an acute lateral ankle sprain?

[ ] Yes

[ ] No

Please indicate the reason(s) for your response.

* 52. Do you feel the assessment of patient-reported foot and ankle outcome measures (e.g. Foot and Ankle Ability Measure or Foot and Ankle Outcome Score) should be a criterion to support the RTS decision after an acute lateral ankle sprain?

[ ] Yes

[ ] No

Please indicate the reason(s) for your response.

* 53. Do you feel the assessment of perceived ankle stability (i.e. how steady and controlled the ankle feels when performing sporting tasks) should be a criterion to support the RTS decision after an acute lateral ankle sprain?

[ ] Yes

[ ] No

Please indicate the reason(s) for your response.
54. Do you feel the assessment of perceived ankle reassurance/confidence (i.e. how confident the athlete is that he/she will not sprain their ankle when performing sporting tasks) should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

55. Do you feel the assessment of psychological readiness should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

56. Do you feel the assessment of acute:chronic workload ratio should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.

57. Do you feel the assessment of health-related quality of life should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No

Please indicate the reason(s) for your response.
To remind you, for the purpose of this survey return to sport (RTS) is defined as “sanctioned for unrestricted training and cleared/available for match play/competition selection”. (This is based on definitions of time loss injury from Fuller et al 2006 and RTS from Ardern et al 2016).
So far in this survey you have been asked whether the following should be criteria to support the RTS decision after an acute lateral ankle sprain.

- Swelling
- Pain severity over the last 24 hours
- Pain severity over the last week
- Pain severity on palpation
- Pain severity during sport-specific physical activity
- Ankle range of motion
- Ankle muscle length
- Ankle muscle strength
- Hip/knee muscle strength
- Ankle muscle endurance
- Hip/knee muscle endurance
- Ankle muscle power
- Lower limb muscle power
- Ankle muscle reaction time
- Ligamentous laxity
- Structural integrity of the ligament(s) on imaging
- Proprioception (joint position sense, threshold for the detection of movement and force sense)
- Static postural control/balance
- Dynamic postural control/balance
- Foot biomechanics
- Lower limb and/or trunk kinematics
- The Functional Movement Screen™
- Anaerobic fitness
- Aerobic fitness
- Straight-line running speed
- Hopping
- Jumping
- Agility
- Sport specific tasks
- Patient-reported foot and ankle outcome measures
- Perceived ankle stability
- Perceived ankle reassurance/confidence
- Psychological readiness
- Acute:chronic workload ratio
- Health-related quality of life
58. Is there anything else you feel should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

If yes, please list them here.

59. Do you feel the criteria to support the RTS decision should differ for individuals with an acute first-time lateral ankle sprain compared to individuals with CAI who are returning to sport following a new acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

If yes, please explain how you feel the criteria to support the RTS decision of these populations should differ (i.e. what criteria you would use with one group that you would not use with the other).

60. Do you think successful RTS after an acute lateral ankle sprain can be defined?

- Yes
- No
- Unsure/I don't know

If yes, please explain your answer.
61. If there is anything else you would like to add regarding RTS criteria after an acute lateral ankle sprain, please add it here.

Thank you for taking the time to complete this survey. Your participation is much appreciated.
Introduction

Thank you for your participation as an expert panellist in this study and for your response to date. This is the second survey for this study.

Lateral ankle sprains are the most prevalent musculoskeletal injury sustained by individuals who participate in sports; they also account for the highest proportion of all musculoskeletal injuries presenting to US emergencies departments. Furthermore, lateral ankle sprains have the highest recurrence rate of all musculoskeletal injuries. It is estimated that up to 74% of individuals who sprain their ankle will experience recurrent sprains and/or ongoing symptoms of pain, swelling, instability and “giving way”. Return to sport (RTS) times vary for individuals who have sustained an acute lateral ankle sprain injury. At the moment, there are no clear criteria to guide RTS decisions after lateral ankle sprains.

The aim of this study is to use a Delphi approach to develop consensus for RTS criteria for individuals who have sustained an acute lateral ankle sprain injury.

You have been identified as having expertise in RTS decision making for athletes that commonly sustain acute lateral ankle sprain injuries. Your participation in this Delphi study will involve completing surveys about RTS criteria after acute lateral ankle sprain injury. Your anonymous responses will be used to develop expert consensus.

Your participation in this study is voluntary and you are able to withdraw at any time by contacting a member of the research team (details below). If you withdraw, you will not be asked to contribute any further data to the study, but data you have already anonymously contributed will be retained. This is due to the anonymity of responses, which means that we are unable to identify your responses among others in the data already collected. Your privacy will be maintained at all times. Survey data will be stored securely on password-protected hard drives/servers. You may not receive direct benefit from participating in this study, but we anticipate the study findings will inform RTS practices and decision-making processes. We will send you a summary of the study findings on completion of the project.

If you have any questions about this research, please contact Dr Michelle Smith at: m.smith5@uq.edu.au or +617 3365 4660.

If you would like to speak to an ethics research officer not involved in the study, you may contact The University of Queensland Ethics Coordinator at: humanethics@research.uq.edu.au or +617 3443 2102.

* 1. Please select one of the options below to confirm your consent to participate in this research project. If you choose to participate in this study and select “yes” then you will automatically be directed to the survey. If you choose not to participate and select “no”, you will be unable to continue.

- Yes, I agree/agree to participate in this study
- No, I do not agree/agree to participate in this study
Part 1: Panellist details

Thank you again for your participation in this Delphi study which aims to develop consensus for RTS criteria for individuals who have sustained an acute lateral ankle sprain injury. To enable us to send you feedback on group-level (de-identified) survey results and send you a follow up survey (if needed), we will need to collect your name and contact details. This information will be removed from your survey responses to keep your responses de-identified.

* 2. Please add your details for the following items.

- Full name
- Email address
- Country in which you work

* 3. What is your sex?
- Male
- Female

* 4. What is your age?

* 5. What is your current profession?
- Physiotherapist
- Exercise physiologist
- Athletic trainer
- Sports medicine physician
- Athletic therapist
- Strength and conditioning coach
- Sports scientist
- Other (please specify)
* 6. What is the highest qualification that you have undertaken?

- Certificate
- Diploma
- Bachelor
- Masters (Clinical)
- Masters (Research)
- Doctorate (Clinical)
- Masters of Philosophy (MPhil)
- Doctor of Philosophy (PhD)
- Other (please specify)

* 7. Which elite sport that you are mainly working with, in which athletes experience acute ankle sprains, will serve as the basis for answering the following questions about RTS criteria after an acute lateral ankle sprain?

- Soccer
- Basketball
- Rugby league
- Rugby union
- Rugby 7s
- Touch rugby
- Team handball
- Volleyball
- Netball
- Australian rules football
- American/Canadian football
- Gaelic football
- Field hockey
- Tennis
- Lacrosse
- Badminton
- Squash
- Korfball
- Hurling
- Camogie
- Other (please specify)

* 8. Did you complete the first Delphi survey from this study that was emailed to you?

- Yes
- No

* 9. Did you start to complete, but not finish, the first Delphi survey from this study that was emailed to you?

- Yes
- No
Part 2: RTS criteria from Survey 1

For the purpose of this survey, return to sport (RTS) is defined as “sanctioned for unrestricted training and cleared/available for match play/competition selection”. (This is based on definitions of time loss injury from Fuller et al 2006 and RTS from Ardern et al 2016).

Based on your responses to the first survey, the following items reached consensus (>70% agreement) and are included as criteria to support the RTS decision after an acute lateral ankle sprain.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>% Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of sport specific tasks</td>
<td>98.1%</td>
</tr>
<tr>
<td>Assessment of pain severity on sport specific physical activity</td>
<td>92.9%</td>
</tr>
<tr>
<td>Assessment of ankle range of motion</td>
<td>89.7%</td>
</tr>
<tr>
<td>Assessment of ankle muscle strength</td>
<td>86.5%</td>
</tr>
<tr>
<td>Assessment of hopping</td>
<td>86.5%</td>
</tr>
<tr>
<td>Assessment of agility</td>
<td>86.5%</td>
</tr>
<tr>
<td>Assessment of jumping</td>
<td>83.9%</td>
</tr>
<tr>
<td>Assessment of pain severity over the last 24 hours</td>
<td>81.3%</td>
</tr>
<tr>
<td>Assessment of perceived ankle reassurance/confidence</td>
<td>81.3%</td>
</tr>
<tr>
<td>Assessment of proprioception</td>
<td>75.5%</td>
</tr>
<tr>
<td>Assessment of perceived ankle instability</td>
<td>75.5%</td>
</tr>
<tr>
<td>Assessment of psychological readiness</td>
<td>74.2%</td>
</tr>
<tr>
<td>Assessment of ankle muscle endurance</td>
<td>72.9%</td>
</tr>
<tr>
<td>Assessment of dynamic postural control/balance</td>
<td>72.9%</td>
</tr>
</tbody>
</table>

You might be also interested to know that there were no items that for which ‘no’ was registered by >70% of respondents, and therefore no criteria have been excluded at this stage.

