

Supplementary Online Content

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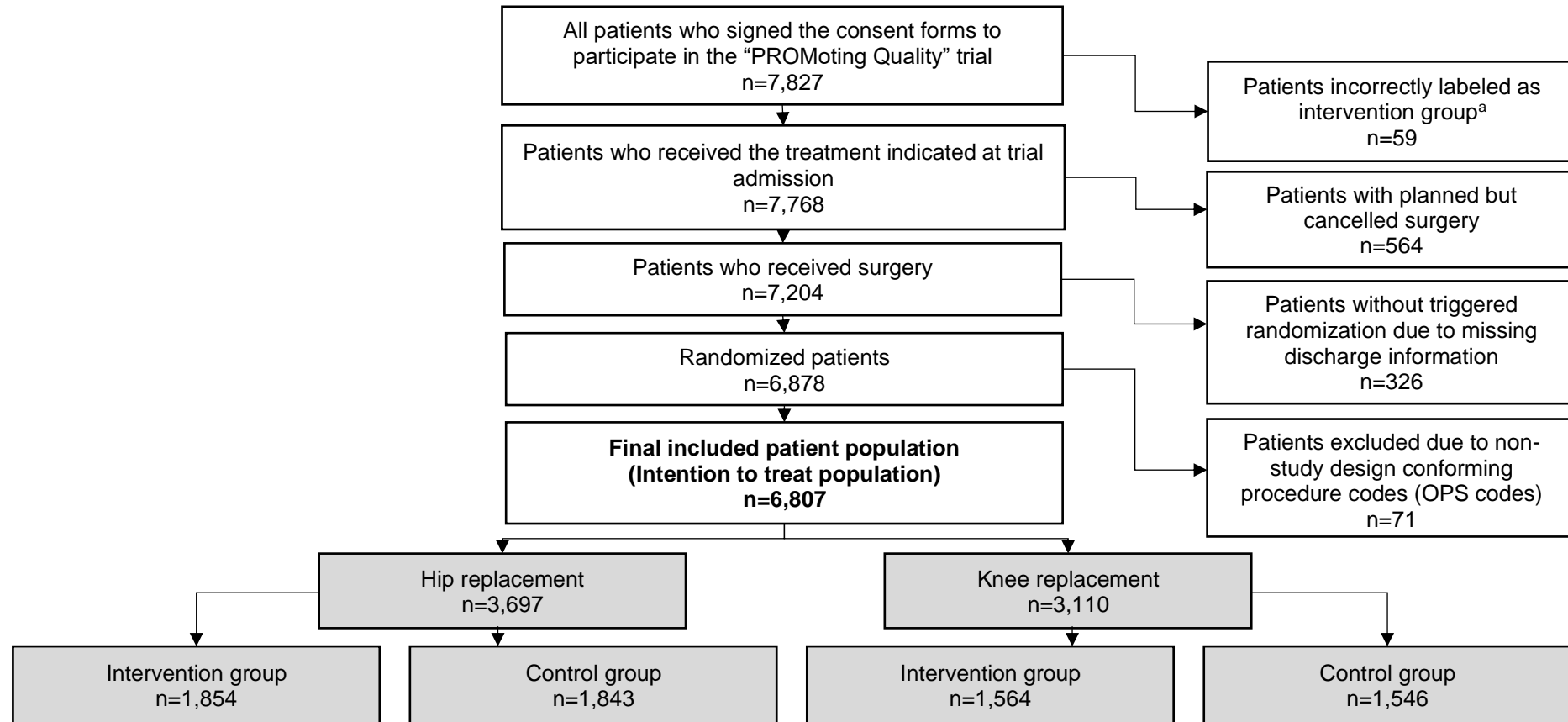
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This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure 1. Participant Flow in the “PROMoting Quality” Trial With Detailed Information on the Reasons for Exclusion



a Patients excluded in this step were originally designated to the control group. A study nurse manually sent PROMs to these participants (only in one hospital) at the intervention time points (at one-, three- and six-months). The digital system however did not initiate alerts, as this aspect could not be changed manually. Due to the difference in timepoints at which PROMs were answered among the 59 participants compared to the other control group participants, these patients were excluded.

eTable 1. Adjustments to the Study Protocol

| | |
|-------------------------|--|
| Threshold alerts | Originally any marginal deterioration in the HOOS-PS, KOOS-PS and EQ-5D-5L scores initiated an alert. After study nurses' feedback about many unnecessary calls (i.e. patients did not report health-related problems after being contacted), the relative threshold was adjusted to initiate an alert with a minimum 10-point deterioration in the HOOS-PS, KOOS-PS and 10% deterioration in EQ-5D-5L. These relative thresholds were calculated based on an analysis of comments made by the study assistants after contacting the patients. It was found that below a 10 point or percent deterioration, patients did not report any problems. Thus, the high administrative burden of the study assistants could be reduced without impacting the PROM-based intervention. |
| Timeframe | The study's timeframe was prolonged from the original recruitment period (October 2019 to September 2020) to last until December 2020. The follow-up lasted until March 2022 due to lower numbers of hip and knee-replacement surgeries being performed during waves of the COVID-19 pandemic. This extension was agreed to by the funder. |
| OPS-codes | Originally a list of surgical procedure codes (OPS-codes) was defined and communicated to study nurses. Unexpectedly, patients with other OPS-codes were also included in the study which initiated a closer look into which OPS-codes of the included ones fits to the target group of primary hip and knee replacements. The following OPS-codes were hence included: Hip: 5-820.00, 5-820.01, 5-820.02, 5-820.20, 5-820.22, 5-820.8, 5-820.80, 5-820.81, 5-820.82, 5-820.9, 5-820.92, 5-820.93, 5-820.94, 5-820.95, 5-820.96, 5-820.X, 5-820.x0, 5-820.x1, 5-820.x2, 5-820.y Knee: 5-822.0, 5-822.00, 5-822.01, 5-822.02, 5-822.g, 5-822.g0, 5-822.g1, 5-822.g2, 5-822.j, 5-822.j1, 5-822.j2, 5-822.k, 5-822.k0, 5-822.k1, 5-822.k2, 5-822.h1, 5-822.h2 |

eTable 2. Absolute Intervention Alert Thresholds for Each PROM-Score

| PROM Sets | Month 1 ^a | Month 3 ^a | Month 6 ^a | Relative deterioration alert ^b | Relative threshold |
|-------------------|----------------------|----------------------|----------------------|---|--------------------|
| EQ-5D-5L hip | 0.37 | 0.64 | 0.74 | Yes | 10% worse than t-1 |
| HOOS-PS | 53.00 | 36.30 | 27.70 | Yes | 10% worse than t-1 |
| EQ-5D-5L knee | 0.36 | 0.51 | 0.70 | Yes | 10% worse than t-1 |
| KOOS-PS | 51.60 | 43.60 | 33.60 | Yes | 10% worse than t-1 |
| PROMIS Depression | 65.80 | 65.80 | 65.80 | No | NA |
| PROMIS Fatigue | 69.00 | 69.00 | 69.00 | No | NA |

a the absolute alert thresholds were set through a Delphi panel (Kuklinski et al. 2020)

b the relative change to a worse score initiated an alert for all PROM-scores with “Yes”. This table is based on the table published in the study protocol of the PROMoting Quality trial (Kuklinski et al. 2020)

eTable 3. Descriptive Statistics of the Compliance Corrected Study Population

| <i>group</i> | Hip replacement patients | | Knee replacement patients | |
|---|---------------------------|----------------------|---------------------------|----------------------|
| | intervention (N=1,649) | control (N=1,843) | intervention (N=1,366) | control (N=1,546) |
| Age | | | | |
| mean (SD) | 65.7 (10.4) | 65.7 (10.6) | 65.9 (8.90) | 65.9 (9.36) |
| Gender (%) | | | | |
| female | 929 (65.3) | 1,036 (56.2) | 738 (54.0) | 830 (53.7) |
| male | 720 (43.7) | 807 (43.8) | 628 (46.0) | 716 (46.3) |
| BMI group (%) | | | | |
| underweight | 10 (0.6) | 10 (0.5) | 1 (0.1) | 3 (0.2) |
| normal | 513 (31.1) | 588 (31.9) | 223 (16.3) | 222 (14.4) |
| overweight | 650 (39.4) | 699 (37.9) | 491 (35.9) | 618 (40.0) |
| obese | 476 (28.9) | 546 (29.6) | 651 (47.7) | 703 (45.5) |
| Smoker (%) | | | | |
| no | 1,423 (86.3) | 1,547 (83.9) | 1,200 (87.8) | 1,336 (86.4) |
| yes | 226 (13.7) | 296 (16.1) | 166 (12.2) | 210 (13.6) |
| Education (%) | | | | |
| no school | 7 (0.4) | 7 (0.4) | 9 (0.7) | 5 (0.3) |
| primary school | 202 (12.2) | 249 (13.5) | 222 (16.3) | 271 (17.5) |
| high/middle school | 964 (58.5) | 1,033 (56.1) | 805 (58.9) | 927 (60.0) |
| university | 476 (28.9) | 554 (30.1) | 330 (24.2) | 343 (22.2) |
| Living situation (%) | | | | |
| alone | 375 (22.7) | 414 (22.5) | 263 (19.3) | 289 (18.7) |
| care facility | 4 (0.2) | 7 (0.4) | 7 (0.5) | 9 (0.6) |
| with a partner/family/friends | 1,261 (76.5) | 1,408 (76.4) | 1,093 (80.0) | 1,233 (79.8) |
| other | 9 (0.5) | 14 (0.8) | 3 (0.2) | 15 (1.0) |
| Job (%) | | | | |
| working | 524 (31.8) | 618 (33.5) | 404 (29.6) | 468 (30.3) |
| voluntarily not working including retirement | 950 (57.6) | 1,034 (56.1) | 792 (58.0) | 875 (56.6) |
| looking for work | 18 (1.1) | 15 (0.8) | 10 (0.7) | 23 (1.5) |
| unable to work | 177 (9.8) | 176 (9.6) | 160 (11.7) | 180 (11.6) |

