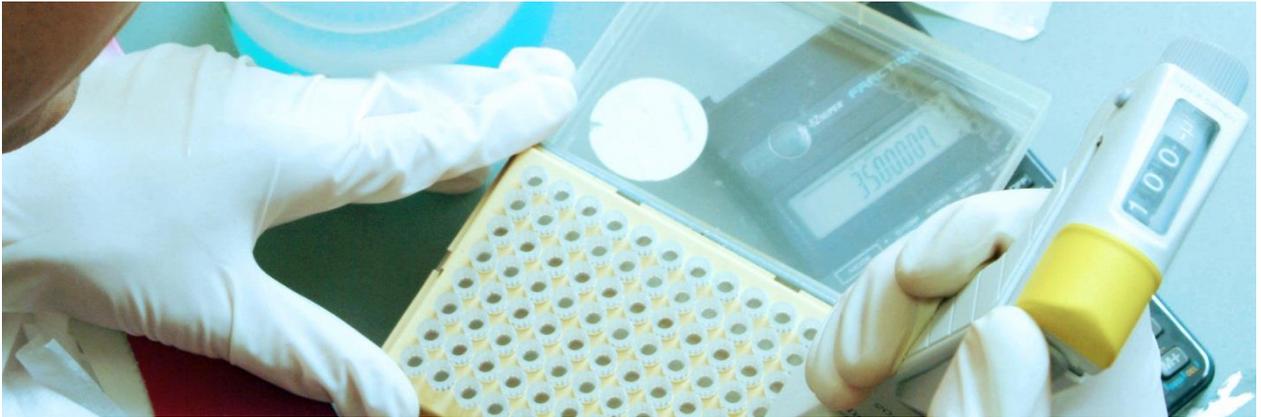


# Assessment of knee arthroscopy for the treatment of degenerative changes



## Scope

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# 1 Background

In the context of the Health Technology Assessment (HTA)-program of the federation, services provided by the compulsory sickness insurance are being re-evaluated. One of the topics chosen in 2015 is the arthroscopy of the knee based on the Swiss Health Observatory (Obsan) report No. 42 “Variations géographiques dans les soins de santé. La situation en Suisse”, which reported an increase of inpatient knee arthroscopies with an increase of the rate of knee arthroscopies of 20% per 100'000 inhabitants between 2005 and 2011.<sup>1</sup> According to the report the rates of inpatient arthroscopies differed markedly between cantons (by a factor of 3.4 between the 10<sup>th</sup> (standardized rate of 121 per 100'000 inhabitants) and 90<sup>th</sup> percentile (standardized rate of 415.6 per 100'000 inhabitants)).<sup>1</sup> In addition the proportion of inpatient and outpatient arthroscopies varied strongly between cantons (16% to 75%, corresponding to the 10 and 90 percentile respectively), raising questions regarding the appropriate use and the benefit of knee arthroscopies.<sup>1</sup>

During a pilot study first data on existing evidence syntheses regarding the clinical effectiveness and costs of knee arthroscopies were sought. In addition, Swiss data on the use of knee arthroscopy independently of the indication were analysed. Table 1 illustrates the main results concerning the most frequent diagnoses:

**Table 1: Main ICD-10 diagnoses for knee/meniscus derangement in 2014.**

<b>ICD-10 Code</b>	<b>Description</b>	<b>Main D</b>	<b>% Accident</b>	<b>1. SD</b>	<b>2. SD</b>	<b>3. SD</b>	<b>Total</b>
<b>M23.2</b>	Derange-ment of meniscus due to old tear or injury	5'683	28.8	2'221	897	343	9'173
<b>M23.3</b>	Other meniscus derangements	7'745	16.4	3'202	1'148	459	12'570
<b>M23.8</b>	Other internal derangements of knee	822	50.9	1'093	719	315	3'000
<b>M23.9</b>	Internal derange-ment of knee, unspecified	85	35.3	163	99	36	418
<b>S83.2</b>	Tear of meniscus, current injury	4'755	69.9	2'703	365	88	7'911
<b>Total</b>	Derange-ment or tear of meniscus	19'090	34.0	9382	3228	1241	33'072

Note: D = Diagnosis, SD = secondary diagnosis

Since many patients received contemporarily more than one single, relevant diagnosis (e.g. 2 different M23.2 codes like “M23.21 - Derangement of anterior horn of medial meniscus due to old tear or injury” and “M23.22 - Derangement of posterior horn of medial meniscus due to old tear or injury”), the total number of ICD-10 codes (N=33'072) does not directly reflect the total number of hospitalized patients.

