**APPENDIX: Statements gaining consensus from Delphi study of experienced and expert clinicians**

### Table 1

**Assessment & management of rowing-related low back pain – statements gaining consensus for each phase of recovery**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Assessment</th>
<th>Management</th>
<th>Exercise</th>
<th>Educate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Triage – first presentation</td>
<td>Assessment</td>
<td>8.9 9.5 1.7 0.8</td>
<td>9.3 9.4 1.5 1.6</td>
<td>9.7 10.0 0.9 0.0</td>
</tr>
<tr>
<td>Acute Phase</td>
<td>Manage</td>
<td>7.7 8.4 2.3 1.9</td>
<td>7.2 7.6 1.9 0.9</td>
<td>8.0 8.9 1.7 1.0</td>
</tr>
<tr>
<td>Sub-Acute Phase</td>
<td>Move</td>
<td>8.6 9.2 1.1 1.0</td>
<td>8.3 8.6 1.5 1.6</td>
<td>8.1 8.4 1.9 1.9</td>
</tr>
<tr>
<td>Acute Phase</td>
<td>Improve</td>
<td>8.5 9.1 1.0 0.8</td>
<td>8.3 8.5 1.1 1.1</td>
<td>8.1 8.4 1.9 1.9</td>
</tr>
<tr>
<td>Sub-Acute Phase</td>
<td>Continue</td>
<td>8.9 9.9 1.1 0.3</td>
<td>8.6 9.1 1.9 0.9</td>
<td>8.7 9.5 1.1 0.8</td>
</tr>
<tr>
<td>Sub-Acute Phase – return to rowing</td>
<td>8.3 9.5 1.4 0.7</td>
<td>8.3 8.1 1.1 0.9</td>
<td>8.4 8.9 1.1 1.1</td>
<td>8.7 8.6 2.0 1.8</td>
</tr>
</tbody>
</table>

**Notes:**
- **Assessment:** includes the key areas of assessment, including pain, function, and patient history.
- **Management:** includes strategies for managing pain and improving function.
- **Exercise:** includes recommendations for pain-free exercise.
- **Educate:** includes education for the patient and their support system.

A trial on water row should be completed before scheduling a return to rowing training.  
When the rower begins to return to the boat, tolerance to sitting should continue to be monitored.  
When the rower returns to the boat, pain in activities of daily living should continue to be monitored.  
As soon as athlete is able to row without pain & with their normal movement patterns they should be returned to on water rowing.  
Biomechanical assessment & technical coaching is an important part of the return to rowing phase for an athlete with low back pain.  
In the initial return to rowing phase, technical issues that are likely contributing risk factors for low back pain should be addressed.  
When considering a return to on water training, the management aims need to include restoration of rowing specific range of motion.  
When considering a return to on water training, the management aims need to consider the ability of the spine to be loaded.  
Maintenance or improvement of mobility is a key component of the return to rowing phase.  
Management must focus on a return to rowing protocol with a gradual re-loading program agreed on by the rower, medical and coaching staff.  
When prescribing return to row consider: 8-10km in single # 8-10km in eight, stability of boat returning to & weather. Set athlete up for success.  
In the initial return to rowing phase, medical staff should work closely with coaches to plan load progressions and monitor actual load.  
A Medical Practitioner’s involvement is often necessary in the return to rowing phase of rehabilitation from low back pain.  
On water & rowing ergometer should progressively increase in intensity & time every 2 weeks.  
The rowing ergometer should be used when the water is rough or the weather is not conducive to on water rowing.  
As sitting tolerance increases, as can time on a stationary or road bike. The bike can be used to ‘top up’ training load at the end of a rowing session.  
If pain with sitting persists, the use of upright exercise for training can be considered; elliptical training, running, hill walking and/or ski ergometer.  
Swimming can be used as a form of increasing training load. Care to not increase shoulder load quickly as this may contribute to shoulder injury.  
Tolerance of land based training is important in this phase.  
Strength, gym & core muscular training are essential parts of the sub-acute management of the rower with low back pain.  
Exercises should be prescribed to ensure appropriate movement control, stability and strength is gained for performance of the rowing stroke.  
Medical staff & strength & conditioning staff should work together to construct an appropriate program of exercises individual to the rower.  
Yellow flags are important to recognise & monitor e.g. fear avoidance behaviour & catastrophising - they may be heightened at competition time.  
Tolerating changing water conditions, changes in rowing rate & change in seating in the boat are all good indications of recovery.  
The response to progressively increasing rowing & ergometer work load should be continually monitored.  
Athletes with red flags should not be progressed to this stage.  
When the rower is increasing their rowing load it is important to review them & ensure their main objective findings are continuing to improve.  
It is important to continue to re-assess significant findings throughout the return to rowing period.  
When the rower has returned to rowing, their everyday life pain should also be monitored, especially pain immediately after rowing.  
When the rower is increasing their rowing load it is important to review them & ensure their main objective findings are continuing to improve.  
Being able to row with no pain or no increase in symptoms is essential for progressing training load.  
Rowing with quality movement patterns, achieving upper core & tolerating different stroke pressures and rates are very good signs of recovery.  
It is important for the rower to avoid developing a return of specific movement patterns. A cognitive functional therapy approach or a confidence with movement approach can be helpful. Splinting or overprotective movements should be discouraged.  
If a rowers has access psychological services, this should be continued through the sub-acute phase.  
If a rower is finding it difficult to cope or their progression is not as expected, psychological consultation may be considered.  
The return to rowing phase must include self-management advice & self-empowerment for the rower with low back pain.

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Box 1 Important considerations – novel response statements gaining consensus

Creating a culture of early recognition and management of low back pain in the training environment optimises management and improves learning and performance. (M: R2 8.8, R3 9.5, SD: R2 2.5, R3 1.9)

Identifying radicular pain early (with or without sensory and/or motor change) is essential and management must involve medical assessment as soon as possible. (M: R2 9.0, R2 9.5, SD: R2 1.9, R3 1.3)

There are gender differences in the causal factors for low back pain in rowers - males are at risk due to reduced hip flexion, females are at risk due to reduced trunk strength. (M: R2 6.1, R3 7.2, SD: R2 2.5, R3 1.9)

Table 2

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Imaging</th>
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<th>Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>M = Mean, R = round, SD = Standard Deviation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3

<table>
<thead>
<tr>
<th>Outcome Measures</th>
<th>Consider specific outcome measure, rate how useful when managing a rower with low back pain (1=useful, 2=undecided, 3=not useful)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual / verbal analogue scale /10</td>
<td>1 1</td>
</tr>
<tr>
<td>Patient Specific Functional Scale</td>
<td>1 1</td>
</tr>
<tr>
<td>Orebro Musculoskeletal Pain Screening Questionnaire</td>
<td>2 1</td>
</tr>
<tr>
<td>A simple function specific question - e.g. is the pain great enough to stop you rowing?</td>
<td>1 1</td>
</tr>
</tbody>
</table>

Table 4

<table>
<thead>
<tr>
<th>Developing Rowers</th>
<th>Specific rowing-related low back pain considerations for developing and masters rowers – statements gaining consensus</th>
</tr>
</thead>
<tbody>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>M = Mean, R = round, SD = Standard Deviation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Masters Rowers</th>
<th>I prioritise the assessment of medical co-morbidities in a masters rower when compared to an elite.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some biomechanical &amp; movement restrictions may not be amenable to change due to underlying degenerative processes &amp; should be assessed &amp; accommodated as part of the rehabilitation program.</td>
<td>6.9 8.3 2.7 1.0</td>
</tr>
</tbody>
</table>

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