

## Physiotherapy interventions evidence table – Exercise-based interventions

The following table provides a summary of level I or II evidence (according to the NHMRC evidence hierarchy) for physiotherapy-relevant interventions in RA published between January 2012 and June 2015. Interpreting the evidence can be complex. RAP-eL users should consider the following:

- There are no current studies investigating the effects of exercise programmes on early versus late rheumatoid arthritis.
- Further research is needed into the optimal content, format (individual vs. group; supervised vs. unsupervised; home vs. gym based), duration and frequency of exercise programmes.
- Further research is required to look at improving long term adherence to home exercise programmes.
- Improved reporting of adverse events is also needed in future studies. Given the systemic nature of RA and extra-articular consequences of RA (refer to [Module 4](#)) practitioners are advised to monitor articular and non-articular effects of exercise and refer to a medical practitioner where unexplained changes in exercise tolerance are observed. Any adverse effects and/or concerns regarding their cardiovascular status should be referred immediately to their medical team.
- It is important to note that many of the interventions studied are done so in isolation, so the evidence refers to the effect of the single intervention, and not the effect of a multimodal intervention.

| Physiotherapy-related intervention(s)  | Sources of evidence (see key below)   | Results | Making sense of the evidence |     |     |  |  |   |  |  |  |
|--|---|---------|------------------------------|-----|-----|--|--|---|--|--|--|
| <b>Resistance exercise</b>   | <table border="1"> <tr> <td>RCT</td> <td>SR</td> <td>MA</td> <td>CSR</td> </tr> <tr> <td></td> <td></td> <td>✓</td> <td></td> </tr> </table> <p>Baillet et al Rheumatology 2012; 51(3); 519-527.<br/><a href="#">[link]</a></p> | RCT     | SR                           | MA  | CSR |  |  | ✓ |  | <ul style="list-style-type: none"> <li>• Resistance exercise significantly improves isokinetic, isometric and grip strength.</li> <li>• Resistance exercise improves disability (as measured by health assessment questionnaire/ HAQ).</li> <li>• Resistance exercise improves walking (as measured by 50 foot walking test).</li> <li>• Although not conclusive it</li> </ul> | <ul style="list-style-type: none"> <li>- Resistance exercise is recommended as a routine and effective component of an RA management programme.</li> <li>- It appears higher intensity resistance exercise is more effective. The decision to use high intensity exercise should be made based on clinical judgement of the patient's functional capacity and musculoskeletal health.</li> </ul> |
|  | RCT   | SR      | MA                           | CSR |     |  |  |   |  |  |  |
|  |   | ✓       |                              |     |     |  |  |   |  |  |  |
| <table border="1"> <tr> <td>RCT</td> <td>SR</td> <td>MA</td> <td>CSR</td> </tr> <tr> <td></td> <td></td> <td></td> <td>✓</td> </tr> </table> <p>Hurkmans et al (2009)<br/>Dynamic exercise programs (aerobic capacity and/or</p> | RCT   | SR      | MA                           | CSR |     |  |  | ✓ |  |  |  |
| RCT  | SR  | MA      | CSR                          |     |     |  |  |   |  |  |  |
|  |   |         | ✓                            |     |     |  |  |   |  |  |  |