For noting, we have used a strict criterion of 70% being the minimum and no rounding up of >69.5 was done, as you will see. The other items included in the first survey did not reach >70% agreement for their inclusion or exclusion in the RTS criteria. For each of these items we will provide you with the following:

a) The percentage of panellists who indicated the item should or should not be included as a criterion to support the RTS decision after an acute lateral ankle sprain, and the percentage of panellist who were unsure;

b) A summary of the top reasons panellists provided to support their answers;

c) A follow up question asking if you feel the assessment item should be a criterion to support the RTS decision after an acute lateral ankle sprain.

We would like to clarify that a RTS criterion is a specific criterion that must be assessed to determine ability to RTS, rather than assessments that will be performed at some point in the rehabilitation program to determine the diagnosis or guide management.
Assessment of swelling

69.7% of panellists indicated that the assessment of swelling should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Swelling can interfere with range of motion, muscle strength, proprioception and function
- Swelling indicates that tissue damage has not been resolved and may indicate an intra-articular problem or synovitis

21.9% of panellists indicated that swelling should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 8.4% of panellists were unsure. Their top reasons included:

- Swelling is not correlated with function, impairments or pain and can persist after tissue damage has resolved

* 10. Do you feel the assessment of swelling should be a criterion to support the RTS decision after an acute lateral ankle sprain?

☐ Yes  ☐ Unsure/I don't know  ☐ No

Please indicate the reason(s) for your response.

Assessment of pain severity over the last week

62.6% of panellists indicated that the assessment of pain severity over the last week should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- It is important to consider the progression of pain over the last week to monitor improvement and response to rehabilitation, training and load
  - Pain indicates the presence of inflammation and injury that has not resolved

25.8% of panellists indicated that the assessment of pain severity over the last week should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 11.6% of panellists were unsure. Their top reason included:

- It is important to determine pain severity in the last 24-72 hours but not over the last week as changes in symptoms and recovery can occur quickly

Please note: There are some differences in the interpretation of this question. We are referring to a single measure (for example, “what was your level of pain in the last week”), rather than repeated measures on a daily basis over the last week (which would be asking the athlete to rate their pain 7 times, one for each day, over the past week). Assessment of pain severity over the last 24 hours and pain severity on sport specific physical activity have already reached consensus and are included as criteria to support the RTS decision after an acute lateral ankle sprain.
* 11. Do you feel the assessment of pain severity over the last week should be a criterion to support the RTS decision after an acute lateral ankle sprain? That is, the athlete is asked the question; ‘What is the level of your pain over the past week?’.

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

Assessment of pain severity on palpation

46.5% of panellists indicated that the assessment of pain severity on palpation should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Pain on palpation indicates inflammation and unresolved tissue damage
- The location of pain on palpation is important as it could indicate fracture, bone bruising or synovitis

41.9% of panellists indicated that the assessment of pain severity on palpation should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 11.6% of panellists were unsure. Their top reasons included:

- Pain on palpation is not indicative of function or other impairments
- Pain on palpation if one of the last things to improve after a lateral ankle sprain and does not restrict progress to RTS

Note: Assessment of pain severity over the last 24 hours and pain severity on sport specific physical activity have already reached consensus and are included as criteria to support the RTS decision after an acute lateral ankle sprain. This item is about pain reported by the athlete when the clinician directly palpates the ankle.

* 12. Do you feel the assessment of pain severity on palpation should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
Assessment of ankle muscle length
26.5% of panellists indicated that the assessment of ankle muscle length should be a criterion to support the RTS decision after an acute lateral ankle sprain.
49.7% of panellists indicated that the assessment of ankle muscle length should NOT be a criterion to support the RTS decision after an acute lateral ankle sprain and 23.9% of panellists were unsure.
Unfortunately panellists were not asked to provide reasons for their response in the first survey and therefore this information cannot be provided for this item.

* 13. Do you feel the assessment of ankle muscle length should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

Assessment of hip/knee muscle strength
51.6% of panellists indicated that the assessment of hip/knee muscle strength should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Hip and knee muscle strength effects lower limb and ankle kinematics, stability, function and performance
- Hip and knee muscle strength could be related to an increased risk of injury/re-injury

28.4% of panellists indicated that the assessment of hip/knee muscle strength should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 20.0% of panellists were unsure. Their top reasons included:

- Hip and knee muscle strength may be important for injury prevention and will be addressed in the rehabilitation program, but it is not a RTS criterion

* 14. Do you feel the assessment of hip/knee muscle strength should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
Assessment of hip/knee muscle endurance

37.4% of panellists indicated that the assessment of hip/knee muscle endurance should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Hip and knee muscle endurance is important to prevent injury/re-injury

36.8% of panellists indicated that the assessment of hip/knee muscle endurance should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 25.8% of panellists were unsure. Their top reasons included:

- Hip and knee muscle endurance should be assessed and deficits should be addressed in the rehabilitation program, but it is not a RTS criterion

15. Do you feel the assessment of hip/knee muscle endurance should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- Unsure/I don't know
- No

Please indicate the reason(s) for your response.

Assessment of ankle muscle power

69.7% of panellists indicated that the assessment of ankle muscle power should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Ankle muscle power effects function and performance
  - Ankle muscle power should be assessed as part of lower limb function (i.e. hopping tests)

13.6% of panellists indicated that the assessment of ankle muscle power should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 16.8% of panellists were unsure. Their top reasons included:

- Ankle muscle power is assessed as part of lower limb function (i.e. hopping tests) but is not assessed in isolation

Please note: Consider this question distinct to the assessment of total lower limb muscle power (which is asked in the next question). This question is purely about power isolated to the ankle.
16. Do you feel the assessment of ankle muscle power should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

**Assessment of lower limb muscle power**

55.5% of panellists indicated that the assessment of lower limb muscle power should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Lower limb muscle power is important for optimal lower limb function and performance
- Lower limb muscle power should be assessed functionally (i.e. by using a counter movement jumps or hop tests)

25.2% of panellists indicated that the assessment of lower limb muscle power should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 19.4% of panellists were unsure. Their top reasons included:

- Lower limb muscle power should be assessed and deficits should be addressed in the rehabilitation program, but it is not a RTS criterion

17. Do you feel the assessment of lower limb muscle power should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
Assessment of ankle muscle reaction time

55.5% of panellists indicated that the assessment of ankle muscle reaction time should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Ankle muscle reaction time is associated with increased risk of injury/re-injury and is important for control of the ankle

15.5% of panellists indicated that the assessment of ankle muscle reaction time should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 29.0% of panellists were unsure. Their top reasons included:

- Ankle muscle reaction time cannot easily be measured clinically and therefore should not be a RTS criterion

Please note: A number panellist who indicated that the assessment of ankle muscle reaction time should be a RTS criterion acknowledged that it cannot easily be measured directly in clinic.

*18. Do you feel the assessment of ankle muscle reaction time should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- Unsure/I don't know
- No

Please indicate the reason(s) for your response.

