

# Appendix 1

Optimising the current model of care for knee osteoarthritis with the implementation of guideline recommended non-surgical treatments: a model-based health economic evaluation

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## Cost data detailed

### Costs non-surgical treatment

| <b>Table 1:</b> Calculation of costs related to non-surgical care. For both, guideline recommended non-surgical treatment (GNT) and current non-surgical treatment (CNT), clinical experts were contacted to make valuation assumptions. Costs described under successful non-surgical treatment reflect healthcare spending that occurs in the state when patients are successfully managed with non-surgical care and are therefore lower than the intervention costs which only are applied for one year. All costs are occurring in one year and are expressed in 2019 Swiss Francs (CH). |        |                |         |            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------|---------|------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Amount | Description    | TARMED  | Cost (CHF) |
| <b>Non-surgical treatment GNT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                |         |            |
| Physiotherapy (exercise and education)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4      | 1:1, Physio    | 7301    | 192        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 14     | Group, Physio  | 7330    | 350        |
| Dietician (weight loss)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1      | 1:1, Dietitian | 7821    | 99         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3      | 1:1, Dietitian | 7822    | 231        |
| Inlay                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1      | customized     | MiGel   | 211        |
| Painkiller                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1      |                |         | 30         |
| Physician (diagnosis, referral)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1      | First 5 min    | 00.0010 | 16         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 5      | Following time | 00.0020 | 80         |
| total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |                |         | 1209       |
| <b>Non-surgical treatment CNC</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |                |         |            |
| Painkiller                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1      |                |         | 30         |
| Physician (diagnosis, education)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2      |                | 00.0010 | 32         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 10     |                | 00.0020 | 160        |
| total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |                |         | 222        |
| <b>Successful non-surgical treatment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |                |         |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        | Assumption     |         | 200        |

## Costs surgical treatment

**Table 2:** Mean costs extracted from health-insurance claims for total knee replacement TKR and Revision surgery. TKR is reimbursed by DRG code I43C, Revision surgery which can occur because of different reasons, is reimbursed by codes I04A, I04B, I43A, I43B. All costs expressed in 2019 Swiss Francs.

|                            | Source                      | DRG Code                 | Cost (CHF) | SD   |
|----------------------------|-----------------------------|--------------------------|------------|------|
| <b>TKR Surgery</b>         |                             |                          |            |      |
|                            | Health insurance claims     | I43C (TKR)               | 18326      | 1606 |
|                            | Health insurance claims     | I43C (TKR)               | 18137      | 1258 |
| <b>Revision surgery</b>    |                             |                          |            |      |
|                            | Health insurance claims     | (I04A, I04B, I43A, I43B) | 28776      | 6436 |
| <b>Successful TKR</b>      |                             |                          |            |      |
|                            | Assumptions, expert opinion |                          | 500        |      |
| <b>Successful revision</b> |                             |                          |            |      |
|                            | Assumptions, expert opinion |                          | 500        |      |

Legend: I43C = Implantation of an endoprosthesis of the knee joint; I04A = Revision or replacement of the knee joint with complicating diagnosis or arthrodesis and certain prosthesis replacement; I04B = Implantation of an endoprosthesis of the knee joint with certain prosthesis exchange

## Transition probabilities detailed

**Table 3:** Data used for the calculation of the transition probabilities from "successful non-surgical treatment" to "TKR surgery" state. The population data was retrieved from Swiss Federal office of Statistics. The age-specific prevalence to develop symptomatic knee osteoarthritis was retrieved from Cross et al. (2014) using data from the global burden of disease study. The Swiss Implant Registry was used to establish the amount of total knee replacements and revision risks.

| 2019                                        | f      | M      | 40-44  | f      | m      | 45-54   | f      | m      | 55-64   | f      | m      | 65-74  | f      | m      | 75-84  | f      | m     | 85+    |
|---------------------------------------------|--------|--------|--------|--------|--------|---------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|-------|--------|
| <b>Population CH 40+</b><br><sub>1</sub>    | 292439 | 295717 | 588156 | 632270 | 640716 | 1272986 | 571378 | 575989 | 1147367 | 433165 | 397538 | 830703 | 304273 | 241667 | 545940 | 150358 | 78799 | 229157 |
| <b>Prevalence KOA</b><br><sub>2</sub>       | 0.032  | 0.019  |        | 0.120  | 0.071  |         | 0.158  | 0.093  |         | 0.171  | 0.100  |        | 0.177  | 0.104  |        | 0.179  | 0.106 |        |
| <b>Population with KOA</b><br>Estimation    | 9358   | 5697   | 15056  | 75872  | 45427  | 121299  | 89992  | 53394  | 143386  | 74028  | 39873  | 113901 | 53917  | 25206  | 79123  | 26944  | 8384  | 35238  |
| <b>Number of TKR</b><br><sub>3</sub>        |        |        | 62     |        |        | 923     |        |        | 3568    |        |        | 5551   |        |        | 4506   |        |       | 784    |
| <b>Proportion TKR</b><br>Estimation         |        |        | 0.004  |        |        | 0.008   |        |        | 0.025   |        |        | 0.049  |        |        | 0.057  |        |       | 0.022  |
| <b>Annual Revision Risk</b><br><sub>3</sub> |        |        | 0.02   |        |        | 0.0287  |        |        | 0.0203  |        |        | 0.013  |        |        | 0.0074 |        |       | 0.004  |