To reduce multiple counting additional analyses were performed. Overall, we estimated that about 25'000 patients were hospitalized in 2014 with a diagnosis of knee/ meniscus derangement or meniscus tear. Depending on the costs and effects of the treatments, such a large number of patients might have a high budget impact on the Swiss healthcare system.

Based on the results of the pilot study and discussion of the results together with a clinical expert the Swiss Federal Office of Public Health (SFOPH) tasked the Swiss Medical Board with the assessment of the clinical effectiveness and cost-effectiveness (Wirksamkeit und Wirtschaftlichkeit) of arthroscopic interventions in patients with degenerative changes of the menisci and to update the report of the German IQWiG (Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen) on the arthroscopic treatment of osteoarthritis (OA) of the knee from March 2014.<sup>2</sup>

## 1.1 Aims according to the SFOPH

According to the Swiss Federal Office of Public Health (SFOPH), the aim of the assessments is to provide an evidence base for discussion with the Medical Societies regarding the benefit, harm and cost-effectiveness of the obligatory insurance for arthroscopic (partial) meniscectomy and associated minor arthroscopic interventions for degenerative changes in the knee joint and – if possible – also provide an evidence base regarding the appropriate setting (i.e. inpatient vs. outpatient).

## 1.2 Questions by the SFOPH

- a. What is the evidence base regarding clinical effectiveness, safety, and efficacy of an arthroscopic (partial) resection of the meniscus (with or without synovectomy and/or debridement of the cartilage) in patients whose symptoms are primarily due to degenerative changes of the meniscus?
- b. What is the evidence base regarding inpatient and outpatient knee arthroscopy (clinical effectiveness and cost-effectiveness) in this population?
- c. What is the evidence base regarding clinical effectiveness and safety of the therapeutic knee arthroscopy (including debridement, synovectomy...) for patients who suffer mainly from with primary or secondary osteoarthritis (OA) and is any new evidence available since the IQWiG report from 2014?<sup>2</sup>

Both the clinical effectiveness and cost-effectiveness shall be assessed for question a and b. For question c only the clinical effectiveness will be assessed. An assessment of the ethical and legal aspects is not planned for any of the three questions.

## 2 General points

Although it was intended to focus on patients whose symptoms are primarily due to degenerative changes of the meniscus, based on the discussion in the IQWiG report<sup>2</sup> and the discussion with clinical experts it seems that the symptoms that are due to degenerative changes of the meniscus and those that are due to OA of the knee cannot be clearly distinguished.

The clinical effectiveness of arthroscopic interventions in the knee for OA has been recently assessed by the IQWiG report and hence the main interest of the SFOPH regards the question whether the evidence for these interventions in the case of degenerative meniscal changes is any different. In order to take into account the difficulty of separating those two pathologies and the main interest of the SFOPH it was decided to first pool the data from both populations – the advantage being that studies in mixed populations can also be taken into consideration.

During the scoping process, which involved a review process with clinical experts and a stakeholder consultation, the original questions by the SFOPH were transformed into specific research questions, specifying populations (P), interventions (I), comparators (C) and outcomes (O) of interest.

Hence it was decided to assess first the clinical effectiveness and safety of knee arthroscopy in patients with degenerative changes of the knee in general (i.e. including both patients with mainly meniscal symptoms, those with symptoms mainly due to OA of the knee and those with mixed changes or studies with mixed populations) (PICO 1).

The second PICO question will focus on those patients with symptoms that are being mainly attributed to degenerative meniscal damage (PICO 2). The third PICO question will assess whether there is evidence for differences in effects depending on whether knee arthroscopy is being performed in an inpatient or outpatient setting for patients with symptoms mainly attributed to degenerative meniscal changes (PICO 3). For PICO 2 and 3 an economic assessment will be performed.