Assessment of ligamentous laxity

34.2% of panellists indicated that the assessment of ligamentous laxity should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Ligamentous laxity may compromise joint stability and increase risk of re-injury

56.1% of panellists indicated that the assessment of ligamentous laxity should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 9.7% of panellists were unsure. Their top reasons included:

- Ligamentous laxity/mechanical instability may remain long-term and is not associated with deficits in function

Please note: A number of panellists who indicated that the assessment of ligamentous laxity should be a RTS criterion also acknowledged that it can remain long-term despite full return to sport and function.
* 19. Do you feel the assessment of ligamentous laxity should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

**Assessment of structural integrity of the ligaments on imaging**

19.4% of panellists indicated that the assessment of structural integrity of the ligaments on imaging should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Structural integrity of the ligaments on imaging identifies the extent of the injury and exact structures involved

69.0% of panellists indicated that the assessment of structural integrity of the ligaments on imaging should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 11.6% of panellists were unsure. Their top reasons included:

- Structural integrity of the ligaments on imaging does not correlate with function
- Structural integrity of ligaments may not resolve post-injury and athletes can RTS with ligamentous disruption

* 20. Do you feel the assessment of structural integrity of the ligaments on imaging should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
**Assessment of ankle joint arthokinematics**

Arthokinematics is the movement of joint (articular) surfaces on each other, which in this case is the movement of talus on tibia.

40.0% of panellists indicated that the assessment of ankle joint arthokinematics should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Talocural arthokinematics are important for normal ankle range of motion and function, which if compromised may be associated with increased risk of injury/re-injury

32.3% of panellists indicated that the assessment of ankle joint arthokinematics should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 27.8% of panellists were unsure. Their top reasons included:

- Ankle joint arthokinematics are not related to function or successful RT
- Ankle joint arthokinematics are not easy to reliably assess clinically

*21. Do you feel the assessment of **ankle joint arthokinematics** should be a criterion to support the RTS decision after an acute lateral ankle sprain?*

- Yes
- Unsure/I don't know
- No

Please indicate the reason(s) for your response.

**Assessment of static postural control/balance (defined as the coordination of muscles to keep the body’s centre of mass within its base of support)**

54.2% of panellists indicated that the assessment of static postural control/balance (defined as the coordination of muscles to keep the body's centre of mass within its base of support) should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Static postural control/balance will impact on dynamic postural control in sport, which if compromised may be associated with increased risk of injury/re-injury

30.3% of panellists indicated that the assessment of static postural control/balance should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 15.5% of panellists were unsure. Their top reasons included:

- Static postural control/balance will be considered early in the rehabilitation program and as a precursor for dynamic postural control training, but it is not part of RTS function

**Please note:** Assessment of **dynamic** postural control/balance (defined as the ability to tolerate separation of the centre of mass and centre of pressure while transitioning from one posture to the next or between a static to a dynamic state) has already reached consensus and is included as a criterion to support the RTS decision after an acute lateral ankle sprain.
**22.** Do you feel the assessment of *static postural control/balance* (defined as the coordination of muscles to keep the body’s centre of mass within its base of support) should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don’t know

Please indicate the reason(s) for your response.

**Assessment of foot mechanics**

27.1% of panelists indicated that the assessment of foot mechanics should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Foot mechanics may be associated with increased injury risk and impaired performance

49.7% of panelists indicated that the assessment of foot mechanics should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 23.2% of panelists were unsure. Their top reasons included:

- Foot mechanics may be addressed in the rehabilitation program, but it is not a RTS criterion

**Please note:** Consider this question distinct to the assessment of lower limb and trunk kinematics (which is asked in the next question).

**23.** Do you feel the assessment of *foot mechanics* should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don’t know

Please indicate the reason(s) for your response.
Assessment of lower limb and/or trunk kinematics

38.1% of panellists indicated that the assessment of lower limb and/or trunk kinematics should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Lower limb and/or trunk kinematic chain abnormalities may be associated with compromised ankle function and increased risk of injury/re-injury

41.9% of panellists indicated that the assessment of lower limb and/or trunk kinematics should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 20.0% of panellists were unsure. Their top reasons included:

- Lower limb and/or trunk kinematics should be assessed and deficits should be addressed in the rehabilitation program, but it is not a RTS criterion

* 24. Do you feel the assessment of lower limb and/or trunk kinematics should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- Unsure/I don't know
- No

Please indicate the reason(s) for your response.

Assessment of The Functional Movement Screen™

19.4% of panellists indicated that the assessment of The Functional Movement Screen™ should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Some assessment of movement is important to identify functional performance, presence of asymmetries and risk of injury

62.6% of panellists indicated that the assessment of The Functional Movement Screen™ should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 18.1% of panellists were unsure. Their top reasons included:

- Many components of the Functional Movement Screen™ do not related to ankle function or ankle sprain, and it is more suitable to assess performance of sport specific tasks
- There is lack of evidence to support the use of the Functional Movement Screen™, and it is not designed for RTS

Please note: The assessment of sport specific tasks has already reached consensus and is included as a criterion to support the RTS decision after an acute lateral ankle sprain.
* 25. Do you feel the assessment of The Functional Movement Screen™ should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

Assessment of anaerobic fitness

35.5% of panellists indicated that the assessment of anaerobic fitness should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Anaerobic fitness should be assessed as a RTS criterion in players that require anaerobic fitness for their sport.

45.2% of panellists indicated that the assessment of anaerobic fitness should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 19.4% of panellists were unsure. Their top reasons included:

- Anaerobic fitness should be addressed as part of the rehabilitation program when required for the sport, but it is not a RTS criterion.

Please note: Panellists who indicated that the assessment of anaerobic fitness should be a RTS criterion and also those who indicated that it should not be a RTS criterion, indicated similarly that it was only relevant for players who require it for their sport, but that it was not appropriate for all athletes after an acute lateral ankle sprain.

* 26. Do you feel the assessment of anaerobic fitness should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
Assessment of aerobic fitness

40.0% of panellists indicated that the assessment of aerobic fitness should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Aerobic fitness is important to determine an athlete's readiness to return to sports and their ability to cope with demands of the sport

43.2% of panellists indicated that the assessment of aerobic fitness should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 16.8% of panellists were unsure. Their top reasons included:

- Aerobic fitness should be addressed as part of the rehabilitation program when required for the sport, but it is not a RTS criterion

Please note: Panellists who indicated that the assessment of aerobic fitness should be a RTS criterion and also those who indicated that it should not be a RTS criterion, indicated similarly that it was only relevant for players who require it for their sport, but that it was not appropriate for all athletes after an acute lateral ankle sprain.

* 27. Do you feel the assessment of aerobic fitness should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

Assessment of straight-line running speed

45.2% of panellists indicated that the assessment of straight-line running speed should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Straight-line running speed is a good test of ankle and overall function and sport specific ability (n=22)

40.7% of panellists indicated that the assessment of straight-line running speed should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 14.2% of panellists were unsure. Their top reasons included:

- Assessment of sport specific tasks should be considered in the RTS decision rather than straight-line running speed

Note: The assessment of hopping, jumping, agility and sport-specific tasks have already reached consensus and are included as criteria to support the RTS decision after an acute lateral ankle sprain.
28. Do you feel the assessment of straight-line running speed should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

Assessment of patient-reported foot and ankle function (e.g. Foot and Ankle Ability Measure or Foot and Ankle Outcome Score)

49.0% of panellists indicated that the assessment of patient-reported foot and ankle function (e.g. Foot and Ankle Ability Measure or Foot and Ankle Outcome Score) should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Patient-reported foot and ankle outcome measures are important to get the athlete's perspective on their ability to RTS

23.3% of panellists indicated that the assessment of patient-reported foot and ankle outcome measures should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 27.8% of panellists were unsure. Their top reasons included:

- Patient-reported foot and ankle outcome measures such as the Foot and Ankle Ability Measure or Foot and Ankle Outcome Score are not specific enough to gauge readiness for RTS

Note: The assessment of perceived ankle stability (i.e. how steady and controlled the ankle feels when performing sporting tasks), perceived ankle reassurance/confidence (i.e. how confident the athlete is that he/she will not sprain their ankle when performing sporting tasks) and psychological readiness have already reached consensus and are included as criteria to support the RTS decision after an acute lateral ankle sprain.

29. Do you feel the assessment of patient-reported foot and ankle outcome measures (e.g. Foot and Ankle Ability Measure or Foot and Ankle Outcome Score) should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
Assessment of acute:chronic workload ratio
Acute to chronic workload ratio is the workload performed by the athlete recently expressed as a proportion (ratio) of their workload over a longer period. For example, their running distance over the past week expressed as a ratio of their running distance over the past month.

