### Appendix Table A1. Missingness of data for each outcome at baseline, week 5, week 10, and four months.

|                      | Baseline | Week 5 | Week 10 | 4 months |
|----------------------|----------|--------|---------|----------|
|                      | IG  | CG  | IG  | CG  | IG  | CG  | IG  | CG  |
| SPADI score          | 0   | 0   | 28  | 12  | 36  | 17  | 29  | 19  |
| Abduction strength   | 0   | 1   | 32  | 16  | 40  | 19  | 32  | 21  |
| External rotation strength | 0   | 0   | 32  | 15  | 40  | 19  | 32  | 21  |
| Abduction range-of-motion | 0   | 0   | 32  | 15  | 40  | 19  | 32  | 20  |
| Pain last week       | 0   | 0   | 31  | 15  | 39  | 19  | 31  | 20  |
| EQ-5D-index-TTO      | 3   | 0   | 29  | 14  | 36  | 17  | 30  | 20  |
| EQ-5D-index-VAS      | 3   | 0   | 29  | 14  | 36  | 17  | 30  | 20  |
| Self-rated health    | 0   | 0   | 28  | 13  | 36  | 20  | 30  | 19  |
### Appendix Table A2. Primary and secondary outcomes at each follow up time-point, separately for intervention and control group

|                      | Baseline | Week 5 | Week 10 | 4 months |
|----------------------|----------|--------|---------|----------|
|                      | IG       | CG     | IG      | CG       |
| SPADI score          |          |        |         |          |
| 0=best, 100=worst    | 57 ±19   | 57 ±19 | 42 ±24  | 40 ±26   | 36 ±24  | 39 ±26 | 35 ±27 | 34 ±27 |
| Abduction strength   |          |        |         |          |
| Nm/kg                | 0.49 ±0.23 | 0.42 ±0.23 | 0.50 ±0.25 | 0.42 ±0.24 | 0.49 ±0.24 | 0.43 ±0.23 | 0.52 ±0.25 | 0.46 ±0.27 |
| External rotation strength | 0.22 ±0.09 | 0.20 ±0.09 | 0.22 ±0.09 | 0.19 ±0.09 | 0.22 ±0.09 | 0.19 ±0.08 | 0.23 ±0.09 | 0.20 ±0.08 |
| Degrees              | 122 ±40  | 123 ±43 | 134 ±37 | 132 ±41 | 137 ±37 | 135 ±40 | 144 ±36 | 140 ±39 |
| Pain last week       |          |        |         |          |
| 0=no pain, 10=worst pain | 3.2 ±1.9 | 3.3 ±2.2 | 2.9 ±2.1 | 2.6 ±2.2 | 2.7 ±2.1 | 2.7 ±2.4 | 2.5 ±2.3 | 2.5 ±2.3 |
| EQ-5D-index-TTO      |          |        |         |          |
| 0=worst, 1=best      | 0.65 ±0.2 | 0.68 ±0.16 | 0.69 ±0.17 | 0.72 ±0.18 | 0.71 ±0.17 | 0.72 ±0.18 | 0.7 ±0.2 | 0.73 ±0.2 |
| EQ-5D-index-VAS      |          |        |         |          |
| 0=worst, 1=best      | 0.53 ±0.12 | 0.55 ±0.13 | 0.56 ±0.15 | 0.59 ±0.17 | 0.58 ±0.18 | 0.61 ±0.18 | 0.6 ±0.19 | 0.62 ±0.18 |
| Self-rated health    |          |        |         |          |
| 0=worst, 100=best    | 68 ±19   | 70 ±18 | 69 ±20  | 69 ±19  | 71 ±18  | 71 ±19 | 72 ±18 | 72 ±20 |
### Appendix Table A3. Per protocol analyses. Between-group differences (IG – CG) for changes in primary and secondary outcomes separately for each follow-up time-point interval.