The evaluation of the quality of the evidence regarding the clinical effectiveness will be done according to GRADE.

## 3 PICO Question 1 and 2

PICO 2 will have the same inclusion and exclusion criteria as PICO 1 apart from the study population, which will only include patients with clinical symptoms that are primarily due to degenerative changes of the menisci. In a first step, potential differences in effects for this population compared to patients with mainly OA of the knee will be assessed in subgroup analyses of PICO 1. If relevant differences between the two populations are being found, then further analyses will be performed separately for PICO 1 and PICO 2.

### 3.1 PICO 1

#### 3.1.1 Population

Patients with symptoms with degenerative changes of the knee – irrespective of whether they are primarily due to meniscal damage, OA of the knee or a mix of both (see also section 3.2.1 for the definition of the different population subgroups)

#### 3.1.2 Intervention

Therapeutic knee arthroscopy (see also section 3.2.2)

#### 3.1.3 Comparators

Placebo, no treatment, conservative treatment or any other surgical treatment (see also section 3.2.3)

#### 3.1.4 Outcomes

Health outcomes like mortality, morbidity, or quality of life and safety outcomes like adverse events and serious adverse events (see section 3.2.4)

#### 3.1.5 Study designs

Randomized controlled trials (RCTs) and quasi-randomized trials (see section 3.3)

## 3.2 Inclusion and exclusion criteria for PICO-Question 1 (and 2)

### 3.2.1 Population

Patients with symptoms due to degenerative changes of the knee joint – irrespective of whether they are primarily due to meniscal damage, OA of the knee or a mix of both.

Studies on patients with symptoms mainly due to OA of the knee will be identified based on the criteria used in the IQWiG report namely: The diagnosis of OA of the knee should have been made based on the diagnostic criteria of the American College of Rheumatism (ACR).<sup>3</sup> Alternatively other similar definitions of OA of the knee can have been used as long as they are based on the classic criteria of arthrosis (knee pain, morning stiffness less than 30 minutes, crepitus on active motion, and/or osteophytes).

Not included are studies with patients whose pre-operative symptoms or intraoperative findings show that serious, primarily non-arthrotic changes in the knee (e.g. traumatic meniscal tears, free joint bodies) dominate the symptomatology. This seemed to be particularly likely in the case of a mechanical impairment (e.g. a locked knee).<sup>2</sup>

The definition for patients with symptoms due to meniscal degenerative changes will be based on the definition given by the authors of eligible RCTs.

Studies on patients with traumatic injuries to other structures of the knee that tend to be associated with significant trauma to the meniscus or cartilage (e.g. tears of the cruciate ligaments) will not be considered in the assessment.

Any studies that cannot be clearly classified will be considered to contain a mixed population.

### 3.2.2 Intervention

Relevant interventions are arthroscopic interventions at the knee that include one or more procedure related to debridement, synovectomy, or lavage as well as interventions at the synovia, the cartilage of the joint and the menisci.

### 3.2.3 Comparator

- a) No active treatment like:
  - No therapeutic intervention
  - Sham arthroscopy
  - Diagnostic arthroscopy
- b) Active treatment like:
  - Lavage (without arthroscopy)
  - Non-surgical treatment (drug treatment and treatment without drugs, e.g. physiotherapy, acupuncture...)

- Surgical treatment, not included in the application to the IQWiG (open surgical or arthroscopic).

### 3.2.4 Outcomes

#### Critical outcomes:

1. Pain
2. Function
3. Global assessment (e.g. WOMAC (Western Ontario and McMaster Universities Arthritis Index)<sup>4</sup> or KOOS (Knee Injury and Osteoarthritis Outcome Score), combined with joint stiffness, physical function)<sup>5</sup>

#### Important outcomes:

1. Joint stiffness
2. Time to total knee replacement
3. Health related quality of life
4. Adverse events (excluding type of adverse event)
5. Serious adverse events (including type serious adverse event e.g. mortality)

Subjective outcomes (e.g. health related quality of life) will only be considered, if they had been assessed with valid measurement instruments (e.g. validated scales).