|  |  |  |     |    |     |  |  |  |   |   |  |
|--|--|--|-----|----|-----|--|--|--|---|---|--|
|  | muscle strength training) in patients with RA<br><a href="#">[link]</a>  | appears there is a trend towards higher intensity programmes being more effective. |     |    |     |  |  |  |   |   |  |
| <b>Balance (proprioceptive) exercise</b> | <table border="1"> <tr> <td>RCT</td> <td>SR</td> <td>MA</td> <td>CSR</td> </tr> <tr> <td></td> <td></td> <td></td> <td>✓</td> </tr> </table> <p>Silva et al (2010)<br/>Balance training (proprioceptive training) for patients with rheumatoid arthritis<br/><a href="#">[link]</a></p>          | RCT  | SR  | MA | CSR |  |  |  | ✓ | <ul style="list-style-type: none"> <li>No studies were available testing a specific balance exercise programme in patients with RA.</li> <li>A combination of strengthening, endurance and dynamic/functional exercises were used in all studies analysed.</li> </ul>   | <ul style="list-style-type: none"> <li>There is currently no evidence to support the use of specific balance or proprioceptive exercise in patients with RA</li> <li>The effects of lower limb muscle weakness on falls risk in patients with RA is unclear</li> <li>Patients with RA are at risk of falls and the associated co-morbidities of a fall</li> <li>Until further research is available, clinicians need to assess on a case by case basis whether to include balance/ proprioceptive exercise into a patient's exercise programme.</li> </ul> |
| RCT                                      | SR   | MA   | CSR |    |     |  |  |  |   |   |  |
|  |  |  | ✓   |    |     |  |  |  |   |   |  |
| <b>Aerobic exercise</b>                  | <table border="1"> <tr> <td>RCT</td> <td>SR</td> <td>MA</td> <td>CSR</td> </tr> <tr> <td></td> <td></td> <td></td> <td>✓</td> </tr> </table> <p>Hurkmans et al (2009)<br/>Dynamic exercise programs (aerobic and/or muscle strength training) in patients with RA<br/><a href="#">[link]</a></p> | RCT  | SR  | MA | CSR |  |  |  | ✓ | <ul style="list-style-type: none"> <li>Aerobic exercise programmes (short and long term programmes, exercise min x 2 weekly for at least a 6 week programme at &gt;55% maximum heart rate, performed under supervision) have a positive effect on aerobic capacity in patients with RA</li> <li>No adverse effects (on pain or</li> </ul> | <ul style="list-style-type: none"> <li>Aerobic exercise performed a minimum x 2 weekly appears to be a safe and effective inclusion to a RA exercise programme for improving aerobic capacity.</li> <li>Aerobic exercise should not be used as a single modality, but rather an adjunct to other modalities, to address pain and functional impairment related</li> </ul>  |
| RCT                                      | SR   | MA   | CSR |    |     |  |  |  |   |   |  |
|  |  |  | ✓   |    |     |  |  |  |   |   |  |

|                            |   | <p>joint count) were found in the four studies included in the Cochrane review.</p> <ul style="list-style-type: none"> <li>• Small improvements in pain and function may be seen but these may not be clinically significant.</li> </ul> | <p>to RA</p> <ul style="list-style-type: none"> <li>- Aerobic exercise is recommended as routine practice when combined with strengthening exercise</li> <li>- There are no found safety benefits of aerobic exercise performed in water over land based aerobic exercise.</li> </ul> |    |     |   |  |  |  |     |    |    |     |  |   |  |  |     |    |    |     |  |  |  |   |   |  |
|----------------------------|---|--|---|----|-----|---|--|--|--|-----|----|----|-----|--|---|--|--|-----|----|----|-----|--|--|--|---|---|--|
| <p><b>Hydrotherapy</b></p> | <table border="1"> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </table> <p>Siqueira et al 2017 Am J Phys Med Rehabil.; 96 (3): 167-175.</p><br><table border="1"> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> <tr> <td></td> <td>✓</td> <td></td> <td></td> </tr> </table> <p>Al-Qubaeissy et al 2013 Musculoskeletal Care; 11(1): 3-18.<br/>[link]</p><br><table border="1"> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> <tr> <td></td> <td></td> <td></td> <td>✓</td> </tr> </table> <p>Verhagen et al 2015 Balneotherapy (or spa therapy) for RA<br/>[link]</p> | RCT  | SR  | MA | CSR | ✓ |  |  |  | RCT | SR | MA | CSR |  | ✓ |  |  | RCT | SR | MA | CSR |  |  |  | ✓ | <ul style="list-style-type: none"> <li>• There is some evidence to support hydrotherapy in the short term</li> <li>• Potential benefits including reducing pain and joint tenderness, improved mood, increased grip strength and improved patient satisfaction when compared with usual or no care (<a href="#">Al-Qubaeissy, 2013</a>).</li> <li>• The most recent Cochrane review (<a href="#">Verhagen, 2015</a>) reported no clear evidence that balneotherapy improves pain and physical function compared with hydrotherapy, land exercises or relaxation therapy.</li> <li>• <a href="#">Barker et al (2014)</a> also found moderate improvements in pain, QOL and physical function when compared to</li> </ul> | <ul style="list-style-type: none"> <li>- Some studies show hydrotherapy may improve pain, joint tenderness, mood, grip strength and patient satisfaction as well as reduce disability in patients with RA in the short term.</li> <li>- Evidence supporting longer term benefits is inconclusive.</li> <li>- Based on current evidence deciding between land and aquatic-based exercise should be made based on patient preference, functional capacity, safety and access to facilities.</li> </ul> |
| RCT                        | SR  | MA   | CSR   |    |     |   |  |  |  |     |    |    |     |  |   |  |  |     |    |    |     |  |  |  |   |   |  |
| ✓                          |   |  |   |    |     |   |  |  |  |     |    |    |     |  |   |  |  |     |    |    |     |  |  |  |   |   |  |
| RCT                        | SR  | MA   | CSR   |    |     |   |  |  |  |     |    |    |     |  |   |  |  |     |    |    |     |  |  |  |   |   |  |
|                            | ✓   |  |   |    |     |   |  |  |  |     |    |    |     |  |   |  |  |     |    |    |     |  |  |  |   |   |  |
| RCT                        | SR  | MA   | CSR   |    |     |   |  |  |  |     |    |    |     |  |   |  |  |     |    |    |     |  |  |  |   |   |  |
|                            |   |  | ✓   |    |     |   |  |  |  |     |    |    |     |  |   |  |  |     |    |    |     |  |  |  |   |   |  |