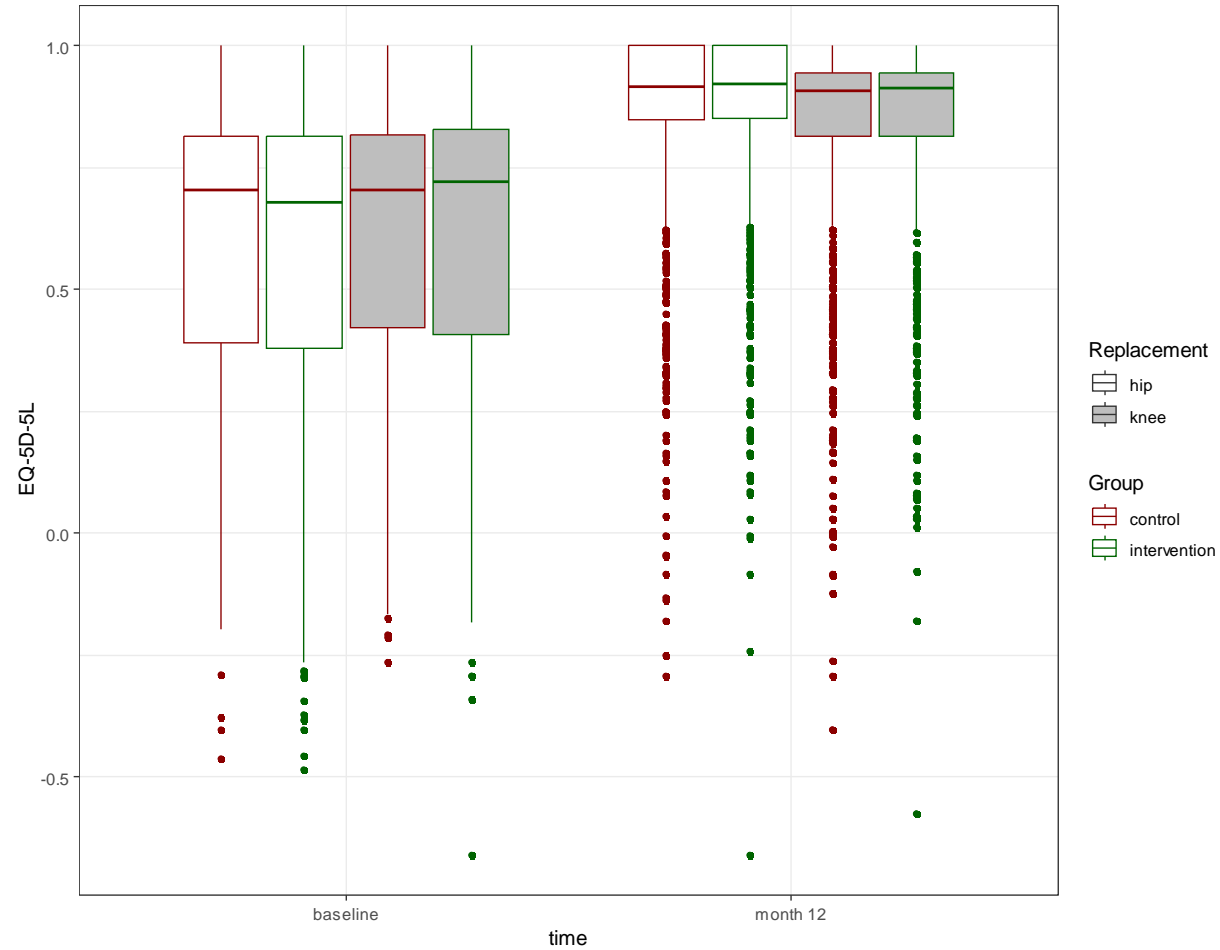
| group | Hip replacement patients | | Knee replacement patients | |
|--|---------------------------|----------------------|---------------------------|----------------------|
| | intervention (N=1,649) | control (N=1,843) | intervention (N=1,366) | control (N=1,546) |
| mobilization after surgery (%) | | | | |
| within 6 hours | 755 (45.8) | 854 (46.3) | 716 (45.8) | 709 (45.9) |
| within 12 hours | 503 (30.5) | 496 (26.9) | 410 (30.0) | 425 (27.5) |
| within 24 hours | 359 (21.8) | 443 (24.0) | 283 (20.7) | 356 (23.0) |
| within 48 hours | 22 (1.3) | 35 (1.9) | 36 (2.6) | 46 (3.0) |
| after 48 hours | 10 (0.6) | 15 (0.8) | 9 (0.7) | 10 (0.6) |
| Readmission (%) | | | | |
| no | 1,609 (97.6) | 1,789 (97.1) | 1,335 (97.7) | 1,506 (97.4) |
| within 30 days post-surgery | 18 (1.1) | 28 (1.5) | 7 (0.5) | 21 (1.4) |
| between 30-90 days post-surgery | 22 (1.3) | 26 (1.4) | 24 (1.7) | 19 (1.2) |
| reoperation within 12 months post-surgery (%) | | | | |
| no | 1,617 (98.1) | 1,798 (97.6) | 1,336 (97.8) | 1,504 (97.3) |
| yes | 32 (1.9) | 45 (2.4) | 30 (2.2) | 42 (2.7) |
| PROM baseline score mean (SD)^a | | | | |
| EQ-5D-5L | 0.599 (0.260) | 0.603 (0.256) | 0.628 (0.258) | 0.623 (0.245) |
| EQ-VAS | 56.6 (19.9) | 57.1 (19.7) | 58.9 (19.5) | 57.9 (19.1) |
| HOOS/KOOS-PS | 48.1 (16.3) | 47.1 (16.1) | 43.1 (13.4) | 43.0 (12.0) |
| PROMIS-fatigue | 49.2 (9.84) | 49.2 (9.98) | 48.2 (10.1) | 48.1 (9.54) |
| PROMIS-depression | 49.7 (8.32) | 49.8 (8.26) | 49.3 (8.40) | 49.4 (8.16) |

^a a PROM-scores have different score ranges: -0.661-1 for the EQ-5D-5L, 0-100 for the EQ-VAS, 0-100 for the HOOS-PS and KOOS-PS, 33.7-75.8 for the PROMIS-fatigue and 41-79.4 for the PROMIS-depression. Higher values in the EQ-VAS and EQ-5D-5L indicate better health levels, whereas lower values in H/KOOS-PS, PROMIS-fatigue, and depression indicate better health (less health impairment).

eTable 4. Descriptive Statistics of the Admission, Discharge and 12-Month Follow-up PROM-Scores

| procedure | hip replacement patients | | | | knee replacement patients | | | |
|-------------------------------|---------------------------------|-----------|----------------------------|-----------|----------------------------------|-----------|----------------------------|-----------|
| group | Intervention (n = 1,854) | | Control (n = 1,843) | | Intervention (n = 1,564) | | Control (n = 1,546) | |
| variable | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| admission PROM-score | | | | | | | | |
| EQ-VAS | 56.529 | 20.035 | 57.096 | 19.694 | 58.652 | 19.379 | 57.926 | 19.135 |
| EQ-5D-5L | 0.594 | 0.263 | 0.603 | 0.256 | 0.625 | 0.257 | 0.623 | 0.245 |
| HOOS/KOOS-PS | 48.35 | 16.398 | 47.109 | 16.099 | 43.135 | 13.339 | 42.983 | 12.026 |
| PROMIS-depression | 49.704 | 8.354 | 49.835 | 8.263 | 49.367 | 8.393 | 49.384 | 8.156 |
| PROMIS-fatigue | 49.163 | 9.912 | 49.209 | 9.975 | 48.319 | 10.105 | 48.145 | 9.544 |
| 12-months post-surgery | | | | | | | | |
| EQ-VAS | 75.505 | 17.148 | 73.974 | 18.45 | 72.198 | 17.519 | 70.235 | 18.423 |
| EQ-5D-5L | 0.881 | 0.158 | 0.874 | 0.169 | 0.851 | 0.182 | 0.843 | 0.191 |
| HOOS/KOOS-PS | 14.557 | 13.304 | 15.179 | 14.246 | 25.787 | 13.417 | 26.625 | 12.869 |
| PROMIS-depression | 46.926 | 7.403 | 47.622 | 7.633 | 47.483 | 7.7 | 47.744 | 7.831 |
| PROMIS-fatigue | 44.839 | 8.652 | 45.582 | 8.727 | 45.595 | 8.932 | 46.27 | 8.791 |

eFigure 2. Raw PROM-Score Distributions (Baseline, 12 Months) for the Control and Intervention Groups in the Intention to Treat Population for the EQ-5D-5L^a