The importance of outcomes is described according to GRADE, which differentiates critical, important, and not so important outcomes. The latter are deemed not relevant for decision making and are therefore not covered in the evidence synthesis, while critical outcomes have a major impact on decision making and the quality of the evidence available for these outcomes is the basis for judging the overall quality of the evidence for a clinical question.

The relevant time points will be defined depending on the available evidence.

## 3.3 Study design

The effectiveness of knee arthroscopy is going to be assessed based on randomised controlled trials as these type of studies tend to minimize bias compared to observational studies.<sup>6</sup>

## 3.4 Subgroup analyses

Patients with symptoms mainly due to meniscal degeneration vs. patients with symptoms mainly due to OA of the knee vs. mixed population

Type of the arthroscopic intervention (e.g. debridement, partial meniscectomy)

Type of treatment in the control group

Inpatient vs. outpatient arthroscopy

Gender

Age

Disease (severity, primary or secondary OA), e.g. severity of osteoarthritis at baseline

For the evaluation of PICO-question 2 subgroup analyses will be performed to assess whether the effects differ between the three populations (meniscal damage, OA of the knee, mixed population) and explain potential heterogeneity. If no relevant difference between the three subgroups is being identified any other subgroup analyses will only be performed for the PICO 1 population.

Further sub-group analyses will only be performed if at least 5 studies are available per subgroup analysis.

## 4 PICO Question 3

### 4.1 PICO 3

#### 4.1.1 Population

Patients with degenerative disease of the knee as defined in section 4.2.1.

#### 4.1.2 Intervention

Inpatient arthroscopic intervention (see section 4.2.2)

#### 4.1.3 Comparator

Outpatient arthroscopic intervention (see section 4.2.2)

#### 4.1.4 Outcomes

Health outcomes like mortality, morbidity or quality of life and safety outcomes like adverse events and serious adverse events are the same as defined in section 3.2.4. for PICO 1 and 2.

The relevant time points will be depending on the available evidence.

#### 4.1.5 Study designs

Randomized controlled trials (RCTs) and quasi-randomized trials (see section 3.3)

## 4.2 Additional inclusion criteria PICO 3

### 4.2.1 Population

The definitive relevant population for PICO 3 will depend on the results of the subgroup analyses for the population in PICO 1 and 2. If no statistically significant difference between the subgroups is found, studies on inpatient vs. outpatient arthroscopy will be analysed for both populations together, i.e. Patients with symptoms due to degenerative changes of the knee joint – irrespective of whether they are primarily due to meniscal damage, OA of the knee or a mix of both.

If a difference is found in the subgroup analyses for the populations of PICO 1 and 2 then PICO 3 will focus only on patients with symptoms that are mainly due to meniscal degeneration (i.e. same population as for PICO 2) as this is the most frequent indication identified in Switzerland.

#### **4.2.2 Intervention and comparator**

The exact type of arthroscopic treatment to be considered will depend on the relevant population (see 4.2.1) but will always entail the comparison of the treatment effects depending on the setting (inpatient or outpatient) where the arthroscopies are being performed.

In case if both populations will be examined together (from PICO 1 +2), the following arthroscopic interventions at the knee are relevant: one or more procedure related to debridement, synovectomy, or lavage as well as interventions at the synovia, the cartilage of the joint and the menisci. The intervention performed in an inpatient setting will need to be compared to the same intervention being performed in an outpatient setting.

In case only patients with symptoms mainly due to meniscal degeneration will be examined (PICO 2 only) the relevant arthroscopic treatment will consist of inpatient arthroscopic (partial) meniscectomy whereas the comparator will consist of outpatient arthroscopic (partial) meniscectomy. The treatment may include other procedures related to debridement, synovectomy, or lavage as well as interventions at the synovia, the cartilage of the joint and the menisci in addition to the arthroscopic (partial) meniscectomy.