|                | <table border="1"> <thead> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>✓</td> <td></td> </tr> </tbody> </table> <p>Barker et al 2014 Arch Phys Med Rehabil; 95(9): 1776-1786.<br/> <a href="#">[link]</a></p>  | RCT | SR  | MA | CSR |  |   | ✓ |   | no exercise but no significant benefits over land exercise.   |  |    |     |  |   |  |  |   |  |
|----------------|---|-----|-----|----|-----|--|---|---|---|---|--|----|-----|--|---|--|--|---|--|
| RCT            | SR  | MA  | CSR |    |     |  |   |   |   |   |  |    |     |  |   |  |  |   |  |
|                |   | ✓   |     |    |     |  |   |   |   |   |  |    |     |  |   |  |  |   |  |
| <b>Tai Chi</b> | <table border="1"> <thead> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table> <p>Han et al 2004 (3) Tai Chi for treating RA<br/> <a href="#">[link]</a></p> <table border="1"> <thead> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> </thead> <tbody> <tr> <td></td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table> <p>Ekelman et al (2014) Occup Ther Health Care; 28(4): 347-361.<br/> <a href="#">[link]</a></p> | RCT | SR  | MA | CSR |  |   |   | ✓ | RCT   | SR   | MA | CSR |  | ✓ |  |  | <ul style="list-style-type: none"> <li>• <a href="#">Ekelman et al (2014)</a> found insufficient evidence to support of Tai Chi delivered by OT's for RA.</li> <li>• Tai Chi-based programmes had no statistically significant effect on disease activity, activities of daily living, tender and swollen joints and patient global overall rating.</li> <li>• Tai Chi is suggested not to exacerbate symptoms (<a href="#">Han et al, 2004</a>) and has statistically significant benefits in improving ankle plantarflexion.</li> </ul> | <ul style="list-style-type: none"> <li>- There is no current evidence to support the use of Tai Chi in improving disease activity, QOL, pain or function in patients with RA.</li> <li>- There is no current reported evidence of adverse effects of Tai Chi for RA.</li> <li>- Some patients may find Tai Chi more enjoyable than traditional exercise programmes (<a href="#">Han et al, 2004</a>). This may improve participation and enjoyment and therefore be a suitable mode of gentle, active joint mobilisation.</li> </ul> |
| RCT            | SR  | MA  | CSR |    |     |  |   |   |   |   |  |    |     |  |   |  |  |   |  |
|                |   |     | ✓   |    |     |  |   |   |   |   |  |    |     |  |   |  |  |   |  |
| RCT            | SR  | MA  | CSR |    |     |  |   |   |   |   |  |    |     |  |   |  |  |   |  |
|                | ✓   |     |     |    |     |  |   |   |   |   |  |    |     |  |   |  |  |   |  |
| <b>Yoga</b>    | <table border="1"> <thead> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> </thead> <tbody> <tr> <td></td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table> <p>Ward et al. Complement Ther Med 2014; 22(5); 909-919.<br/> <a href="#">[link]</a></p>   | RCT | SR  | MA | CSR |  | ✓ |   |   | <ul style="list-style-type: none"> <li>• Reviews found only one study of poor quality investigating yoga for RA (the remaining studies reviewed were for other MSK conditions e.g. LBP).</li> <li>• There was poor detail regarding the frequency, class</li> </ul> | <ul style="list-style-type: none"> <li>- High heterogeneity is found in literature researching yoga for RA (and other MSK conditions) resulting in no clear evidence regarding dosage/most efficacious content.</li> <li>- Yoga may reduce pain in patients with RA, however,</li> </ul> |    |     |  |   |  |  |   |  |
| RCT            | SR  | MA  | CSR |    |     |  |   |   |   |   |  |    |     |  |   |  |  |   |  |
|                | ✓   |     |     |    |     |  |   |   |   |   |  |    |     |  |   |  |  |   |  |