44.5% of panellists indicated that the assessment of acute:chronic workload ratio should be a criterion to support the RTS decision after an acute lateral ankle sprain. Their top reasons included:

- Acute:chronic workload ratio is important to manage load in preparation for RTS and for injury prevention on RTS

29.0% of panellists indicated that the assessment of acute:chronic workload ratio should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 26.5% of panellists were unsure. Their top reasons included:

- Acute:chronic workload ratio should be assessed and taken into account to manage load during rehabilitation and training, but it is not a RTS criterion

* 30. Do you feel the assessment of acute:chronic workload ratio should be a criterion to support the RTS decision after an acute lateral ankle sprain?

☐ Yes  ☐ Unsure/I don't know  ☐ No

Please indicate the reason(s) for your response.

Assessment of health-related quality of life
17.4% of panellists indicated that the assessment of health-related quality of life should be a criterion to support the RTS decision after an acute lateral ankle sprain. There were no consistently reported reasons provided by panellist to support this answer.

54.2% of panellists indicated that the assessment of health-related quality of life should not be a criterion to support the RTS decision after an acute lateral ankle sprain and 28.4% of panellists were unsure. Their top reasons included:

- Health-related quality of life is not appropriately specific or relevant to determine RTS ability

Note: The assessment of perceived ankle stability (i.e. how steady and controlled the ankle feels when performing sporting tasks), perceived ankle reassurance/confidence (i.e. how confident the athlete is that he/she will not sprain their ankle when performing sporting tasks) and psychological readiness have already reached consensus and are included as criteria to support the RTS decision after an acute lateral ankle sprain.
* 31. Do you feel the assessment of health-related quality of life should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

Assessment of performance during a full training session

In your responses to the first Delphi survey, panellists were asked to nominate additional items they felt could support the RTS decision after an acute lateral ankle sprain. Assessment of performance during a full training session was nominated by greater than 5% of panellists.

* 32. Do you feel the assessment of performance during a full training session should be a criterion to support the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
Part 3: Other factors that may influence the RTS decision after an acute lateral ankle sprain

There are a number of factors that may influence the criteria to support the RTS decision after an acute lateral ankle sprain. These factors are not specific RTS criteria, but may or may not influence your RTS decision making. The questions below ask your opinions as to whether or not these factors would influence the criteria you use to support the RTS decision after an acute lateral ankle sprain.

To remind you, for the purpose of this survey, return to sport (RTS) is defined as “sanctioned for unrestricted training and cleared/available for match play/competition selection”. (This is based on definitions of time loss injury from Fuller et al 2006 and RTS from Ardern et al 2016).

* 33. Do you feel that the type of sport played should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?
   ○ Yes
   ○ No
   ○ Unsure/I don't know

   Please indicate the reason(s) for your response.

* 34. Do you feel that the position played (e.g. goalkeeper in soccer) should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?
   ○ Yes
   ○ No
   ○ Unsure/I don't know

   Please indicate the reason(s) for your response.

* 35. Do you feel that limb dominance should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?
   ○ Yes
   ○ No
   ○ Unsure/I don't know

   Please indicate the reason(s) for your response.
* 36. Do you feel that the **ability to protect the ankle** (e.g. taping or bracing) should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

* 37. Do you feel that **timing in the season** (e.g. playoffs/finals) should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

* 38. Do you feel that **pressure from the athlete to RTS** should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.

* 39. Do you feel that **pressure from external individuals** (e.g. coach) should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?

- Yes
- No
- Unsure/I don't know

Please indicate the reason(s) for your response.
* 40. Do you feel that masking the injury (e.g. use of analgesics) should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?
   - Yes
   - No
   - Unsure/I don't know

Please indicate the reason(s) for your response.

* 41. Do you feel that other (e.g. financial) interests should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?
   - Yes
   - No
   - Unsure/I don't know

Please indicate the reason(s) for your response.

* 42. Do you feel that fear of litigation should influence (e.g. expedite or delay) the RTS decision after an acute lateral ankle sprain?
   - Yes
   - No
   - Unsure/I don't know

Please indicate the reason(s) for your response.
Part 4: Thank you!

43. If there is anything else you would like to add regarding RTS criteria after an acute lateral ankle sprain, please add it here.

Thank you for taking the time to complete this survey. Your participation is much appreciated.
Introduction

Thank you for your participation as an expert panellist in this study and for your responses to date. This is the third and final survey for this study.

Lateral ankle sprains are the most prevalent musculoskeletal injury sustained by individuals who participate in sports; they also account for the highest proportion of all musculoskeletal injuries presenting to US emergency departments. Furthermore, lateral ankle sprains have the highest recurrence rate of all musculoskeletal injuries. It is estimated that up to 74% of individuals who sustain their ankle will experience recurrent sprains and/or ongoing symptoms of pain, swelling, instability and “giving way”. Return to sport (RTS) times vary for individuals who have sustained an acute lateral ankle sprain injury. At the moment, there are no clear criteria to guide RTS decisions after lateral ankle sprains.

The aim of this study is to use a Delphi approach to develop consensus for RTS criteria for individuals who have sustained an acute lateral ankle sprain injury.

You have been identified as having expertise in RTS decision making for athletes that commonly sustain acute lateral ankle sprain injuries. Your participation in this Delphi study will involve completing surveys about RTS criteria after acute lateral ankle sprain injury. Your anonymous responses will be used to develop expert consensus.

Your participation in this study is voluntary and you are able to withdraw at any time by contacting a member of the research team (details below). If you withdraw, you will not be asked to contribute any further data to the study, but data you have already anonymously contributed will be retained. This is due to the anonymity of responses, which means that we are unable to identify your responses among others in the data already collected. Your privacy will be maintained at all times. Survey data will be stored securely on password-protected hard drives/servers. You may not receive direct benefit from participating in this study, but we anticipate the study findings will inform RTS practices and decision-making processes. We will send you a summary of the study findings on completion of the project.

If you have any questions about this research, please contact Dr Michelle Smith at: m.smith5@uq.edu.au or +617 3365 4660.

If you would like to speak to an ethics research officer not involved in the study, you may contact The University of Queensland Ethics Coordinator at: humanethics@research.uq.edu.au or +617 3443 2102.

1. Please select one of the options below to confirm your consent to participate in this research project. If you choose to participate in this study and select “yes” then you will automatically be directed to the survey. If you choose not to participate and select “no”, you will be unable to continue.

- Yes, I agree/consent to participate in this study
- No, I do not agree/consent to participate in this study
Part 1: Panellist details

Thank you again for your participation in this Delphi study which aims to develop consensus for RTS criteria for individuals who have sustained an acute lateral ankle sprain injury. To enable us to send you feedback on group-level (de-identified) survey results, we will need to collect your name and contact details. This information will be removed from your survey responses to keep your responses de-identified.

* 2. Please add your details for the following items.

<table>
<thead>
<tr>
<th>Item</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full name</td>
<td></td>
</tr>
<tr>
<td>Email address</td>
<td></td>
</tr>
<tr>
<td>Country in which you work</td>
<td></td>
</tr>
</tbody>
</table>
Part 2: Included and excluded RTS criteria

Based on your responses to Surveys 1 and 2, the following items reached consensus (>70% agreement) to be excluded as assessment items to support the RTS decision after an acute lateral ankle sprain.

For the purpose of this survey, return to sport (RTS) is defined as “sanctioned for unrestricted training and cleared/available for match play/competition selection”. (This is based on definitions of time loss injury from Fuller et al 2006 and RTS from Ardern et al 2016).

<table>
<thead>
<tr>
<th>Excluded Item</th>
<th>% Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of structural integrity of the ligaments on imaging</td>
<td>89.1%</td>
</tr>
<tr>
<td>Assessment of health-related quality of life</td>
<td>85.4%</td>
</tr>
<tr>
<td>Assessment of The Functional Movement Screen™</td>
<td>83.9%</td>
</tr>
<tr>
<td>Assessment of ligamentous laxity</td>
<td>81.0%</td>
</tr>
<tr>
<td>Assessment of foot biomechanics</td>
<td>73.7%</td>
</tr>
<tr>
<td>Assessment of lower limb and/or trunk kinematics</td>
<td>74.5%</td>
</tr>
</tbody>
</table>

Based on your responses to the 1st and 2nd surveys, the following items reached consensus (>70% agreement) and are included as assessment items to support the RTS decision after an acute lateral ankle sprain.