a higher value in the EQ-5D-5L indicates better health levels

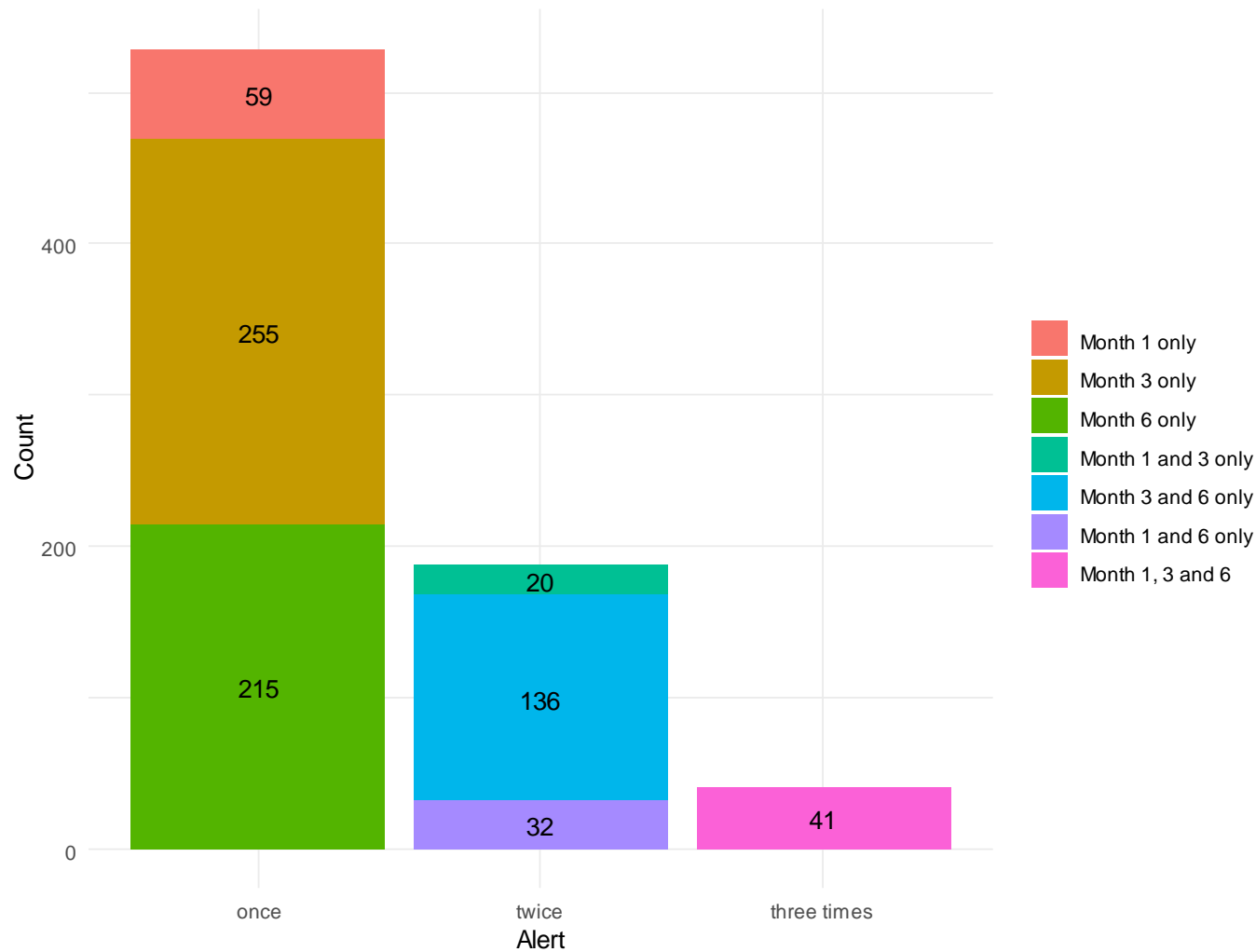
eTable 5. Readmission and Reoperation Descriptive Statistics in the Intervention Versus the Control Group Separated per Joint Replacement Type

| Hip replacement patients | | | | | |
|---------------------------------------|----------------|----------------|---------------------|----------------|------------------------------------|
| Group | control | | intervention | | Chi-Square Test p-value |
| Variable | N | Percent | N | Percent | |
| readmission | 1843 | | 1854 | | 0.544 |
| ... no | 1789 | 97% | 1809 | 98% | |
| ... readmission within 30 days | 28 | 2% | 19 | 1% | |
| ... readmission between 30 to 60 days | 10 | 1% | 8 | 0% | |
| ... readmission between 60 to 90 days | 16 | 1% | 18 | 1% | |
| reoperation | 1843 | | 1854 | | 0.488 |
| ... no | 1798 | 98% | 1816 | 98% | |
| ... yes | 45 | 2% | 38 | 2% | |
| Knee replacement patients | | | | | |
| readmission | 1546 | | 1564 | | 0.140 |
| ... no | 1506 | 97% | 1531 | 98% | |
| ... readmission within 30 days | 21 | 1% | 9 | 1% | |
| ... readmission between 30 to 60 days | 8 | 1% | 10 | 1% | |
| ... readmission between 60 to 90 days | 11 | 1% | 14 | 1% | |
| reoperation | 1546 | | 1564 | | 0.388 |
| ... no | 1504 | 97% | 1530 | 98% | |
| ... yes | 42 | 3% | 34 | 2% | |

eTable 6. Information on Critical Values and Reactions to PROM-Based Critical Value Alerts From Study Assistants and Patients - Critical Values and Alert Reactions

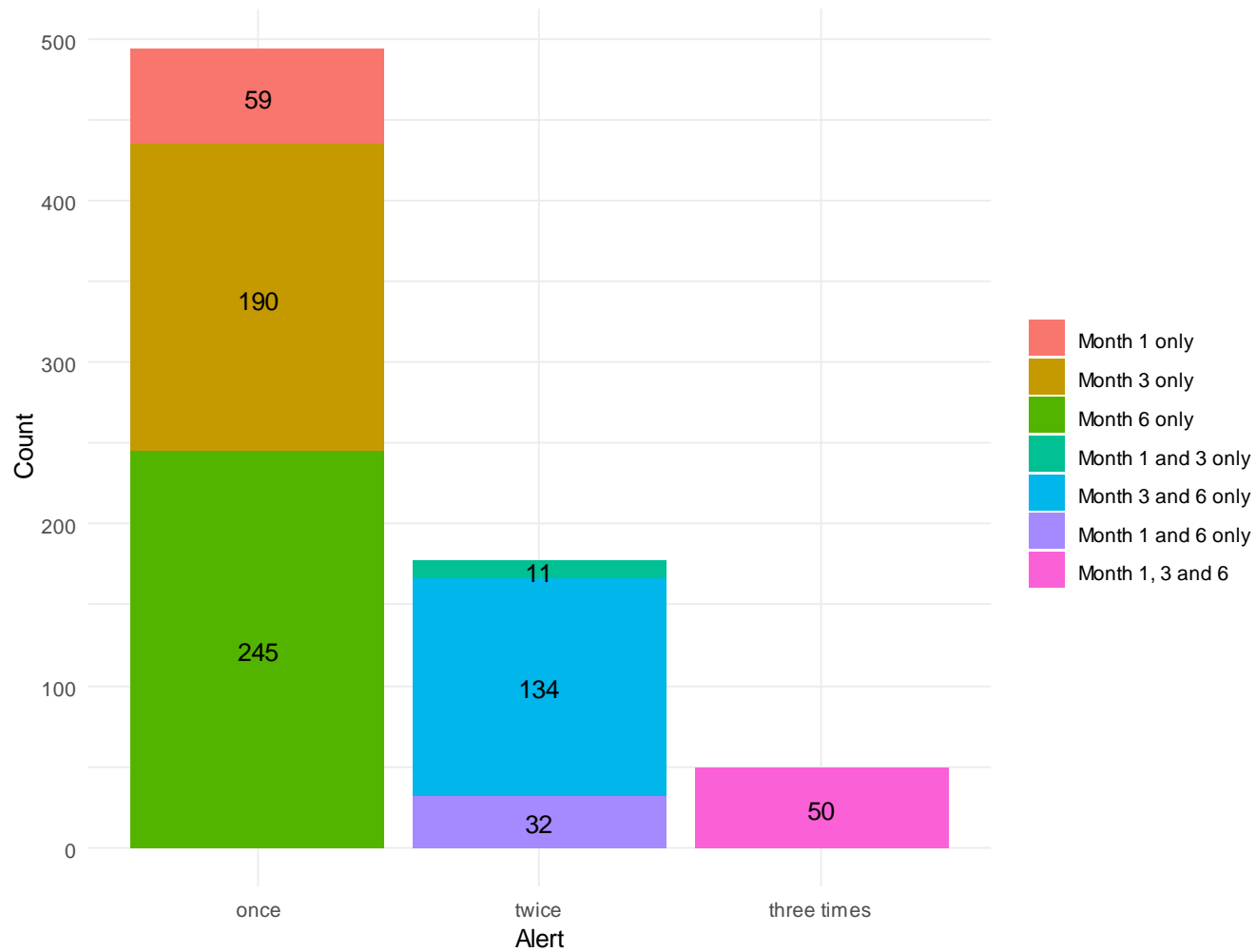
| <i>procedure</i> | <i>Hip replacement patients</i> | | | <i>Knee replacement patients</i> | | |
|---|---------------------------------|----------------|----------------|----------------------------------|----------------|----------------|
| <i>month</i> | <i>month 1</i> | <i>month 3</i> | <i>month 6</i> | <i>month 1</i> | <i>month 3</i> | <i>month 6</i> |
| number of patients in the intervention group | | | | | | |
| <i>critical value information available</i> | 1,772 | 1,773 | 1,709 | 1,486 | 1,485 | 1,435 |
| number of patients in the intervention group (% of patients with information on critical values) | | | | | | |
| <i>patients with critical values</i> | 157 (9%) | 454 (26%) | 424 (25%) | 157 (11%) | 386 (26%) | 461 (32%) |
| <i>patients without critical values</i> | 1615 (91%) | 1319 (74%) | 1285 (75%) | 1329 (89%) | 1099 (74%) | 974 (68%) |
| number of those with critical values (% of critical value patients) | | | | | | |
| <i>call to patient by study nurse</i> | 114 (73%) | 319 (70%) | 321 (76%) | 111 (71%) | 287 (74%) | 316 (69%) |
| <i>data transfer to patients</i> | 29 (18%) | 88 (19%) | 83 (20%) | 32 (20%) | 74 (19%) | 105 (23%) |
| <i>data transfer to physician</i> | 24 (15%) | 43 (9%) | 26 (6%) | 28 (18%) | 49 (13%) | 25 (5%) |
| <i>physician visit</i> | 103 (66%) | 299 (66%) | 259 (61%) | 102 (65%) | 288 (75%) | 323 (70%) |

eFigure 3. Count of Hip Replacement Patients Whose PROM-Scores Initiated Alerts per Intervention Time/Times^a



^a the total number of patients with critical values (alerts) were 157, 454 and 424 for month one, three and six respectively. The total number of patients who did not have a critical value (no alert) were 1615, 1099 and 974 respectively.

eFigure 4. Count of Knee Replacement Patients Whose PROM-Scores Initiated Alerts per Intervention Time/Times^a



^a the total number of patients with critical values (alerts) were 157, 386 and 461 for month one, three and six respectively. The total number of patients who did not have a critical value (no alert) were 1329, 1319 and 1285 respectively.