| Outcome                          | Baseline to week 5 | Week 5 to week 10 | Week 10 to 4 months | Baseline to 4 months |
|---------------------------------|--------------------|-------------------|---------------------|----------------------|
| SPADI score                     | 0.0                | -4.4              | 2.8                 | -1.6                 |
| 0=best, 100=worst               | (-5.6 to 5.6)      | (-10.3 to 1.5)    | (-3.2 to 8.7)       | (-7.3 to 4.2)        |
| Abduction strength Nm/kg        | 0.02               | -0.02             | -0.01               | -0.01                |
| 0=best, 100=worst               | (-0.02 to 0.05)    | (-0.06 to 0.01)   | (-0.04 to 0.03)     | (-0.05 to 0.02)      |
| External rotation strength Nm/kg| 0.01               | 0.00              | 0.00                | 0.01                 |
| 0=best, 100=worst               | (-0.01 to 0.02)    | (-0.01 to 0.02)   | (-0.02 to 0.01)     | (-0.01 to 0.02)      |
| Abduction range-of-motion Degrees| 3.7                | 1.5               | 1.5                 | 6.8                  |
| 0=baseline, 1=worst             | (-5.2 to 12.7)     | (-8.1 to 11.2)    | (-8.2 to 11.3)      | (-2.3 to 15.9)       |
| Pain last week                  | 0.1                | -0.3              | 0.0                 | -0.2                 |
| 0=no pain, 10=worst pain        | (-0.4 to 0.6)      | (-0.9 to 0.2)     | (-0.6 to 0.6)       | (-0.7 to 0.3)        |
| EQ-5D-index-TTO                 | 0.00               | 0.02              | -0.02               | -0.01                |
| 0=worst, 1=best                 | (-0.04 to 0.05)    | (-0.04 to 0.07)   | (-0.07 to 0.03)     | (-0.05 to 0.04)      |
| EQ-5D-index-VAS                  | -0.01              | 0.01              | -0.01               | -0.01                |
| 0=worst, 1=best                 | (-0.06 to 0.03)    | (-0.04 to 0.06)   | (-0.06 to 0.04)     | (-0.06 to 0.03)      |
| Self-rated health                | 3.1                | -1.2              | -2.7                | -0.8                 |
| 0=worst, 100=best               | (-1.9 to 8.0)      | (-6.7 to 4.2)     | (-8.4 to 3.0)       | (-6.0 to 4.4)        |
Appendix Table A4. Add-on intervention dosage and time spent on usual care exercise.

| Minutes per week spent on usual care exercise | CG | N= | IG | N= |
|-----------------------------------------------|----|----|----|----|
| Week 1                                        | 29 | 95 | 29 | 89 |
| Week 2                                        | 38 | 94 | 31 | 86 |
| Week 3                                        | 48 | 96 | 39 | 83 |
| Week 4                                        | 50 | 93 | 37 | 80 |
| Week 5                                        | 55 | 94 | 43 | 75 |
| Week 6                                        | 51 | 93 | 44 | 77 |
| Week 7                                        | 56 | 95 | 43 | 76 |
| Week 8                                        | 59 | 95 | 38 | 76 |
| Week 9                                        | 52 | 92 | 36 | 75 |
| Week 10                                       | 52 | 92 | 37 | 77 |
| Week 11                                       | 57 | 90 | 32 | 74 |
| Week 12                                       | 58 | 91 | 31 | 72 |
| Week 13                                       | 54 | 91 | 28 | 72 |
| Week 14                                       | 50 | 90 | 30 | 74 |
| Week 15                                       | 52 | 89 | 33 | 71 |
| Week 16                                       | 57 | 88 | 30 | 69 |

Time-under-tension in hours per phase

| Phase 1 (Week 1-5) | - | 1.6 | 90 |
| Phase 2 (Week 6-10) | - | 0.8 | 88 |
| Phase 3 (Week 11-16) | - | 0.6 | 83 |

Reasons for missing data for time-under-tension. Phase 1: Changed diagnosis (n=2), Technical issues (n=1), lost unit (n=7). Phase 2; Changed diagnosis (n=3), Technical issues (n=1), lost sensor (n=6), surgery (n=1), refused to use the sensor (n=1). Phase 3: Changed diagnosis (n=4), Technical issues (n=3), lost sensor (n=7), surgery (n=2), refused to use the sensor (n=1).
## Appendix Table A5. Concomitant care and pain medication use.