<table>
<thead>
<tr>
<th>Included Item</th>
<th>% Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of sport specific tasks</td>
<td>98.1%</td>
</tr>
<tr>
<td>Assessment of pain severity on sport specific physical activity</td>
<td>92.9%</td>
</tr>
<tr>
<td>Assessment of ankle range of motion</td>
<td>89.7%</td>
</tr>
<tr>
<td>Assessment of ankle muscle strength</td>
<td>86.5%</td>
</tr>
<tr>
<td>Assessment of hopping</td>
<td>86.5%</td>
</tr>
<tr>
<td>Assessment of agility</td>
<td>86.5%</td>
</tr>
<tr>
<td>Assessment of jumping</td>
<td>83.9%</td>
</tr>
<tr>
<td>Assessment of pain severity over the last 24 hours</td>
<td>81.3%</td>
</tr>
<tr>
<td>Assessment of perceived ankle reassurance/confidence</td>
<td>81.3%</td>
</tr>
<tr>
<td>Assessment of proprioception</td>
<td>75.5%</td>
</tr>
<tr>
<td>Assessment of perceived ankle instability</td>
<td>75.5%</td>
</tr>
<tr>
<td>Assessment of psychological readiness</td>
<td>74.2%</td>
</tr>
<tr>
<td>Assessment of ankle muscle endurance</td>
<td>72.9%</td>
</tr>
<tr>
<td>Assessment of dynamic postural control/balance</td>
<td>72.9%</td>
</tr>
<tr>
<td>Assessment of ankle muscle power</td>
<td>71.5%</td>
</tr>
</tbody>
</table>
We have mapped the above agreed-upon RTS items to domains, which represent separate aspects of RTS. The domains and aligned agreed-upon items are detailed in the following table.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Included RTS assessment item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Pain severity during sporting physical activity</td>
</tr>
<tr>
<td></td>
<td>Pain severity over last 24 hours</td>
</tr>
<tr>
<td>Athlete perception</td>
<td>Perceived ankle confidence/reassurance</td>
</tr>
<tr>
<td></td>
<td>Perceived ankle stability</td>
</tr>
<tr>
<td></td>
<td>Psychological readiness</td>
</tr>
<tr>
<td>Ankle impairments</td>
<td>Ankle range of motion</td>
</tr>
<tr>
<td></td>
<td>Ankle muscle strength</td>
</tr>
<tr>
<td></td>
<td>Ankle muscle endurance</td>
</tr>
<tr>
<td></td>
<td>Ankle muscle power</td>
</tr>
<tr>
<td>Sensorimotor control</td>
<td>Dynamic postural control/balance</td>
</tr>
<tr>
<td></td>
<td>Proprioception</td>
</tr>
<tr>
<td>Sport/functional performance</td>
<td>Sport-specific tasks</td>
</tr>
<tr>
<td></td>
<td>Hopping and jumping</td>
</tr>
<tr>
<td></td>
<td>Agility</td>
</tr>
</tbody>
</table>

* 3. Do you agree with the chosen domains and the mapping of the agreed-upon RTS items to the domains? (If you do not agree with the domains or the mapping of items you will have an opportunity to identify what you do not agree with in subsequent questions.)

- [ ] Yes, I agree with the domains and mapping of items to the domains
- [ ] No, I do not agree with the domains or mapping of items to the domains
Part 2: RTS Domains

* 4. Do you agree with the domains created to house the agreed-upon RTS items? (The domains and items mapped to each domain are shown again in the table below.)

- Yes, I agree with the domains
- No, I do not agree with the domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Included RTS assessment item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
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<tr>
<td>Sport/functional performance</td>
<td>Sport-specific tasks</td>
</tr>
<tr>
<td></td>
<td>Hopping and jumping</td>
</tr>
<tr>
<td></td>
<td>Agility</td>
</tr>
</tbody>
</table>
**Part 2: RTS domains**

* 5. Do you agree with the creation of the domain "**Pain**"?
   - [ ] Yes
   - [ ] No
   - [ ] Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.

* 6. Do you agree with the creation of the domain "**Athlete perception**"?
   - [ ] Yes
   - [ ] No
   - [ ] Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.

* 7. Do you agree with the creation of the domain "**Ankle impairments**"?
   - [ ] Yes
   - [ ] No
   - [ ] Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.

* 8. Do you agree with the creation of the domain "**Sensorimotor control**"?
   - [ ] Yes
   - [ ] No
   - [ ] Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.
9. Do you agree with the creation of the domain "Sport/functional performance"?

☐ Yes

☐ No

☐ Unsure/I don't know

If you answered 'no' or 'unsure', please explain your reasons.


Part 2: Placement of RTS items in domains

* 10. Do you agree that each of the RTS items are placed appropriately in the domains? (The domains and items mapped to each domain are shown again in the table below.)

- Yes, I agree with the placement of the RTS items
- No, I do not agree with the placement of the RTS items

<table>
<thead>
<tr>
<th>Domain</th>
<th>Included RTS assessment item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>Pain severity during sporting physical activity</td>
</tr>
<tr>
<td></td>
<td>Pain severity over last 24 hours</td>
</tr>
<tr>
<td>Athlete perception</td>
<td>Perceived ankle confidence/reassurance</td>
</tr>
<tr>
<td></td>
<td>Perceived ankle stability</td>
</tr>
<tr>
<td></td>
<td>Psychological readiness</td>
</tr>
<tr>
<td>Ankle impairments</td>
<td>Ankle range of motion</td>
</tr>
<tr>
<td></td>
<td>Ankle muscle strength</td>
</tr>
<tr>
<td></td>
<td>Ankle muscle endurance</td>
</tr>
<tr>
<td></td>
<td>Ankle muscle power</td>
</tr>
<tr>
<td>Sensorimotor control</td>
<td>Dynamic postural control/balance</td>
</tr>
<tr>
<td></td>
<td>Proprioception</td>
</tr>
<tr>
<td>Sport/functional performance</td>
<td>Sport-specific tasks</td>
</tr>
<tr>
<td></td>
<td>Hopping and jumping</td>
</tr>
<tr>
<td></td>
<td>Agility</td>
</tr>
</tbody>
</table>
Part 2: Placement of RTS items in domains

* 11. Do you agree with the placement of the RTS item "Pain severity during sporting physical activity" in the domain "Pain"?
   - Yes
   - No
   - Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.

* 12. Do you agree with the placement of the RTS item "Pain severity over the last 24 hours" in the domain "Pain"?
   - Yes
   - No
   - Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.

* 13. Do you agree with the placement of the RTS item "Perceived ankle confidence/reassurance" in the domain "Athlete perception"?
   - Yes
   - No
   - Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.
* 14. Do you agree with the placement of the RTS item "Perceived ankle stability" in the domain "Athlete perception"?
   - Yes
   - No
   - Unsure/I don't know
   If you answered 'no' or 'unsure', please explain your reasons.

* 15. Do you agree with the placement of the RTS item "Psychological readiness" in the domain "Athlete perception"?
   - Yes
   - No
   - Unsure/I don't know
   If you answered 'no' or 'unsure', please explain your reasons.

* 16. Do you agree with the placement of the RTS item "Ankle range of motion" in the domain "Ankle impairments"?
   - Yes
   - No
   - Unsure/I don't know
   If you answered 'no' or 'unsure', please explain your reasons.

* 17. Do you agree with the placement of the RTS item "Ankle muscle strength" in the domain "Ankle impairments"?
   - Yes
   - No
   - Unsure/I don't know
   If you answered 'no' or 'unsure', please explain your reasons.
*18. Do you agree with the placement of the RTS item "Ankle muscle endurance" in the domain "Ankle impairments"?

- Yes
- No
- Unsure/I don't know

If you answered 'no' or 'unsure', please explain your reasons.

*19. Do you agree with the placement of the RTS item "Ankle muscle power" in the domain "Ankle impairments"?

- Yes
- No
- Unsure/I don't know

If you answered 'no' or 'unsure', please explain your reasons.

*20. Do you agree with the placement of the RTS item "Dynamic postural control/balance" in the domain "Sensorimotor control"?

- Yes
- No
- Unsure/I don't know

If you answered 'no' or 'unsure', please explain your reasons.

*21. Do you agree with the placement of the RTS item "Proprioception" in the domain "Sensorimotor control"?