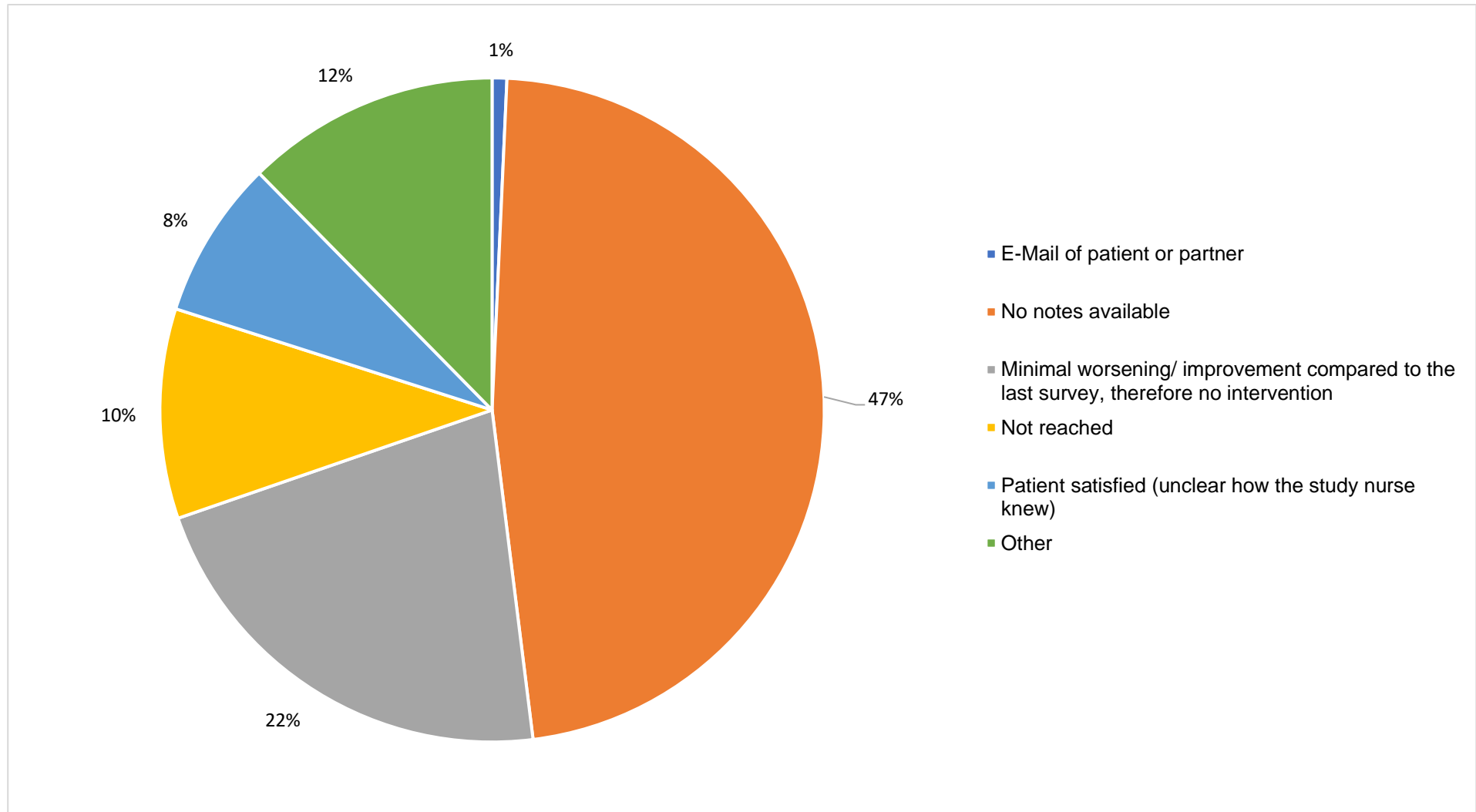
eTable 7. Therapy Changes in the Intervention Group of Patients Who Visited a Physician and Were Called Versus Not Called

| procedure | hip replacement patients | | | knee replacement patients | | |
|---|--------------------------|----------------|-----------------|---------------------------|----------------|-----------------|
| | month 1 | month 3 | month 6 | month 1 | month 3 | month 6 |
| Call in:^a | | | | | | |
| Reaction by:^b | month 3 | month 6 | month 12 | month 3 | month 6 | month 12 |
| discussed PROs with treating physician | | | | | | |
| yes | 30 (36.6%) | 72 (38.7%) | 58 (36.5%) | 30 (33.0%) | 49 (26.6%) | 43 (24.3%) |
| no | 52 (63.4%) | 114 (61.3%) | 101 (63.5%) | 61 (67.0%) | 135 (73.4%) | 134 (75.7%) |
| change in medication | | | | | | |
| yes | 20 (24.4%) | 49 (26.3%) | 38 (23.9%) | 41 (45.1%) | 42 (22.8%) | 48 (27.1%) |
| no | 62 (75.6%) | 137 (73.7%) | 121 (76.1%) | 50 (54.9%) | 142 (77.2%) | 129 (72.9%) |
| change in physiotherapy | | | | | | |
| yes | 31 (37.8%) | 86 (46.2%) | 64 (40.3%) | 34 (37.4%) | 75 (40.8%) | 62 (35.0%) |
| no | 51 (62.2%) | 100 (53.8%) | 95 (59.7%) | 57 (62.6%) | 109 (59.2%) | 115 (65.0%) |
| change of aftercare physician | | | | | | |
| yes | 8 (9.8%) | 16 (8.6%) | NA | 3 (3.3%) | 7 (3.8%) | NA |
| no | 74 (90.2%) | 170 (91.4%) | NA | 88 (96.7%) | 177 (96.2%) | NA |
| No call in:^a | month 1 | month 3 | month 6 | month 1 | month 3 | month 6 |
| Reaction by:^b | month 3 | month 6 | month 12 | month 3 | month 6 | month 12 |
| discussed PROs with treating physician | | | | | | |
| yes | 267 (27.8%) | 191 (28.9%) | 143 (27.7%) | 225 (26.1%) | 210 (32.4%) | 140 (31.9%) |
| no | 693 (72.2%) | 471 (71.1%) | 373 (72.3%) | 637 (73.9%) | 439 (67.6%) | 299 (68.1%) |
| change in medication | | | | | | |
| yes | 224 (23.3%) | 106 (16.0%) | 72 (14.0%) | 239 (27.7%) | 151 (23.3%) | 71 (16.2%) |
| no | 736 (76.7%) | 556 (84.0%) | 444 (86.0%) | 623 (72.3%) | 498 (76.7%) | 368 (83.8%) |
| change in physiotherapy | | | | | | |
| yes | 407 (42.4%) | 233 (35.2%) | 153 (29.7%) | 356 (41.3%) | 252 (38.8%) | 133 (30.3%) |
| no | 553 (57.6%) | 429 (64.8%) | 363 (70.3%) | 506 (58.7%) | 397 (61.2%) | 306 (69.7%) |
| change of aftercare physician | | | | | | |
| yes | 24 (2.5%) | 24 (3.6%) | NA | 26 (3.0%) | 28 (4.3%) | NA |
| no | 936 (97.5%) | 638 (96.4%) | NA | 836 (97.0%) | 621 (95.7%) | NA |

^a Call means that a phone call took place in which the study nurse called the patient who had an alert at month 1,3,6 (one of the intervention steps). No call means that no call took place in the respective month.

^b Reaction by refers to the month in which a change in therapy was reported. This row specified the next measurement time after the call taking place/not taking place, as the reaction based on the call could have only be visible in the data after the call at the next measurement time.

eFigure 5. Classification of Notes by Study Nurses of Patients Who Were Not Called Following an Alert (n= 560)



eTable 8. Difference in the PROM-Score-Change From Baseline to 12 Months Post-Surgery, Between Intervention and Control Group (Compliance Corrected Study Population)

| variable | intervention | | | control | | | mean between-group difference | | |
|----------------------------------|--------------|--|-------|---------|--|-------|-------------------------------|-------------------------|----------------------|
| | N | Mean change in PROM-score ^a | SD | N | Mean change in PROM-score ^a | SD | in points ^b | 95% confidence interval | p-value ^c |
| Hip replacement patients | | | | | | | | | |
| EQ-5D-5L | 1,649 | 0.283 | 0.262 | 1,843 | 0.271 | 0.262 | 0.012 | - 0.004 to 0.030 | 0.144 |
| EQ-VAS | 1,649 | 19.14 | 22.35 | 1,843 | 16.88 | 22.56 | 2.26 | 0.76 to 3.75 | 0.003*** |
| HOOS-PS | 1,649 | -33.78 | 17.68 | 1,843 | -31.93 | 17.99 | -1.85 | -3.04 to -0.66 | 0.002*** |
| PROMIS-depression | 1,649 | -2.79 | 7.85 | 1,843 | -2.21 | 7.90 | -0.58 | -1.10 to -0.05 to | 0.031** |
| PROMIS-fatigue | 1,649 | -4.45 | 9.32 | 1,843 | -3.63 | 9.17 | -0.82 | -1.44 to -0.21 | 0.009*** |
| Knee replacement patients | | | | | | | | | |
| EQ-5D-5L | 1,366 | 0.223 | 0.258 | 1,546 | 0.220 | 0.251 | 0.003 | -0.015 to 0.022 | 0.697 |
| EQ-VAS | 1,366 | 13.65 | 22.19 | 1,546 | 12.31 | 21.27 | 1.34 | -0.25 to 2.92 | 0.098* |
| KOOS-PS | 1,366 | -17.50 | 14.60 | 1,546 | -16.36 | 13.60 | -1.14 | -2.17 to -0.12 | 0.028** |
| PROMIS-depression | 1,366 | -1.89 | 7.81 | 1,546 | -1.64 | 7.71 | -0.25 | -0.82 to 0.31 | 0.384 |
| PROMIS-fatigue | 1,366 | -2.78 | 9.11 | 1,546 | -1.88 | 8.81 | -0.90 | -1.55 to 0.25 | 0.007*** |

a The score ranges for the PROMs are: -0.661- 1.0 for the EQ-5D-5L, 0-100 for the EQ-VAS, 0-100 for the HOOS-PS and KOOS-PS, 33.7-75.8 for the PROMIS-fatigue and 41-79.4 for the PROMIS-depression. Due to the low score range of the EQ-5D-5L, three digits after the decimal point are reported

b The mean difference in points refers to the difference between intervention and control group in terms of their mean change in the respective PROM-score

eTable 9. Mixed Effects Models With PROM-Score Changes as Outcomes, Controlling for Gender, Age, Mobilization and Admission PROM Scores as Fixed Effects and Hospital as Random Intercept (Intention to Treat Study Population)