### **4.3 Subgroup analyses**

If feasible the following subgroups will be considered:

Type of the arthroscopic intervention (debridement, partial meniscectomy)

Type of treatment in the control group

Gender

Age

Disease (severity, primary or secondary OA) , e.g. severity of osteoarthritis at baseline

## 5 Cost-effectiveness and budget impact analysis

### 5.1 Study aims

The aims of the health economic analysis are to assess the cost-effectiveness and the budget impact of meniscectomy in Switzerland for the treatment of chronic knee problems.

In order to have a better idea of the magnitude of these interventions in Switzerland, a preliminary analysis using the Hospital Statistics provided by the Swiss Federal Statistical Office has been conducted as part of a pilot project. A part of the analyses conducted in the pilot study is presented in the background chapter of this scoping. This economic section will provide additional information concerning patient classification (DRG codes) and arthroscopic treatments (CHOP codes).

Moreover, to evaluate the cost-effectiveness of meniscectomy in the available literature, a preliminary search on health economic analyses has been conducted in PubMed and in the Cochrane library. The methods and findings are described in chapters 5.2 and 5.3.

On this base, the scope and planned approach for the health economic part of the main study commissioned by the Swiss Federal Office of Public Health has been developed and is described in chapter 5.4.

### 5.2 Methods of preliminary analysis

#### 5.2.1 Preliminary analysis of the Swiss Hospital Statistics

The Hospital Statistics provided by the Swiss Federal Statistical Office was briefly analysed to roughly assess the magnitude of meniscectomy in Switzerland. The analysed dataset included all patients that were hospitalized in a Swiss hospital in 2014 (N=1.4 Mio.).

Relevant patients were identified through following ICD-10 codes:

M23.2	Derangement of meniscus due to old tear or injury
M23.3	Other meniscus derangements
M23.8	Other internal derangements of knee
M23.9	Internal derangement of knee, unspecified
S83.2	Tear of meniscus, current injury

The analysis included the main diagnosis as well as the secondary diagnoses. For the main diagnosis, the percentage of patients hospitalized for an accident is reported.

The Hospital Statistics also contains information about the patient classification (diagnosis-related group, DRG) as well as data concerning the main and secondary arthroscopic treatments

(CHOP codes). Relationships between DRG codes and diagnoses (i.e. ICD-10 codes) as well as arthroscopic treatments (i.e. CHOP codes) will be investigated.

## 5.2.2 Preliminary literature search

Several clinical and economic search terms were combined to identify potentially relevant publications. Table 2 illustrates the search process used in PubMed.

**Table 2: Search strategy development in PubMed (28.11.2016)**

<b>Search term(s)</b>	<b>Hits</b>
Meniscus	7988
Meniscectomy	2380
Meniscectomy OR meniscal resection	2525
(Meniscectomy OR meniscal resection) AND (cost OR costs)	58
(Meniscectomy OR meniscal resection OR meniscus debridement) AND (cost OR costs OR cost-effectiveness OR cost-benefit OR budget impact)	59
(Meniscectomy OR meniscal resection OR meniscus debridement) AND (cost OR costs OR cost-effectiveness OR cost-benefit OR budget impact) – Published in the last five years	18

A similar search was developed for the Cochrane library, leading to 29 potentially relevant articles.

Since the number of articles published in the last 5 years was limited, the screening for relevant titles was extended to all search results.

## 5.3 Results of preliminary analysis

### 5.3.1 Preliminary analysis of the Swiss Hospital Statistics

The preliminary analyses of the ICD-10 diagnoses for knee/meniscus derangement conducted during the pilot study are already reported in the background. As already mentioned, this project will focus on chronic knee problems. Therefore, cases that are reimbursed by the accident insurance will be excluded from the analyses. Similarly, the cases identified through the ICD-10 code 83.2 suggesting an acute injury-related hospitalisation will not be of primary interest. (nearly 70% of them are officially reimbursed by the accident insurance).

The analysis of the DRG codes showed that in 2014 there were 22'665 hospitalizations mainly due to a knee-related problem (Table 3). The analysis of the DRG codes regarding the selected M23 and S83 ICD-10 codes suggests that only two DRG codes seem to be strictly related to a M23 or S83 ICD-10 diagnosis (I18B and I30Z). The fact that the number of diagnoses is greater than the number reported in the DRG codes can be explained with the fact that a single hospitalization (DRG code) can receive at the same time multiple diagnoses.