|  | <table border="1"> <thead> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> </thead> <tbody> <tr> <td></td> <td>✓</td> <td></td> <td></td> </tr> </tbody> </table> <p>Ward et al. Musculoskeletal Care 2013 Dec; 11(4):203-217.<br/> <a href="#">[link]</a></p> | RCT | SR  | MA | CSR |   | ✓ |  |  | <p>setting, yoga dosage and the control group was unspecified in the RA study.</p> <ul style="list-style-type: none"> <li>Although improvements in pain after a 40 week yoga programme were cited, methodological quality was poor resulting in a lower level of evidence.</li> </ul>   | <p>studies of higher methodological quality are required.</p> <ul style="list-style-type: none"> <li>There is currently no evidence to show yoga as being more efficacious than other forms of exercise for patients with RA.</li> <li>Some patients may find yoga to be more enjoyable than other forms of land-based exercise and therefore yoga may be an appropriate selection for some patients, depending on their physical function.</li> </ul> |
|--|---|-----|-----|----|-----|---|---|--|--|---|--|
| RCT  | SR  | MA  | CSR |    |     |   |   |  |  |   |  |
|  | ✓   |     |     |    |     |   |   |  |  |   |  |
| <b>Static cycling</b>                      | <table border="1"> <thead> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> </thead> <tbody> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Meeus et al Pain Practice 2015; 15(2): 98-106.<br/> <a href="#">[link]</a></p>            | RCT | SR  | MA | CSR | ✓ |   |  |  | <ul style="list-style-type: none"> <li>Patients with RA have a similar response to healthy controls whereby temporal summation of pain (the cumulative effect of C-fibre nerve stimulation resulting in increased discharges from 2<sup>nd</sup> order neurones in the spinal cord experienced by humans as an increase in pain) reduced after submaximal exercise (&lt;15 minutes exercise bike) (<a href="#">Meeus et al, 2015</a>).</li> </ul> | <ul style="list-style-type: none"> <li>Submaximal exercise (e.g. on an exercise bike) performed by people with RA can have similar effects on endogenous pain modulation to healthy controls and hence may be beneficial as a management strategy for pain in RA (in addition to improvements in cardiovascular fitness and strength)</li> </ul>   |
| RCT  | SR  | MA  | CSR |    |     |   |   |  |  |   |  |
| ✓  |   |     |     |    |     |   |   |  |  |   |  |
| <b>Unsupervised gym based exercise vs.</b> | <table border="1"> <thead> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> </thead> <tbody> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Orlova et al J Jpn Soci</p>   | RCT | SR  | MA | CSR | ✓ |   |  |  | <ul style="list-style-type: none"> <li>Both exercise types were more effective than a control (drug therapy) in improving:</li> </ul>   | <ul style="list-style-type: none"> <li>Consider recommending gym based exercise (strengthening and cardiovascular) particularly</li> </ul>   |
| RCT  | SR  | MA  | CSR |    |     |   |   |  |  |   |  |
| ✓  |   |     |     |    |     |   |   |  |  |   |  |

| <p><b>supervised non-gym based exercise in patients with early RA</b></p>                                | <p>Balneol Climatol Phys Med 2014; 77(5): 469-470.<br/> <a href="#">[link]</a></p>   | <ul style="list-style-type: none"> <li>○ Function</li> <li>○ QOL, and</li> <li>○ Muscle strength</li> </ul> <ul style="list-style-type: none"> <li>• Compliance with supervised exercise at 6 months is better than that of unsupervised gym-based exercise (except for patients &lt;40yrs with early RA).</li> <li>• Poor detail given in the study about the content of the specific exercise interventions.</li> </ul> | <p>to patients &lt; 40yrs (better compliance)</p> <ul style="list-style-type: none"> <li>- Supervised or gym based exercise will improve function, QOL and muscle strength.</li> </ul> |    |     |   |  |  |  |  |   |
|--|--|---|--|----|-----|---|--|--|--|--|---|
| <p><b>Upper extremity functional exercise training in combination with self-management education</b></p> | <table border="1" data-bbox="483 743 856 831"> <thead> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">✓</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Manning VL et al. Arthritis Care Res 2014; 66: 217-227.<br/> <a href="#">[PubMed Link]</a></p> | RCT   | SR   | MA | CSR | ✓ |  |  |  | <ul style="list-style-type: none"> <li>• Manning et al (2014) investigated upper extremity functional exercise training integrated with self-management education delivered in a group format (compared to HEP alone).</li> <li>• They found significant improvements in upper limb function (DASH outcome measure) at 12 but not 36 weeks.</li> <li>• Improvements were also seen in hand function, grip strength, self-efficacy, joint count and pain.</li> <li>• Benefits were maintained at</li> </ul> | <ul style="list-style-type: none"> <li>- Including functional upper limb exercise (and education) to a HEP improves upper limb function and strength.</li> <li>- Improvements in pain and self-efficacy may be longer lasting than improvements in upper limb strength and function.</li> <li>- Refer to the study <a href="#">Manning et al (2014)</a> for further detail about the content and delivery of self-management education and specific exercise examples.</li> </ul> |
| RCT  | SR   | MA  | CSR  |    |     |   |  |  |  |  |   |
| ✓  |  |   |  |    |     |   |  |  |  |  |   |