Hip replacement patients

| Predictors | EQ-5D-5L | | | EQ-VAS | | | HOOS-PS | | | PROMIS-fatigue | | | PROMIS-depression | | |
|--|-----------------------|--------------------|------------------|-----------------------|------------------|------------------|-----------------------|-------------------|------------------|-----------------------|------------------|------------------|-----------------------|------------------|------------------|
| | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p |
| (Intercept) | 0.743 | 0.675 - 0.811 | <0.001 | 65.00 | 57.56 - 72.44 | <0.001 | 4.63 | -1.24 - 10.49 | 0.122 | 27.50 | 23.92 - 31.08 | <0.001 | 26.60 | 23.43 - 29.77 | <0.001 |
| group [intervention] | 0.008 | -0.002 - 0.018 | 0.113 | 1.66 | 0.58 - 2.74 | 0.003 | -0.82 | -1.65 - 0.00 | 0.051 | -0.65 | -1.12 - -0.18 | 0.007 | -0.60 | -1.01 - -0.18 | 0.005 |
| gender [male] | 0.004 | -0.006 - 0.014 | 0.450 | -0.26 | -1.35 - 0.84 | 0.647 | -0.17 | -1.01 - 0.68 | 0.702 | 0.57 | 0.08 - 1.06 | 0.022 | -0.17 | -0.59 - 0.26 | 0.444 |
| age | -0.001 | -0.001 - -0.001 | <0.001 | -0.24 | -0.30 - -0.19 | <0.001 | 0.15 | 0.11 - 0.19 | <0.001 | -0.02 | -0.04 - 0.00 | 0.118 | 0.01 | -0.01 - 0.03 | 0.180 |
| mobilisation [within 12 hours after surgery] | 0.074 | 0.014 - 0.135 | 0.016 | 8.75 | 2.22 - 15.27 | 0.009 | -11.10 | -16.10 - -6.10 | <0.001 | -3.95 | -6.81 - -1.09 | 0.007 | -3.62 | -6.12 - -1.13 | 0.004 |
| mobilisation [within 24 hours after surgery] | 0.059 | -0.001 - 0.120 | 0.056 | 7.88 | 1.33 - 14.43 | 0.018 | -9.60 | -14.62 - -4.59 | <0.001 | -2.92 | -5.79 - -0.05 | 0.046 | -3.01 | -5.52 - -0.50 | 0.019 |
| mobilisation [within 48 hours after surgery] | 0.032 | -0.039 - 0.103 | 0.382 | 5.18 | -2.52 - 12.87 | 0.187 | -6.84 | -12.74 - -0.95 | 0.023 | -2.17 | -5.54 - 1.19 | 0.206 | -1.19 | -4.13 - 1.76 | 0.429 |
| mobilisation [within 6 hours after surgery] | 0.082 | 0.022 - 0.142 | 0.007 | 10.10 | 3.61 - 16.59 | 0.002 | -12.24 | -17.22 - -7.27 | <0.001 | -3.94 | -6.79 - -1.10 | 0.007 | -3.61 | -6.09 - -1.13 | 0.004 |
| EQ-5D-5L admission | -0.811 | - | <0.001 | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|------------------------------------|---------------|-------|---------------|--------|---------------|-------|---------------|-------|---------------|--------|-------|-------|--------|--|--|
| EQ-VAS admission | | -0.73 | -0.75 | <0.001 | | | | | | | | | | | |
| HOOS-PS admission | | | -0.70 | 1 | -0.74 | -0.77 | <0.001 | | | | | | | | |
| PROMIS-fatigue admission | | | | | | -0.71 | 1 | -0.53 | -0.56 | <0.001 | | | | | |
| PROMIS-depression admission | | | | | | | | | | | -0.53 | -0.55 | <0.001 | | |
| | | | | | | | | | | | | -0.50 | 1 | | |
| Random Effects | | | | | | | | | | | | | | | |
| σ^2 | 0.02 | | 279.03 | | 163.70 | | 53.42 | | 40.84 | | | | | | |
| τ_{00} | 0.00 hospital | | 3.20 hospital | | 4.99 hospital | | 1.64 hospital | | 0.50 hospital | | | | | | |
| ICC | 0.01 | | 0.01 | | 0.03 | | 0.03 | | 0.01 | | | | | | |
| N | 9 hospital | | 9 hospital | | 9 hospital | | 9 hospital | | 9 hospital | | | | | | |
| Observations | 3,697 | | 3,697 | | 3,697 | | 3,697 | | 3,697 | | | | | | |
| Marginal R^2 / Conditional R^2 | 0.646 / 0.650 | | 0.437 / 0.443 | | 0.461 / 0.477 | | 0.342 / 0.362 | | 0.318 / 0.326 | | | | | | |

Knee replacement patients

| Predictors | EQ-5D-5L | | | EQ-VAS | | | KOOS-PS | | | PROMIS-fatigue | | | PROMIS-depression | | |
|--------------------------|-----------|--------|--------|-----------|--------|--------|-----------|--------|--------|----------------|--------|--------|-------------------|--------|--------|
| | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p |
| (Intercept) | 0.518 | 0.434 | <0.001 | 46.58 | 38.35 | <0.001 | 16.16 | 10.06 | <0.001 | 29.27 | 25.28 | <0.001 | 24.73 | 21.15 | <0.001 |
| | | -0.603 | | | -54.80 | | | -22.26 | | | -33.26 | | | -28.32 | |
| group [intervention] | 0.007 | -0.005 | 0.248 | 1.71 | 0.53 | 0.005 | -0.80 | -1.63 | 0.057 | -0.71 | -1.23 | 0.006 | -0.23 | -0.69 | 0.313 |
| | | -0.019 | | | -2.90 | | | -0.03 | | | -0.20 | | | -0.22 | |
| gender [male] | 0.010 | -0.002 | 0.096 | 1.23 | 0.02 | 0.046 | -1.03 | -1.88 | 0.016 | -0.23 | -0.75 | 0.400 | -0.77 | -1.24 | 0.001 |
| | | -0.023 | | | -2.43 | | | -0.19 | | | -0.30 | | | -0.30 | |
| age | 0.001 | 0.000 | 0.012 | -0.03 | -0.10 | 0.308 | -0.06 | -0.11 | 0.007 | -0.06 | -0.09 | <0.001 | -0.01 | -0.03 | 0.514 |
| | | -0.002 | | | -0.03 | | | -0.02 | | | -0.03 | | | -0.02 | |
| mobilisation [within 12] | 0.108 | 0.038 | 0.003 | 7.11 | 0.25 | 0.042 | -3.22 | -8.02 | 0.187 | -3.02 | -5.99 | 0.047 | -1.33 | -3.97 | 0.321 |
| | | -0.179 | | | -13.97 | | | -1.57 | | | -0.04 | | | -1.30 | |

| | | | | | | | | | | | | | | | |
|-----------------------------|--------|----------|------------------|--------|----------|------------------|--------|----------|------------------|-------|----------|------------------|-------|-------|------------------|
| hours after surgery] | | | | | | | | | | | | | | | |
| mobilisation [within 24 | 0.087 | 0.017 | 0.015 | 6.51 | -0.37 | 0.064 | -1.81 | -6.61 | 0.460 | -2.49 | -5.47 | 0.102 | -1.02 | -3.66 | 0.450 |
| hours after surgery] | | -0.158 | | | -13.39 | | | -2.99 | | | -0.50 | | | -1.62 | |
| mobilisation [within 48 | 0.046 | -0.032 | 0.253 | 2.77 | -4.87 | 0.478 | -1.24 | -6.57 | 0.649 | -1.61 | -4.92 | 0.341 | 0.70 | -2.23 | 0.640 |
| hours after surgery] | | -0.125 | | | -10.40 | | | -4.10 | | | -1.70 | | | -3.63 | |
| mobilisation [within 6 | 0.104 | 0.034 | 0.004 | 7.53 | 0.69 | 0.031 | -3.95 | -8.73 | 0.105 | -2.88 | -5.85 | 0.057 | -1.29 | -3.91 | 0.335 |
| hours after surgery] | | -0.174 | | | -14.36 | | | -0.83 | | | -0.08 | | | -1.33 | |
| EQ-5D-5L admission | -0.740 | -0.764 | <0.001 | | | | | | | | | | | | |
| | | -- | | | | | | | | | | | | | |
| | | 0.715 | | | | | | | | | | | | | |
| EQ-VAS admission | | | | -0.69 | - | <0.001 | | | | | | | | | |
| | | | | | 0.72 -- | | | | | | | | | | |
| | | | | | 0.66 | | | | | | | | | | |
| KOOS-PS admission | | | | | | | -0.57 | - | <0.001 | | | | | | |
| | | | | | | | | 0.61 -- | | | | | | | |
| | | | | | | | | 0.54 | | | | | | | |
| PROMIS-fatigue admission | | | | | | | | | | -0.50 | - | <0.001 | | | |
| | | | | | | | | | | | 0.53 -- | | | | |
| | | | | | | | | | | | 0.48 | | | | |
| PROMIS-depression admission | | | | | | | | | | | | | -0.49 | -0.52 | <0.001 |
| | | | | | | | | | | | | | | -0.46 | |
| Random Effects | | | | | | | | | | | | | | | |
| σ^2 | 0.03 | | | 283.95 | | | 137.79 | | | 53.04 | | | | 41.67 | |
| T00 | 0.00 | hospital | | 1.73 | hospital | | 4.32 | hospital | | 1.76 | hospital | | | 0.55 | hospital |
| ICC | 0.01 | | | 0.01 | | | 0.03 | | | 0.03 | | | | 0.01 | |
| N | 9 | hospital | | 9 | hospital | | 9 | hospital | | 9 | hospital | | | 9 | hospital |
| Observations | 3,110 | | | 3,110 | | | 3,110 | | | 3,110 | | | | 3,110 | |