# Age-specific mortality 2019 Switzerland

**Table 4:** Age-specific mortality for 2019 calculated from data available from the Swiss Federal Statistics Office

| Age | Deaths | Population | Mortality rate |
|-----|--------|------------|----------------|
| 30  | 44     | 120951     | 0.000364       |
| 31  | 41     | 123719     | 0.000331       |
| 32  | 39     | 121483     | 0.000321       |
| 33  | 41     | 122975     | 0.000333       |
| 34  | 39     | 122953     | 0.000317       |
| 35  | 51     | 123350     | 0.000413       |
| 36  | 51     | 122415     | 0.000417       |
| 37  | 77     | 124532     | 0.000618       |
| 38  | 69     | 123430     | 0.000559       |
| 39  | 80     | 123368     | 0.000648       |
| 40  | 52     | 119672     | 0.000435       |
| 41  | 73     | 118212     | 0.000618       |
| 42  | 84     | 117660     | 0.000714       |
| 43  | 94     | 116625     | 0.000806       |
| 44  | 95     | 115987     | 0.000819       |
| 45  | 114    | 118170     | 0.000965       |
| 46  | 130    | 118579     | 0.001096       |
| 47  | 130    | 121751     | 0.001068       |
| 48  | 177    | 125213     | 0.001414       |
| 49  | 185    | 126456     | 0.001463       |
| 50  | 190    | 129488     | 0.001467       |
| 51  | 225    | 131768     | 0.001708       |
| 52  | 293    | 132580     | 0.00221        |
| 53  | 299    | 134647     | 0.002221       |
| 54  | 305    | 134334     | 0.00227        |
| 55  | 349    | 135976     | 0.002567       |
| 56  | 423    | 131156     | 0.003225       |
| 57  | 390    | 125675     | 0.003103       |
| 58  | 447    | 120627     | 0.003706       |
| 59  | 446    | 116586     | 0.003826       |
| 60  | 496    | 111966     | 0.00443        |
| 61  | 519    | 106920     | 0.004854       |
| 62  | 585    | 103644     | 0.005644       |
| 63  | 624    | 99887      | 0.006247       |
| 64  | 686    | 94930      | 0.007226       |
| 65  | 722    | 90810      | 0.007951       |
| 66  | 689    | 87083      | 0.007912       |
| 67  | 771    | 86127      | 0.008952       |
| 68  | 866    | 82416      | 0.010508       |
| 69  | 850    | 84176      | 0.010098       |
| 70  | 1044   | 82159      | 0.012707       |
| 71  | 1096   | 82424      | 0.013297       |
| 72  | 1243   | 80621      | 0.015418       |
| 73  | 1303   | 79524      | 0.016385       |

|     |      |       |          |
|-----|------|-------|----------|
| 74  | 1498 | 75363 | 0.019877 |
| 75  | 1510 | 73162 | 0.020639 |
| 76  | 1726 | 69497 | 0.024836 |
| 77  | 1659 | 65330 | 0.025394 |
| 78  | 1917 | 59792 | 0.032061 |
| 79  | 1830 | 53646 | 0.034113 |
| 80  | 1965 | 51003 | 0.038527 |
| 81  | 2142 | 47790 | 0.044821 |
| 82  | 2285 | 44240 | 0.05165  |
| 83  | 2366 | 41987 | 0.056351 |
| 84  | 2625 | 39493 | 0.066467 |
| 85  | 2999 | 36129 | 0.083008 |
| 86  | 3065 | 32378 | 0.094663 |
| 87  | 3198 | 29277 | 0.109233 |
| 88  | 3221 | 25685 | 0.125404 |
| 89  | 3225 | 22809 | 0.141392 |
| 90  | 3273 | 18845 | 0.17368  |
| 91  | 3082 | 15694 | 0.196381 |
| 92  | 2935 | 12470 | 0.235365 |
| 93  | 2501 | 10071 | 0.248337 |
| 94  | 2276 | 7805  | 0.291608 |
| 95  | 1944 | 5934  | 0.327604 |
| 96  | 1607 | 4249  | 0.378207 |
| 97  | 1234 | 2860  | 0.431469 |
| 98  | 863  | 2073  | 0.416305 |
| 99  | 727  | 1232  | 0.590097 |
| 100 | 476  | 1646  | 0.289186 |

## Age-specific annual revision risk

**Table 5:** Annual revision probabilities after total knee replacement according to age groups over a follow-up period of 8 years. The table shows that in the first two years after total knee replacement risk for revision surgery is higher when compared to the years after. In general, revision probability is higher in younger age groups. Data from the Swiss Implant Registry (SIRIS)

| Annual revision probability<br>(years after total knee replacement) | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | Ø    |
|---------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|
| <45                                                                 | 2.4 | 3.3 | 1.8 | 2.6 | 1.4 | 2.1 | 2.1 | 1.1 | 2.1  |
| 45-54                                                               | 2.4 | 3.4 | 2.1 | 1.1 | 1   | 1.1 | 0.3 | 1.1 | 1.56 |
| 55-64                                                               | 1.9 | 2.6 | 1.4 | 0.9 | 0.7 | 0.8 | 0.6 | 0.4 | 1.16 |
| 65-74                                                               | 1.4 | 1.7 | 0.9 | 0.7 | 0.6 | 0.4 | 0.4 | 0.4 | 0.81 |
| 75-84                                                               | 1.3 | 1.2 | 0.6 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.53 |
| 85+                                                                 | 1.3 | 0.4 | 0.4 | 0   | 0.2 | 0.2 | 0   | 0.3 | 0.35 |

## References

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