- Yes
- No
- Unsure/I don't know

If you answered 'no' or 'unsure', please explain your reasons.
* 22. Do you agree with the placement of the RTS item "Sport-specific tasks" in the domain "Sport/functional performance"?
   - Yes
   - No
   - Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.

* 23. Do you agree with the placement of the RTS item "Hopping and jumping" in the domain "Sport/functional performance"?
   - Yes
   - No
   - Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.

* 24. Do you agree with the placement of the RTS item "Agility" in the domain "Sport/functional performance"?
   - Yes
   - No
   - Unsure/I don't know

   If you answered 'no' or 'unsure', please explain your reasons.
Part 3: Undecided RTS items that require decision

A number of other items included in the survey did not reach >70% agreement for their inclusion or exclusion. For each of the items that did not reach consensus, we provide you with information on the percentage of panellists who indicated the item should or should not be included as a criterion to support the RTS decision after an acute lateral ankle sprain; and a summary of the reasons why panellists thought the item should or should not be included.

We recognise that in these surveys we have asked if an ‘assessment’ should be a ‘criterion’ to support this RTS decision. We acknowledge that this phrasing may be confusing as it is the result of the assessment, rather than the assessment itself, that informs the RTS criteria. For example, for a hopping assessment it would be something like a symmetry score/result (e.g. 90% symmetry) that would be the criterion for RTS. We would like to clarify that we are asking if the result of the assessment listed below should be included as a criterion to support the RTS decision after an acute lateral ankle sprain.

This is the final survey round and encourage you to read and consider each point carefully, and to make a decision.

To remind you, for the purpose of this survey, return to sport (RTS) is defined as “sanctioned for unrestricted training and cleared/available for match play/competition selection”. (This is based on definitions of time loss injury from Fuller et al 2006 and RTS from Ardern et al 2016).

Assessment of anaerobic and aerobic fitness

You, the panellists, agree that anaerobic and aerobic fitness should be addressed in the rehabilitation program and are important for optimal performance on RTS. The discussion below specifically relates to whether an athlete would not be medically cleared for RTS after an acute lateral ankle sprain because of their anaerobic or aerobic fitness.

67.1% of panellists indicated that anaerobic fitness should not be included as a criterion to support the RTS decision after an acute lateral ankle sprain and 61.3% of panellists indicated that aerobic fitness should not be included as a criterion. The reasons provided by panellists were aerobic and anaerobic fitness will be addressed in rehabilitation and are linked to performance but not medical clearance for RTS. They also indicated that these items would be assessed through sport-specific testing, which has already reached consensus and has been included as RTS criteria.

22.6% of panellists indicated that anaerobic fitness should be a criterion to support the RTS decision after an acute lateral ankle sprain, and 29.2% of panellists indicated that aerobic fitness should be a criterion. The reasons provided by panellists were that aerobic and anaerobic fitness are needed to meet the demands of sport.
* 25. Do you agree that a deficit in **anaerobic fitness** will not stop clearance of an athlete for RTS?

- Yes, I agree that a deficit in anaerobic fitness will **not** stop clearance of an athlete for RTS
- No, I think that full anaerobic fitness is required for clearance of an athlete for RTS
- Unsure/I don’t know

If you have indicated “no”, please indicate the reason(s) for your response.

* 26. Do you agree that a deficit in **aerobic fitness** will not stop clearance of an athlete for RTS?

- Yes, I agree that a deficit in aerobic fitness will **not** stop clearance of an athlete for RTS
- No, I think that full aerobic fitness is required for clearance of an athlete for RTS
- Unsure/I don’t know

If you have indicated “no”, please indicate the reason(s) for your response.

**Assessment of acute:chronic workload**

You, the panellists, agree that an assessment of acute:chronic workload should be used throughout the entire rehabilitation program to manage load. The discussion below specifically relates to whether an athlete would **not** be medically cleared for RTS after an acute lateral ankle sprain because of their acute:chronic workload ratio.

56.2% of panellists indicated that the acute:chronic workload ratio should **not** be included as a criterion to support the RTS decision after an acute lateral ankle sprain. Panellists indicated that the acute:chronic workload ratio is used to manage load throughout rehabilitation and on RTS, but it does **not** stop an athlete from RTS.

32.1% of panellists indicated the acute:chronic workload ratio should be **criterion** to support the RTS decision after an acute lateral ankle sprain. Panellists indicated that the acute:chronic workload ratio helps manage load and possibly decrease risk of injury.
* 27. Do you agree that a sub-optimal acute:chronic workload will not stop clearance of an athlete for RTS?

- Yes, I agree that sub-optimal acute:chronic workload will not stop clearance of an athlete for RTS
- No, I think that optimal acute:chronic workload is required for clearance of an athlete for RTS
- Unsure/I don't know

If you have indicated "no", please indicate the reason(s) for your response.

Assessment of performance during a full training session
The definition of RTS in this survey is "sanctioned for unrestricted training and cleared/available for match play/competition selection". Based on this definition, returning to full training alone (without clearance for match play/competition selection) means that the athlete has not yet returned to sport.

62.0% of panellists indicated that performance during a full training session should be included as a criterion to support the RTS decision after an acute lateral ankle sprain. Panellists indicated that performance during a full training session is the final step to determine ability to RTS.

28.5% of panellists indicated that performance during a full training session should not be criterion to support the RTS decision after an acute lateral ankle sprain. The reasons provided by panellists were that performance at training is not specific or measurable, and that return to training indicated RTS (but we have clarified above that based on our definition, return to full training does not mean an athlete has returned to sport).

* 28. Do you agree that completion of a full training session is required for an athlete to be sanctioned for match play/competition selection?

- Yes, I agree that completion of a full training session is required for an athlete to be sanctioned for match play/competition selection
- No, I do not think that completion of a full training session is required for an athlete to be sanctioned for match play/competition selection
- Unsure/I don't know

If you have indicated "no", please indicate the reason(s) for your response.
Assessment of lower limb muscle power

In the previous surveys you agreed that the assessment of ankle muscle power, jumping and hopping be included as a criterion to support the RTS decision after an acute lateral ankle sprain. The discussion below specifically relates to whether lower limb muscle power should be measured separately and in addition to ankle muscle power, jumping and hopping.

64.2% of panellists indicated that the assessment of lower limb muscle power should be included as a criterion to support the RTS decision after an acute lateral ankle sprain. They indicated they would assess lower limb ankle muscle power by using tests such as jumping and hopping (both of which have already reached consensus are are included as criterion to support the RTS decision).

29.2% of panellists indicated that the assessment of lower limb muscle power should not be a criterion to support the RTS decision after an acute lateral ankle sprain. These panellists indicated that lower limb and ankle muscle power would be assessed together using jumping and hopping tests. Note, this is the same reason as the 64.2% of panellists who indicated that the assessment of lower limb muscle power should be included as a criterion to support the RTS decision.

* 29. Do you agree that lower limb muscle power is assessed together with ankle muscle power and/or tests of jumping or hopping to determine an athlete's ability to RTS?

- Yes, I agree that lower limb muscle power is assessed together with ankle muscle power, jumping and/or hopping to determine ability to RTS
- No, I think the assessment of lower limb muscle power should be separate to ankle muscle power, jumping and/or hopping to determine ability to RTS
- Unsure/I don't know

If you have answered "no", please indicate how you assess lower limb power differently with your athletes.
Assessment of hip and knee muscle endurance and strength
You, the panelists, agree that deficits in hip and knee muscle endurance and strength should be addressed in the rehabilitation program. The discussion below specifically relates to whether an athlete would not be medically cleared for RTS after an acute lateral ankle sprain because of their hip and knee muscle endurance or strength.

62.8% of panelists indicated that hip and knee muscle endurance should not be included as a criterion to support the RTS decision after an acute lateral ankle sprain, and 54.1% indicated that hip and knee muscle strength should not be included as a criterion. Panelists indicated they will address deficits in rehabilitation, but hip and knee muscle endurance or strength will not stop them from clearing an athlete to RTS.

29.9% of panelists indicated that hip and knee muscle endurance should be a criterion to support the RTS decision after an acute lateral ankle sprain, and 40.1% indicate that hip and knee muscle strength should be a criterion. The reasons provided by panelists were that hip and knee muscle endurance and strength could contribute to performance and injury risk. Many panelists acknowledged that they would indirectly assess hip and knee muscle endurance and strength using hopping, jumping or sports-specific tests (all of which have already reached consensus and are included in as assessments to support the RTS decision).