Marginal R^2 / 0.529 / 0.534
Conditional
 R^2

0.380 / 0.384

0.267 / 0.289

0.303 / 0.326

0.272 / 0.282

eTable 10. Mixed Effects Models With PROM-Score Changes as Outcomes, Controlling for Gender, Age, Mobilization and Admission PROM Scores as Fixed Effects and Hospital as Random Intercept (Compliance Corrected Study Population)

Hip replacement patients

| Predictors | EQ-5D-5L | | | EQ-VAS | | | HOOS-PS | | | PROMIS-fatigue | | | PROMIS-depression | | |
|---|-----------|------------------------|------------------|-----------|------------------|------------------|-----------|-------------------|------------------|----------------|------------------|------------------|-------------------|------------------|------------------|
| | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p |
| (Intercept) | 0.745 | 0.674 - 0.815 | <0.001 | 65.17 | 57.48 - 72.86 | <0.001 | 4.78 | -1.31 - 10.88 | 0.124 | 27.52 | 23.81 - 31.23 | <0.001 | 26.79 | 23.49 - 30.09 | <0.001 |
| group [intervention] | 0.008 | -0.002 - 0.019 | 0.121 | 1.80 | 0.67 - 2.92 | 0.002 | -0.89 | -1.76 - -0.03 | 0.043 | -0.68 | -1.17 - -0.19 | 0.007 | -0.56 | -1.00 - -0.13 | 0.010 |
| gender [male] | 0.003 | -0.008 - 0.014 | 0.575 | -0.40 | -1.54 - 0.74 | 0.492 | -0.11 | -1.00 - 0.78 | 0.808 | 0.53 | 0.02 - 1.04 | 0.041 | -0.19 | -0.64 - 0.25 | 0.399 |
| age | -0.001 | -0.001 - - 0.000 | <0.001 | -0.24 | -0.30 - -0.19 | <0.001 | 0.15 | 0.11 - 0.19 | <0.001 | -0.02 | -0.04 - 0.01 | 0.133 | 0.01 | -0.01 - 0.03 | 0.227 |
| mobilisation [within 12 hours after surgery] | 0.080 | 0.018 - 0.143 | 0.012 | 8.61 | 1.88 - 15.35 | 0.012 | -11.47 | -16.65 - -6.28 | <0.001 | -4.08 | -7.03 - -1.12 | 0.007 | -3.68 | -6.26 - -1.10 | 0.005 |
| mobilisation [within 24 hours after surgery] | 0.065 | 0.002 - 0.128 | 0.042 | 7.84 | 1.08 - 14.60 | 0.023 | -9.99 | -15.19 - -4.79 | <0.001 | -3.07 | -6.03 - -0.10 | 0.043 | -3.06 | -5.65 - -0.47 | 0.021 |
| mobilisation [within 48 hours after surgery] | 0.041 | -0.033 - 0.115 | 0.277 | 5.76 | -2.21 - 13.73 | 0.156 | -7.45 | -13.58 - -1.32 | 0.017 | -2.53 | -6.03 - 0.97 | 0.156 | -1.49 | -4.55 - 1.56 | 0.338 |
| mobilisation [within 6 hours after surgery] | 0.087 | 0.025 - 0.149 | 0.006 | 9.99 | 3.29 - 16.69 | 0.003 | -12.50 | -17.65 - -7.35 | <0.001 | -3.93 | -6.87 - -1.00 | 0.009 | -3.61 | -6.18 - -1.04 | 0.006 |
| EQ-5D-5L admission | -0.813 | -0.834 - - 0.793 | <0.001 | | | | | | | | | | | | |

| | | | | | | | | | | |
|-----------------------------|-------|------------------|------------------|-------|------------------|------------------|-------|------------------|------------------|------------------|
| EQ-VAS admission | -0.73 | -0.76 - -0.70 | <0.001 | | | | | | | |
| HOOS-PS admission | | | | -0.74 | -0.77 - -0.71 | <0.001 | | | | |
| PROMIS-fatigue admission | | | | | | | -0.53 | -0.56 - -0.50 | <0.001 | |
| PROMIS-depression admission | | | | | | | | -0.53 | -0.56 - -0.50 | <0.001 |

Random Effects

| | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|
| σ^2 | 0.02 | 285.66 | 168.93 | 54.92 | 41.98 |
| T00 | 0.00 hospital | 3.35 hospital | 5.18 hospital | 1.62 hospital | 0.61 hospital |
| ICC | 0.01 | 0.01 | 0.03 | 0.03 | 0.01 |
| N | 9 hospital | 9 hospital | 9 hospital | 9 hospital | 9 hospital |
| Observations | 3,492 | 3,492 | 3,492 | 3,492 | 3,492 |
| Marginal R ² / Conditional R ² | 0.639 / 0.643 | 0.431 / 0.438 | 0.453 / 0.469 | 0.333 / 0.353 | 0.312 / 0.322 |

Knee replacement patients

| Predictors | EQ-5D-5L | | | EQ-VAS | | | KOOS-PS | | | PROMIS-fatigue | | | PROMIS-depression | | |
|----------------------|-----------|-------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|----------------|------------------|------------------|-------------------|------------------|------------------|
| | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p |
| (Intercept) | 0.511 | 0.418 - 0.606 | <0.001 | 44.91 | 35.73 - 54.09 | <0.001 | 15.49 | 8.77 - 22.22 | <0.001 | 27.90 | 23.55 - 32.24 | <0.001 | 24.30 | 20.37 - 28.23 | <0.001 |
| group [intervention] | 0.005 | -0.007 - 0.018 | 0.412 | 1.86 | 0.61 - 3.11 | 0.004 | -0.94 | -1.81 - -0.07 | 0.035 | -0.73 | -1.27 - -0.20 | 0.007 | -0.22 | -0.70 - 0.26 | 0.365 |
| gender [male] | 0.009 | -0.003 - 0.023 | 0.146 | 1.02 | -0.24 - 2.29 | 0.113 | -1.10 | -1.99 - -0.22 | 0.015 | -0.10 | -0.65 - 0.45 | 0.721 | -0.73 | -1.23 - -0.24 | 0.003 |

| | | | | | | | | | | | | | | | |
|---|---------------|------------------------|------------------|---------------|------------------|------------------|---------------|------------------|------------------|---------------|------------------|------------------|---------------|------------------|------------------|
| age | 0.001 | 0.004 - 0.001 | 0.038 | -0.04 | -0.10 - 0.03 | 0.317 | -0.06 | -0.11 - -0.01 | 0.021 | -0.06 | -0.09 - -0.03 | <0.001 | -0.01 | -0.03 - 0.02 | 0.681 |
| mobilisation [within 12 hours after surgery] | 0.117 | 0.036 - 0.197 | 0.005 | 8.65 | 0.79 - 16.50 | 0.031 | -3.07 | -8.54 - 2.41 | 0.272 | -1.89 | -5.26 - 1.48 | 0.272 | -1.26 | -4.26 - 1.75 | 0.412 |
| mobilisation [within 24 hours after surgery] | 0.098 | 0.017 - 0.178 | 0.018 | 8.27 | 0.40 - 16.14 | 0.040 | -1.83 | -7.32 - 3.65 | 0.512 | -1.52 | -4.90 - 1.86 | 0.378 | -0.99 | -4.00 - 2.02 | 0.520 |
| mobilisation [within 48 hours after surgery] | 0.053 | -0.035 - 0.141 | 0.242 | 4.34 | -4.27 - 12.95 | 0.323 | -1.16 | -7.17 - 4.84 | 0.704 | -0.75 | -4.44 - 2.95 | 0.692 | 0.63 | -2.67 - 3.92 | 0.709 |
| mobilisation [within 6 hours after surgery] | 0.114 | 0.034 - 0.194 | 0.005 | 9.22 | 1.39 - 17.05 | 0.021 | -3.98 | -9.44 - 1.48 | 0.153 | -1.83 | -5.19 - 1.54 | 0.287 | -1.24 | -4.24 - 1.75 | 0.416 |
| EQ-5D-5L admission | -0.734 | -0.759 - - 0.708 | <0.001 | | | | | | | | | | | | |
| EQ-VAS admission | | | | -0.68 | -0.72 - -0.65 | <0.001 | | | | | | | | | |
| KOOS-PS admission | | | | | | | -0.57 | -0.60 - -0.53 | <0.001 | | | | | | |
| PROMIS- fatigue admission | | | | | | | | | | -0.49 | -0.52 - -0.46 | <0.001 | | | |
| PROMIS- depression admission | | | | | | | | | | | | | -0.49 | -0.52 - -0.46 | <0.001 |
| Random Effects | | | | | | | | | | | | | | | |
| σ^2 | 0.03 | | | 295.34 | | | 142.89 | | | 54.13 | | | 43.01 | | |
| T00 | 0.00 hospital | | | 2.15 hospital | | | 4.15 hospital | | | 1.92 hospital | | | 0.73 hospital | | |
| ICC | 0.01 | | | 0.01 | | | 0.03 | | | 0.03 | | | 0.02 | | |
| N | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | |

| | | | | | |
|--|---------------|---------------|---------------|---------------|---------------|
| Observations | 2,912 | 2,912 | 2,912 | 2,912 | 2,912 |
| Marginal R ² / Conditional R ² | 0.516 / 0.522 | 0.370 / 0.375 | 0.256 / 0.277 | 0.290 / 0.315 | 0.263 / 0.275 |

eTable 11. Mixed Effects Models With PROM-Score Change Z-Scores as Outcomes, Controlling for Gender, Age, Mobilization and Admission PROM Scores as Fixed Effects and Hospital as Random Intercept (Intention to Treat Study Population)