|  |  |     |     |     | 36 weeks for pain and self-efficacy. |   |   |  |   |  |  |  |  |   |
|--|--|-----|-----|-----|--------------------------------------|---|---|--|---|--|--|--|--|---|
| <b>Specific hand exercise programme</b>  | <table border="1"> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> <tr> <td></td> <td>✓</td> <td></td> <td></td> </tr> </table> | RCT | SR  | MA  | CSR                                  |   | ✓ |  |   | Hammond & Prior 2016; British Medical Bulletin<br><a href="#">[link]</a> |  |  | <ul style="list-style-type: none"> <li>• Home exercise programmes improve hand function, grip strength and pain in people with RA.</li> <li>• High-intensity resistance programmes appear to be more effective than low intensity programmes.</li> <li>• Twice weekly physiotherapy-guided hand strengthening exercise sessions (total 20 sessions) in addition to 3 x weekly home exercises resulted in significant improvements in grip strength, pinch strength and hand function.</li> </ul> | <ul style="list-style-type: none"> <li>- Hand strengthening and stretching home exercises (including setting patient-specific goals, and an exercise diary to improve compliance) can be used to improve hand function and strength at relatively low cost.</li> <li>- See <a href="#">Cima et al (2013)</a> for details of strengthening exercises including pictures of exercises given.</li> </ul> |
|  | RCT  | SR  | MA  | CSR |                                      |   |   |  |   |  |  |  |  |   |
|  |  | ✓   |     |     |                                      |   |   |  |   |  |  |  |  |   |
|  | <table border="1"> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </table> | RCT | SR  | MA  | CSR                                  | ✓ |   |  |   | Lamb et al Lancet 2015; 385(9966): 421-429.<br><a href="#">[link]</a>    |  |  |  |   |
| RCT  | SR   | MA  | CSR |     |                                      |   |   |  |   |  |  |  |  |   |
| ✓  |  |     |     |     |                                      |   |   |  |   |  |  |  |  |   |
| <table border="1"> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </table> | RCT  | SR  | MA  | CSR | ✓                                    |   |   |  | Williams et al Health Technol Assess 2015; 19 (19): 1-222.<br><a href="#">[link]</a>  |  |  |  |  |   |
| RCT  | SR   | MA  | CSR |     |                                      |   |   |  |   |  |  |  |  |   |
| ✓  |  |     |     |     |                                      |   |   |  |   |  |  |  |  |   |
| <table border="1"> <tr> <th>RCT</th> <th>SR</th> <th>MA</th> <th>CSR</th> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </table> | RCT  | SR  | MA  | CSR | ✓                                    |   |   |  | Cima et al Rheumatology International 2013; 33(3): 725-732.<br><a href="#">[link]</a> |  |  |  |  |   |
| RCT  | SR   | MA  | CSR |     |                                      |   |   |  |   |  |  |  |  |   |
| ✓  |  |     |     |     |                                      |   |   |  |   |  |  |  |  |   |

## Key To Evidence Sources:

Randomised Controlled Trial (RCT)

# RAP-eL

Systematic Review (SR)

Meta-Analysis (MA)

Cochrane Systematic Review (CSR)

## **List of Table Abbreviations:**

ADL's – Activities of Daily Living

DAS28 – Disease activity score calculator for Rheumatoid arthritis [[click here for link to PDF](#)]

DASH – “Disabilities of the Arm Shoulder and Hand” outcome measure

HAQ – Health Assessment Questionnaire

HEP – Home Exercise Programme

HRQ – Health Risk Questionnaire

JP – Joint Protection

LBP – Lower Back Pain

OA – Osteoarthritis

OT – Occupational Therapy

QOL – Quality Of Life

RA – Rheumatoid Arthritis

RCT – Randomised Controlled Trial

TENS – Transcutaneous Electrical Nerve Stimulation

US - Ultrasound

1<sup>st</sup> MTPJ – 1<sup>st</sup> Metatarsophalangeal Joint