* 30. Do you agree that a deficit in hip and knee muscle endurance will not stop clearance an athlete for RTS who performs appropriately on hopping, jumping and sport-specific tests?

- Yes, I agree that a deficit in hip and knee muscle endurance will not stop clearance of an athlete for RTS
- No, I think that full hip and knee muscle endurance is required for clearance of an athlete for RTS
- Unsure/I don't know

If you have indicated "no", please indicate the reason(s) for your response.

* 31. Do you agree that a deficit in hip and knee muscle strength will not stop clearance of an athlete for RTS who performs appropriately on hopping, jumping and sport-specific tests?

- Yes, I agree that a deficit in hip and knee muscle strength will not stop clearance of an athlete for RTS
- No, I think that full hip and knee muscle strength is required for clearance of an athlete for RTS
- Unsure/I don't know

If you have indicated "no", please indicate the reason(s) for your response.
Assessment of pain severity over the last week and pain on palpation

All panellists agree that it is important to measure pain to support the RTS decision after an acute lateral ankle sprain. The discussion below specifically relates to how to measure pain, rather than the need to measure pain. In the previous surveys you agreed that the assessment of pain severity during sporting physical activity and over the last 24 hours be included as criteria to support the RTS decision after an acute lateral ankle sprain.

24.8% of panellists indicated that the assessment of pain severity on palpation should be included as a criterion to support the RTS decision after an acute lateral ankle sprain and 58.4% of panellists indicated that the assessment of pain severity over the last week should be included as a criterion. The reasons provided by panellists were related to the need to measure pain in general, but not specific to these measures of pain.

68.6% of panellists indicated that the assessment of pain severity on palpation should not be a criterion to support the RTS decision after an acute lateral ankle sprain, and 36.5% of panellists indicated that the assessment of pain severity over the last week should not be a criterion. Panellists indicated they would repeatedly assess pain over the last 24 hours and during sporting activities to see the change in pain over multiple days/weeks (but they would not assess average pain severity over a one week period as this does not show changes in pain over time). They indicated they would use pain on palpation to diagnose the injury, but not to determine RTS ability.

* 32. Do you agree that assessment of pain severity on palpation is not required in addition to the assessment of pain severity during sporting physical activity and pain severity in the last 24 hours (repeated over multiple days/weeks) to determine an athlete's ability to RTS?

- Yes, I agree an additional assessment of pain severity on palpation is not required to determine ability to RTS
- No, I think that an additional assessment of pain severity on palpation is required to determine ability to RTS
- Unsure/I don't know

If you have indicated "no", please indicate the reason(s) for your response.
33. Do you agree that assessment of a single measure of pain severity over the last week is **not** required in addition to the assessment of pain severity during sporting physical activity and pain severity in the last 24 hours (repeated over multiple days/weeks) to determine an athlete's ability to RTS?

- [ ] Yes, I agree that an additional assessment of a single measure of pain severity over the last week is **not** required to determine ability to RTS
- [ ] No, I think that an additional assessment of a single measure of pain severity over the last week is required to determine ability to RTS
- [ ] Unsure/I don't know

If you have indicated "no", please indicate the reason(s) for your response.

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**Assessment of swelling**

There were many comments around the type of swelling that may be important to measure, and many panellists agreed that mild persistent swelling will not delay RTS after a lateral ankle sprain, but intra-articular swelling was important.

55.5% of panellists indicated that the assessment of swelling should be a criterion to support the RTS decision after an acute lateral ankle sprain. They suggested the need to specifically assess intra-articular swelling which can indicate intra-articular damage or synovitis.

37.2% of panellists indicated that swelling should not be a criterion to support the RTS decision after an acute lateral ankle sprain. They felt that it is not reasonable to delay RTS solely due to mild persistent swelling if function is restored and impairments are resolved.

34. Do you feel the assessment of **intra-articular swelling** should be a criterion to determine an athlete's ability to RTS after an acute lateral ankle sprain?

- [ ] Yes
- [ ] No
- [ ] Unsure/I don't know

Please indicate the reason(s) for your response.
Assessment of ankle muscle length
Panellists agree that it is important to measure ankle range of motion and this has been included as a criteria to support the RTS decision after an acute lateral ankle sprain. Many panellists indicated that they would use the knee to wall test (knee straight and knee bent versions) to assess ankle range of motion. The discussion below specifically relates to whether ankle muscle length should be measured separately and in addition to ankle range of motion.

59.9% of panellists indicated that the assessment of ankle muscle length should not be included as a criterion to support the RTS decision after an acute lateral ankle sprain. Panellists indicated they would assess ankle range of motion (using a test such as the knee to wall test) to support the RTS decision but would not separately measure ankle muscle length to determine RTS ability.

26.3% of panellists indicated that the assessment of ankle muscle length should be included as a criterion to support the RTS decision after an acute lateral ankle sprain. The reasons provided by panellists were related to the need to measure ankle range of motion (which has already been included as a criteria to support the RTS decision after an acute lateral ankle sprain).

* 35. Do you agree that the assessment of ankle muscle length is not required in addition to the assessment of ankle range of motion to determine an athlete's ability to RTS?

- Yes, I agree that an additional assessment of ankle muscle length is not required to determine ability to RTS
- No, I think that an additional assessment of ankle muscle length is required to determine ability to RTS
- Unsure/I don't know

If you have indicated "no", please indicate the reason(s) for your response.

Assessment of ankle joint arthrokinematics
As mentioned above, panellists agree that it is important to measure ankle range of motion and this has been included as a criteria to support the RTS decision after an acute lateral ankle sprain. Like ankle muscle length, ankle joint arthrokinematics is another factor that may contribute to ankle range of motion. The discussion below specifically relates to whether ankle joint arthrokinematics should be measured separately and in addition to ankle range of motion to determine ability to RTS.

53.3% of panellists indicated that the assessment of ankle joint arthrokinematics should not be included as a criterion to support the RTS decision after an acute lateral ankle sprain. Panellists indicated they would assess ankle range of motion to support the RTS decision but would not separately assess ankle joint arthrokinematics.

37.3% of panellists indicated that the assessment of ankle muscle length should be included as a criterion to support the RTS decision after an acute lateral ankle sprain. The reasons provided by panellists were related to the effect of ankle range of motion (which has already been included as a RTS criteria) on function and injury risk.
* 36. Do you agree that the assessment of ankle joint arthrokinematics is **not** required in addition to the assessment of ankle range of motion to determine an athlete's ability to RTS?

- [ ] Yes, I agree that an additional assessment of ankle joint arthrokinematics is **not** required to determine ability to RTS
- [ ] No, I think that an additional assessment of ankle joint arthrokinematics is required to determine ability to RTS
- [ ] Unsure/I don't know

**Note:** If you have indicated "no", please indicate the reason(s) for your response.

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**Assessment of straight line running speed**

In the previous surveys you agreed that the assessment of **sport-specific tasks** be included to support the RTS decision after an acute lateral ankle sprain. The discussion below specifically relates to whether straight line running speed should be measured separately and in addition to sport-specific tasks to determine ability to RTS.

48.9% of panellists indicated that straight line running speed should **not** be included as a criterion to support the RTS decision after an acute lateral ankle sprain. They indicated they would assess straight line running speed, as needed, as part of their assessment of sport-specific tasks (which has already reached consensus and is included as an assessment to support the RTS decision).

45.3% of panellists indicated that straight line running speed should be a criterion to support the RTS decision after an acute lateral ankle sprain. The top reason was that straight line running speed is important for function and sporting requirements.

* 37. Do you agree that the assessment of straight-line running speed is **not** required in addition to the assessment of sport-specific tasks to determine an athlete's ability to RTS?

- [ ] Yes, I agree that an additional assessment of straight-line running speed is **not** required to determine ability to RTS
- [ ] No, I think an additional assessment of straight line running speed is required to determine ability to RTS
- [ ] Unsure/I don't know

**Note:** If you have answered "no", please indicate the reason(s) for your response.
Assessment of static postural control/balance (defined as the coordination of muscles to keep the body's centre of mass within its base of support)

Dynamic postural control and sport-specific skills have both reached consensus and have been included as a criteria to support the RTS decision after an acute lateral ankle sprain. Panellists agree that the assessment of static postural control/balance will occur during the rehabilitation of an acute lateral ankle sprain. The discussion below relates to whether or not the assessment of static postural control/balance is a criterion to support the RTS decision.