Hip replacement patients

| Predictors | EQ total Z | | | EQ-VAS Z | | | HOOS Z | | | PROMIS fat Z | | | PROMIS dep Z | | |
|--|-----------------------|---------------------|------------------|-----------------------|---------------------|------------------|-----------------------|---------------------|------------------|-----------------------|----------------------|------------------|-----------------------|---------------------|------------------|
| | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p |
| (Intercept) | 1.78 | 1.52 -2.0 4 | <0.001 | 2.11 | 1.78 -2.4 4 | <0.001 | -2.12 | -2.45 -- 1.78 | <0.001 | -3.42 | -3.81 -- -3.03 | <0.001 | -3.73 | -4.14 -- 3.33 | <0.001 |
| group [intervention] | 0.03 | -0.01 -0.0 7 | 0.113 | 0.07 | 0.03 -0.1 2 | 0.003 | 0.05 | -0.00 -0.0 9 | 0.051 | 0.07 | 0.02 -0.12 | 0.007 | 0.08 | 0.02 -0.1 3 | 0.005 |
| gender [male] | 0.02 | -0.02 -0.0 5 | 0.450 | -0.01 | -0.06 -0.0 4 | 0.647 | 0.01 | -0.04 -0.0 6 | 0.702 | -0.06 | -0.11 -0.01 | 0.022 | 0.02 | -0.03 -0.0 8 | 0.444 |
| age | -0.00 | -0.01 -- 0.00 | <0.001 | -0.01 | -0.01 -- 0.01 | <0.001 | -0.01 | -0.01 -- 0.01 | <0.001 | 0.00 | -0.00 -0.00 | 0.118 | -0.00 | -0.00 -0.0 0 | 0.180 |
| mobilisation [within 12 hours after surgery] | 0.29 | 0.05 -0.5 2 | 0.016 | 0.39 | 0.10 -0.6 8 | 0.009 | 0.63 | 0.34 -0.9 1 | <0.001 | 0.43 | 0.12 -0.74 | 0.007 | 0.46 | 0.14 -0.7 9 | 0.004 |
| mobilisation [within 24 hours after surgery] | 0.23 | -0.01 -0.4 6 | 0.056 | 0.35 | 0.06 -0.6 5 | 0.018 | 0.54 | 0.26 -0.8 3 | <0.001 | 0.32 | 0.01 -0.63 | 0.046 | 0.39 | 0.06 -0.7 1 | 0.019 |
| mobilisation [within 48 hours after surgery] | 0.12 | -0.15 -0.3 9 | 0.382 | 0.23 | -0.11 -0.5 8 | 0.187 | 0.39 | 0.05 -0.7 2 | 0.023 | 0.24 | -0.13 -0.60 | 0.206 | 0.15 | -0.23 -0.5 3 | 0.429 |

| | | | | | | | | | | | | | | | | |
|---|---------------|---------------------|------------------|---------------|---------------------|------------------|---------------|-------------------|------------------|---------------|-----------------|------------------|---------------|-------------------|------------------|--|
| hours after surgery] | | | | | | | | | | | | | | | | |
| mobilisation [within 6 hours after surgery] | 0.32 | 0.09 -0.5 5 | 0.007 | 0.45 | 0.16 -0.7 4 | 0.002 | 0.69 | 0.41 -0.9 7 | <0.001 | 0.43 | 0.12 -0.74 | 0.007 | 0.46 | 0.14 -0.7 8 | 0.004 | |
| EQ total admission | -3.11 | -3.18 -- 3.03 | <0.001 | | | | | | | | | | | | | |
| EQVAS admission | | | | -0.03 | -0.03 -- 0.03 | <0.001 | | | | | | | | | | |
| HOOS KOOS admission | | | | | | | 0.04 | 0.04 -0.0 4 | <0.001 | | | | | | | |
| PROMIS fat admission | | | | | | | | | | 0.06 | 0.06 - 0.0 6 | <0.001 | | | | |
| PROMIS dep admission | | | | | | | | | | | | | 0.07 | 0.06 -0.0 7 | <0.001 | |
| Random Effects | | | | | | | | | | | | | | | | |
| σ^2 | 0.35 | | | 0.56 | | | 0.52 | | | 0.63 | | | 0.67 | | | |
| T00 | 0.00 hospital | | | 0.01 hospital | | | 0.02 hospital | | | 0.02 hospital | | | 0.01 hospital | | | |
| ICC | 0.01 | | | 0.01 | | | 0.03 | | | 0.03 | | | 0.01 | | | |
| N | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | | |
| Observations | 3,697 | | | 3,697 | | | 3,697 | | | 3,697 | | | 3,697 | | | |

Marginal R² / 0.646 / 0.650
 Conditional
 R²

0.437 / 0.443

0.461 / 0.477

0.342 / 0.362

0.318 / 0.326

Knee replacement patients

| Predictors | EQ total Z | | | EQ-VAS Z | | | KOOS Z | | | PROMIS fat Z | | | PROMIS dep Z | | |
|---|------------|-----------------|------------------|-----------|-----------------|------------------|-----------|---------------------|------------------|--------------|---------------------|------------------|--------------|---------------------|------------------|
| | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p |
| (Intercept) | 1.16 | 0.83 - 1.50 | <0.001 | 1.57 | 1.19 - 1.95 | <0.001 | -2.36 | -2.80 -- 1.93 | <0.001 | -3.52 | -3.97 -- 3.08 | <0.001 | -3.46 | -3.92 -- 2.99 | <0.001 |
| group [intervention] | 0.03 | -0.02 - 0.08 | 0.248 | 0.08 | 0.02 - 0.14 | 0.005 | 0.06 | -0.00 - 0.12 | 0.057 | 0.08 | 0.02 - 0.14 | 0.006 | 0.03 | -0.03 - 0.09 | 0.313 |
| gender [male] | 0.04 | -0.01 - 0.09 | 0.096 | 0.06 | 0.00 - 0.11 | 0.046 | 0.07 | 0.01 - 0.13 | 0.016 | 0.03 | -0.03 - 0.08 | 0.400 | 0.10 | 0.04 - 0.16 | 0.001 |
| age | 0.00 | 0.00 - 0.01 | 0.012 | -0.00 | -0.00 - 0.00 | 0.308 | 0.00 | 0.00 - 0.01 | 0.007 | 0.01 | 0.00 - 0.01 | <0.001 | 0.00 | -0.00 - 0.00 | 0.514 |
| mobilisation [within 12 hours after surgery] | 0.43 | 0.15 - 0.71 | 0.003 | 0.33 | 0.01 - 0.65 | 0.042 | 0.23 | -0.11 - 0.57 | 0.187 | 0.34 | 0.00 - 0.67 | 0.047 | 0.17 | -0.17 - 0.52 | 0.321 |
| mobilisation [within 24 hours after surgery] | 0.35 | 0.07 - 0.62 | 0.015 | 0.30 | -0.02 - 0.62 | 0.064 | 0.13 | -0.21 - 0.47 | 0.460 | 0.28 | -0.06 - 0.61 | 0.102 | 0.13 | -0.21 - 0.48 | 0.450 |
| mobilisation [within 48 hours after surgery] | 0.18 | -0.13 - 0.49 | 0.253 | 0.13 | -0.23 - 0.49 | 0.478 | 0.09 | -0.29 - 0.47 | 0.649 | 0.18 | -0.19 - 0.55 | 0.341 | -0.09 | -0.47 - 0.29 | 0.640 |

| | | | | | | | | | | | | | | | |
|--|---------------|----------------------|------------------|---------------|----------------------|------------------|---------------|-----------------|------------------|---------------|-----------------|------------------|---------------|-----------------|------------------|
| mobilisation [within 6 hours after surgery] | 0.41 | 0.13 - 0.69 | 0.004 | 0.35 | 0.03 - 0.67 | 0.031 | 0.28 | -0.06 - 0.63 | 0.105 | 0.32 | -0.01 - 0.65 | 0.057 | 0.17 | -0.17 - 0.51 | 0.335 |
| EQ total admission | -2.92 | -3.02 - - 2.82 | <0.001 | | | | | | | | | | | | |
| EQVAS admission | | | | -0.03 | -0.03 - - 0.03 | <0.001 | | | | | | | | | |
| HOOS KOOS admission | | | | | | | 0.04 | 0.04 - 0.04 | <0.001 | | | | | | |
| PROMIS fat admission | | | | | | | | | | 0.06 | 0.05 - 0.06 | <0.001 | | | |
| PROMIS dep admission | | | | | | | | | | | | | 0.06 | 0.06 - 0.07 | <0.001 |
| Random Effects | | | | | | | | | | | | | | | |
| σ^2 | 0.47 | | | 0.62 | | | 0.71 | | | 0.66 | | | 0.71 | | |
| T00 | 0.00 hospital | | | 0.00 hospital | | | 0.02 hospital | | | 0.02 hospital | | | 0.01 hospital | | |
| ICC | 0.01 | | | 0.01 | | | 0.03 | | | 0.03 | | | 0.01 | | |
| N | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | |
| Observations | 3,110 | | | 3,110 | | | 3,110 | | | 3,110 | | | 3,110 | | |
| Marginal R ² / Conditional R ² | 0.529 / 0.534 | | | 0.380 / 0.384 | | | 0.267 / 0.289 | | | 0.303 / 0.326 | | | 0.272 / 0.282 | | |

eTable 12. Mixed Effects Models With PROM-Score Change Z-Scores as Outcomes, Controlling for Gender, Age, Mobilization and Admission PROM Scores as Fixed Effects and Hospital as Random Intercept (Compliance Corrected Study Population)