| Concomitant care                           | CG   | IG   |
|--------------------------------------------|------|------|
| Physiotherapy in usual care                |      |      |
| Individual sessions, total number reported | 463  | 373  |
| Class sessions, total number reported      | 185  | 68   |
| Doctor visits                              |      |      |
| General practitioner, total number reported| 19   | 15   |
| Specialist practitioner, total number reported | 46   | 36   |
| Steroid injections                         | 11   | 8    |

## Pain medication use, average times per week

| Week 1-5 |          |          |
|----------|----------|----------|
| 0 times per week | 59% (n=48) | 59% (n=41) |
| 1-7 times per week | 33% (n=27) | 32% (n=22) |
| more than 7 times per week | 7% (n=6) | 10% (n=7) |

| Week 6-10 |          |          |
|-----------|----------|----------|
| 0 times per week | 57% (n=46) | 63% (n=39) |
| 1-7 times per week | 35% (n=28) | 24% (n=15) |
| more than 7 times per week | 9% (n=7) | 13% (n=8) |

| Week 11-16 |          |          |
|------------|----------|----------|
| 0 times per week | 56% (n=45) | 60% (n=42) |
| 1-7 times per week | 35% (n=28) | 30% (n=21) |
| more than 7 times per week | 10% (n=8) | 10% (n=7) |
Patient and public involvement statement

Before planning the current trial, our group conducted a consecutive cohort study of 129 patients with subacromial impingement to evaluate the outcome of usual care.[1] We also collected patient-reported information on usual care activities (number of physiotherapy sessions, time spent on shoulder exercise, etc.) through structured interviews. During the interviews, we noted that some patients spontaneously complained about unsatisfactory outcomes of non-operative care. These complaints were supported by outcome data, showing a general lack of improvement in shoulder function following current care.[16] Collectively, the knowledge gained from outcome data and spontaneous complaints had a substantial impact on the decision to undertake the current study and the focus of the add-on intervention. After having developed the add-on intervention, we invited five patients with subacromial impingement from our clinical department to take part in a full intervention session. We then asked the patients to provide inputs to the intervention as well as the layout and readability of the intervention leaflets, but this did not result in any alterations. The results of the current trial will be disseminated directly to all participants via secured email. We also plan to invite all participants to comment on a layperson summary and/or infographic of the study findings. We plan to use these inputs to improve future dissemination of results.
Outcomes reported in subsequent publications

In this publication (the primary trial report) we are reporting the following outcomes:

- SPADI [Time Frame: 16 weeks]
- Abduction strength [Time Frame: 16 weeks]
- External rotation strength [Time Frame: 16 weeks]
- Abduction ROM [Time Frame: 16 weeks]
- Pain last week [Time Frame: 16 weeks]
- QoL-index [Time Frame: 16 weeks]
- QoL-VAS [Time Frame: 16 weeks]
- Global impression of change [Time Frame: 16 weeks]
- PASS [Time Frame: 16 weeks]

As outlined in the registration (ClinicalTrials.gov NCT02747251) and trial protocol, the outcomes listed below will be reported in subsequent publications with a clear reference to the primary trial report and trial identifier. These outcomes represent the embedded mechanistic part of the trial.

- PCS [Time Frame: 16 weeks]
- Temporal summation of pain (TS) [Time Frame: 16 weeks]
- CPM-Threshold [Time Frame: 16 weeks]
- CPM-Detection [Time Frame: 16 weeks]
- PPT-deltoid [Time Frame: 16 weeks]
- PPT-Supraspinatus [Time Frame: 16 weeks]
- PPT-Infraspinatus [Time Frame: 16 weeks]
- PPT-worst [Time Frame: 16 weeks]
- SDT [Time Frame: 16 weeks]
- mSAT [Time Frame: 16 weeks]
- SPADI [Time Frame: 52 weeks]
- QoL-VAS [Time Frame: 52 weeks]
- QoL-index [Time Frame: 52 weeks]
- Surgery [Time Frame: 52 weeks]
- Sick leave [Time Frame: 52 weeks]