46.7% of panellists indicated that static postural control/balance should be included as a criterion to support the RTS decision after an acute lateral ankle sprain. Panellists indicated that static postural control/balance would be assessed earlier in rehabilitation to determine ability to perform dynamic postural control and sport-specific tasks.

46.0% of panellists indicated that static postural control/balance should not be included as a criterion to support the RTS decision after an acute lateral ankle sprain. Panellists indicated that assessment of static postural control/balance will be superseded by dynamic postural control/balance and sport-specific tasks to determine ability to RTS.

* 38. At the end of the rehabilitation continuum, will you assess static postural control/balance to determine an athlete's ability to RTS after an acute lateral ankle sprain?

- Yes, I will assess static postural control/balance at the end of the rehabilitation continuum to determine ability to RTS
- No, I will not assess static postural control/balance at the end of the rehabilitation continuum to determine ability to RTS
- Unsure/I don't know

Please indicate the reason(s) for your response.

Assessment of ankle muscle reaction time

You, the panellists, agree that while ankle muscle reaction time may be important for ankle control and injury prevention, it cannot specifically be measured in a clinic without specialist equipment. Many panellists indicated that they would use hopping, dynamic balance, agility and sport-specific tests to indirectly assess ankle muscle reaction time. All of these items have already reached consensus and are included as criterion to support the RTS decision. The discussion below specifically relates to whether ankle muscle reaction time should (and can) be measured separately and in addition to hopping, dynamic balance, agility and sport-specific tests to determine ability to RTS.

46.7% of panellists indicated that ankle muscle reaction time should be included as a criterion to support the RTS decision after an acute lateral ankle sprain. 35.0% of panellists indicated that ankle muscle reaction time should not be included as a criterion to support the RTS decision after an acute lateral ankle sprain. All panellists indicated they cannot measure ankle muscle reaction time specifically in clinic, but they use the tests mentioned above as a proxy measure of reaction time.
* 39. Do you agree that the assessment of ankle muscle reaction time is not required (and/or possible) in addition to the assessment of hopping, dynamic balance, agility and sport-specific tasks to determine an athlete’s ability to RTS?

- Yes, I agree that an additional assessment of ankle muscle reaction time is not required/possible to determine ability to RTS
- No, I think that an additional assessment of ankle muscle reaction time is required/possible to determine ability to RTS
- Unsure/I don’t know

If you have indicated “no”, please indicate the reason(s) for your response.

**Assessment of patient-reported foot and ankle function (e.g. Foot and Ankle Ability Measure or Foot and Ankle Outcome Score)**

Panellists agree that it is important to use self-report measures to understand the athlete’s perspective when making the RTS decision. Self-report measures of perceived ankle stability (i.e. how steady and controlled the ankle feels when performing sporting tasks), perceived ankle reassurance/confidence (i.e. how confident the athlete is that he/she will not reinjure their ankle when performing sporting tasks) and psychological readiness have already reached consensus and are included as criteria to support the RTS decision after an acute lateral ankle sprain.

44.5% of panellists indicated that patient-reported foot and ankle function (using questionnaires such as the Foot and Ankle Ability Measure or Foot and Ankle Outcome Score) should be included as a criterion to support the RTS decision after an acute lateral ankle sprain. The reasons provided by panellists were related to the need to understand the athlete’s perspective, but not specific to these measures of pain.

38.7% of panellists indicated that these self-report outcomes should not be included as they are not specific enough to identify problems with sport-specific function. Panellists indicate that measures of psychological readiness, and perceived confidence and stability during sport-specific tasks provide the required information to understand the athlete’s perspective.
* 40. Do you agree that the assessment of patient-reported foot and ankle function using questionnaires such as the Foot and Ankle Ability Measure or Foot and Ankle Outcome Score is not required in addition to the assessment of perceived ankle stability, ankle reassurance/confidence and psychological readiness to determine an athlete's ability to RTS?

- Yes, I agree that an additional assessment of foot and ankle function using questionnaires such as the Foot and Ankle Ability Measure or Foot and Ankle Outcome Score is not required to determine ability to RTS
- No, I think that an additional assessment of foot and ankle function using questionnaires such as the Foot and Ankle Ability Measure or Foot and Ankle Outcome Score is required to determine ability to RTS
- Unsure/I don't know

If you have indicated “no”, please indicate the reason(s) for your response.
Part 4: Thank you!

41. This is the final survey of this Delphi study and we thank you very much for your participation. At the end of this survey we hope to have a list of domains and assessments that will form an RTS assessment battery to support the RTS decision after an acute lateral ankle sprain. The next step in this project will be to come up with specific criteria (outcomes/findings) for each assessment. If you would like to be invited to be involved in this future project, please indicate so below.

- Yes, I would like to be invited to be involved in a future project
- No, I do not wish to be invited to be involved in a future project

42. If there is anything else you would like to add regarding RTS criteria after an acute lateral ankle sprain, please add it here.

Thank you again for the time you have taken to complete this survey and the previous surveys.
Appendix 4. Demographics of panelists who completed surveys 1, 2 and 3.

<table>
<thead>
<tr>
<th></th>
<th>Survey 1 (n=155)</th>
<th>Survey 2 (n=137)</th>
<th>Survey 3 (n=119) b</th>
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<td>106 (77.4)</td>
<td>80 (77.7)</td>
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<td>41.8 (8.9)</td>
<td>42.9 (9.1)</td>
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<td>Profession</td>
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<td></td>
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</tr>
<tr>
<td>Physiotherapist</td>
<td>82 (52.9)</td>
<td>73 (53.3)</td>
<td>57 (55.3)</td>
</tr>
<tr>
<td>Athletic trainer</td>
<td>28 (18.1)</td>
<td>24 (17.5)</td>
<td>14 (13.6)</td>
</tr>
<tr>
<td>Sports medicine physician</td>
<td>27 (17.4)</td>
<td>23 (16.8)</td>
<td>18 (17.5)</td>
</tr>
<tr>
<td>Athletic therapist</td>
<td>7 (4.5)</td>
<td>4 (2.9)</td>
<td>3 (2.9)</td>
</tr>
<tr>
<td>Strength and conditioning coach</td>
<td>4 (2.6)</td>
<td>3 (2.2)</td>
<td>2 (1.9)</td>
</tr>
<tr>
<td>Exercise physiologist/Sports scientist</td>
<td>5 (3.2)</td>
<td>7 (5.1)</td>
<td>6 (5.9)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (1.3)</td>
<td>3 (2.1)</td>
<td>3 (2.9)</td>
</tr>
<tr>
<td>Sport working in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer/football</td>
<td>54 (34.8)</td>
<td>44 (32.1)</td>
<td>34 (33.0)</td>
</tr>
<tr>
<td>Basketball</td>
<td>26 (16.8)</td>
<td>19 (13.9)</td>
<td>11 (10.7)</td>
</tr>
<tr>
<td>Rugby</td>
<td>25 (16.1)</td>
<td>25 (18.2)</td>
<td>19 (18.4)</td>
</tr>
<tr>
<td>Volleyball</td>
<td>12 (7.8)</td>
<td>11 (8.0)</td>
<td>9 (8.7)</td>
</tr>
<tr>
<td>American/Canadian football</td>
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<td>7 (5.1)</td>
<td>4 (3.9)</td>
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<tr>
<td>Handball</td>
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<td>10 (9.7)</td>
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<tr>
<td>Netball</td>
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<td>6 (4.4)</td>
<td>4 (3.9)</td>
</tr>
<tr>
<td>Field hockey</td>
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<td>4 (2.9)</td>
<td>3 (2.9)</td>
</tr>
<tr>
<td>Other</td>
<td>13 (8.4)</td>
<td>10 (7.3)</td>
<td>6 (5.8)</td>
</tr>
</tbody>
</table>

Data is presented as number (n) and percentage (%) unless otherwise stated.

a Data are presented as mean (standard deviation).

b Missing data for 16 panelists.