Hip replacement patients

| Predictors | EQ total Z | | | EQ-VAS Z | | | HOOS Z | | | PROMIS fat Z | | | PROMIS dep Z | | |
|--|-----------------------|---------------------|------------------|-----------------------|----------------|------------------|-----------------------|---------------------|------------------|-----------------------|----------------|------------------|-----------------------|---------------------|------------------|
| | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p | Estimate _s | CI | p |
| (Intercept) | 1.78 | 1.51 -2.0 5 | <0.001 | 2.12 | 1.77 -2.46 | <0.001 | -2.12 | -2.47 -- 1.78 | <0.001 | -3.43 | -3.83 -3.02 | <0.001 | -3.76 | -4.18 -- 3.33 | <0.001 |
| group [intervention] | 0.03 | -0.01 -0.0 7 | 0.121 | 0.08 | 0.03 -0.13 | 0.002 | 0.05 | 0.00 -0.1 0 | 0.043 | 0.07 | 0.02 -0.13 | 0.007 | 0.07 | 0.02 -0.1 3 | 0.010 |
| gender [male] | 0.01 | -0.03 -0.0 5 | 0.575 | -0.02 | -0.07 -0.03 | 0.492 | 0.01 | -0.04 -0.0 6 | 0.808 | -0.06 | -0.11 -0.00 | 0.041 | 0.02 | -0.03 -0.0 8 | 0.399 |
| age | -0.00 | -0.01 -- 0.00 | <0.001 | -0.01 | -0.01 -0.01 | <0.001 | -0.01 | -0.01 -- 0.01 | <0.001 | 0.00 | -0.00 -0.00 | 0.133 | -0.00 | -0.00 -0.0 0 | 0.227 |
| mobilisation [within 12 hours after surgery] | 0.31 | 0.07 -0.5 5 | 0.012 | 0.39 | 0.08 -0.69 | 0.012 | 0.65 | 0.35 -0.9 4 | <0.001 | 0.44 | 0.12 -0.76 | 0.007 | 0.47 | 0.14 -0.8 0 | 0.005 |
| mobilisation [within 24 hours after surgery] | 0.25 | 0.01 -0.4 9 | 0.042 | 0.35 | 0.05 -0.65 | 0.023 | 0.56 | 0.27 -0.8 6 | <0.001 | 0.33 | 0.01 -0.66 | 0.043 | 0.39 | 0.06 -0.7 3 | 0.021 |
| mobilisation [within 48 hours after surgery] | 0.16 | -0.13 -0.4 4 | 0.277 | 0.26 | -0.10 -0.62 | 0.156 | 0.42 | 0.07 -0.7 7 | 0.017 | 0.28 | -0.11 -0.66 | 0.156 | 0.19 | -0.20 -0.5 8 | 0.338 |

| | | | | | | | | | | | | | | | |
|---|---------------|----------------------|------------------|---------------|----------------------|------------------|---------------|--------------------|------------------|---------------|-----------------|------------------|---------------|--------------------|------------------|
| hours after surgery] | | | | | | | | | | | | | | | |
| mobilisation [within 6 hours after surgery] | 0.33 | 0.10 - 0.5 7 | 0.006 | 0.45 | 0.15 - 0.75 | 0.003 | 0.71 | 0.41 - 1.0 0 | <0.001 | 0.43 | 0.11 - 0.75 | 0.009 | 0.46 | 0.13 - 0.7 9 | 0.006 |
| EQ total admission | -3.12 | -3.20 - - 3.04 | <0.001 | | | | | | | | | | | | |
| EQVAS admission | | | | -0.03 | - 0.03 - -0.03 | <0.001 | | | | | | | | | |
| HOOS KOOS admission | | | | | | | 0.04 | 0.04 - 0.0 4 | <0.001 | | | | | | |
| PROMIS fat admission | | | | | | | | | | 0.06 | 0.05 - 0.0 6 | <0.001 | | | |
| PROMIS dep admission | | | | | | | | | | | | | 0.07 | 0.06 - 0.0 7 | <0.001 |
| Random Effects | | | | | | | | | | | | | | | |
| σ^2 | 0.36 | | | 0.57 | | | 0.54 | | | 0.65 | | | 0.69 | | |
| T00 | 0.00 hospital | | | 0.01 hospital | | | 0.02 hospital | | | 0.02 hospital | | | 0.01 hospital | | |
| ICC | 0.01 | | | 0.01 | | | 0.03 | | | 0.03 | | | 0.01 | | |
| N | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | |
| Observations | 3,492 | | | 3,492 | | | 3,492 | | | 3,492 | | | 3,492 | | |

Marginal R² / Conditional R² 0.639 / 0.643 0.431 / 0.438 0.453 / 0.469 0.333 / 0.353 0.312 / 0.322

Knee replacement patients

| Predictors | EQ total Z | | | EQ-VAS Z | | | KOOS Z | | | PROMIS fat Z | | | PROMIS dep Z | | |
|---|------------|-----------------|------------------|-----------|-----------------|------------------|-----------|---------------------|------------------|--------------|---------------------|------------------|--------------|---------------------|------------------|
| | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p | Estimates | CI | p |
| (Intercept) | 1.16 | 0.83 - 1.50 | <0.001 | 1.57 | 1.19 - 1.95 | <0.001 | -2.36 | -2.80 -- 1.93 | <0.001 | -3.52 | -3.97 -- 3.08 | <0.001 | -3.46 | -3.92 -- 2.99 | <0.001 |
| group [intervention] | 0.03 | -0.02 - 0.08 | 0.248 | 0.08 | 0.02 - 0.14 | 0.005 | 0.06 | -0.00 - 0.12 | 0.057 | 0.08 | 0.02 - 0.14 | 0.006 | 0.03 | -0.03 - 0.09 | 0.313 |
| gender [male] | 0.04 | -0.01 - 0.09 | 0.096 | 0.06 | 0.00 - 0.11 | 0.046 | 0.07 | 0.01 - 0.13 | 0.016 | 0.03 | -0.03 - 0.08 | 0.400 | 0.10 | 0.04 - 0.16 | 0.001 |
| age | 0.00 | 0.00 - 0.01 | 0.012 | -0.00 | -0.00 - 0.00 | 0.308 | 0.00 | 0.00 - 0.01 | 0.007 | 0.01 | 0.00 - 0.01 | <0.001 | 0.00 | -0.00 - 0.00 | 0.514 |
| mobilisation [within 12 hours after surgery] | 0.43 | 0.15 - 0.71 | 0.003 | 0.33 | 0.01 - 0.65 | 0.042 | 0.23 | -0.11 - 0.57 | 0.187 | 0.34 | 0.00 - 0.67 | 0.047 | 0.17 | -0.17 - 0.52 | 0.321 |
| mobilisation [within 24 hours after surgery] | 0.35 | 0.07 - 0.62 | 0.015 | 0.30 | -0.02 - 0.62 | 0.064 | 0.13 | -0.21 - 0.47 | 0.460 | 0.28 | -0.06 - 0.61 | 0.102 | 0.13 | -0.21 - 0.48 | 0.450 |
| mobilisation [within 48 hours after surgery] | 0.18 | -0.13 - 0.49 | 0.253 | 0.13 | -0.23 - 0.49 | 0.478 | 0.09 | -0.29 - 0.47 | 0.649 | 0.18 | -0.19 - 0.55 | 0.341 | -0.09 | -0.47 - 0.29 | 0.640 |

| | | | | | | | | | | | | | | | |
|--|---------------|----------------------|------------------|---------------|----------------------|------------------|---------------|-----------------|------------------|---------------|-----------------|------------------|---------------|-----------------|------------------|
| mobilisation [within 6 hours after surgery] | 0.41 | 0.13 - 0.69 | 0.004 | 0.35 | 0.03 - 0.67 | 0.031 | 0.28 | -0.06 - 0.63 | 0.105 | 0.32 | -0.01 - 0.65 | 0.057 | 0.17 | -0.17 - 0.51 | 0.335 |
| EQ total admission | -2.92 | -3.02 - - 2.82 | <0.001 | | | | | | | | | | | | |
| EQVAS admission | | | | -0.03 | -0.03 - - 0.03 | <0.001 | | | | | | | | | |
| HOOS KOOS admission | | | | | | | 0.04 | 0.04 - 0.04 | <0.001 | | | | | | |
| PROMIS fat admission | | | | | | | | | | 0.06 | 0.05 - 0.06 | <0.001 | | | |
| PROMIS dep admission | | | | | | | | | | | | | 0.06 | 0.06 - 0.07 | <0.001 |
| Random Effects | | | | | | | | | | | | | | | |
| σ^2 | 0.47 | | | 0.62 | | | 0.71 | | | 0.66 | | | 0.71 | | |
| T00 | 0.00 hospital | | | 0.00 hospital | | | 0.02 hospital | | | 0.02 hospital | | | 0.01 hospital | | |
| ICC | 0.01 | | | 0.01 | | | 0.03 | | | 0.03 | | | 0.01 | | |
| N | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | | 9 hospital | | |
| Observations | 3,110 | | | 3,110 | | | 3,110 | | | 3,110 | | | 3,110 | | |
| Marginal R ² / Conditional R ² | 0.529 / 0.534 | | | 0.380 / 0.384 | | | 0.267 / 0.289 | | | 0.303 / 0.326 | | | 0.272 / 0.282 | | |