**Table 3: DRG vs. M23 and S83 ICD-10 codes in 2014**

<b>DRG Code</b>	<b>Description</b>	<b>N</b>	<b>M23 or S83 ICD-10 codes*</b>
<b>I04Z</b>	Revision or replacement of the knee with complicating diagnose or arthrodesis	157	1
<b>I12B</b>	Infection/Inflammation of Bone and Joint W Misc Musculoskeletal Procs W Sev or Mod CC	514	21
<b>I18A</b>	Arthroscopy, incl. Biopsy or other interventions on bone or joints, age < 16 years	291	143
<b>I18B</b>	Arthroscopy, incl. Biopsy or other interventions on bone or joints, age > 15 years	11'361	12'172
<b>I30Z</b>	Complex knee interventions	7'796	12'984
<b>I59Z</b>	Other interventions on Humerus, Tibia, Fibula, ankle joint or relatively complex interventions on knee joint, elbow joint and forearm	2'546	5
<b>Total</b>		<b>22'665</b>	<b>25'326</b>

\* the codes include the main diagnosis and up to three secondary diagnoses

Table 4 summarizes the number of knee-related arthroscopic interventions performed in 2014. The seven most frequent CHOP codes (Z80.16.11, Z80.26.10, Z80.6X.10, Z80.76.10, Z80.86.10, Z81.47.22, Z81.47.24) represents 94.5% of the knee-related interventions. In particular, it should be noticed that there were more than 22'000 partial meniscectomies, almost 9'000 arthroscopic synovectomies, and nearly 8'200 arthroscopic smoothing of the cartilage.

As for the diagnoses, the number of interventions is higher than the number of DRG codes (i.e. 51'134 vs. 22'665). Rationale behind these numbers is the fact that a single patient with a knee problem often receives a treatment combination (e.g. an arthroscopic meniscectomy with a synovectomy).

**Table 4: Analysis of the CHOP codes for 2014.**

<b>CHOP Code</b>	<b>Description</b>	<b>Main D</b>	<b>% Accident</b>	<b>1. SD</b>	<b>2. SD</b>	<b>3. SD</b>	<b>Total</b>
<b>Z80.16.10</b>	Arthroskopisch Arthrotomie des Kniegelenk, Gelenkspülung mit Drainage ↯	209	21.5	210	156	99	696
<b>Z80.16.11</b>	Arthroskopisch Arthrotomie des Kniegelenk, Entfernung frei Gelenk-körper ↯	331	35.6	509	438	203	1'517
<b>Z80.16.12</b>	Arthroskopisch Arthrotomie des Kniegelenk, Einlegen oder Entfernen eines Medikamentträger	0	0.0	1	0	0	1
<b>Z80.26.00</b>	Arthroskopie des Knie, n.n.bez.	132	25.8	21	4	2	185
<b>Z80.26.10</b>	Arthroskopie des Knie - diagnostisch	217	40.1	501	219	90	1'067
<b>Z80.26.20</b>	Arthroskopisch assistiert Versorgung einer Fraktur am Kniegelenk↯	17	70.6	49	28	10	175
<b>Z80.26.99</b>	Arthroskopie des Knie, sonstige	35	20.0	255	117	45	472
<b>Z80.36.20</b>	Arthroskopisch Gelenkbiopsie am Knie	140	12.9	146	109	58	466
<b>Z80.6X.10</b>	Arthroskopisch, partiell ↯ Meniskektomie am Knie	17'409	32.7	3'097	1'119	355	22'013

<b>Z80.6X.11</b>	Arthroskopisch, total $\neg$ Meniskektomie am Knie	125	35.2	42	10	4	216
<b>Z80.76.10</b>	Arthroskopisch Synovektomie am Kniegelenk	1'135	26.2	4'790	2'324	716	8'991
<b>Z80.86.10</b>	Arthroskopisch lokal Exzision oder Destruktion am Kniegelenk	767	43.5	1'740	1'034	506	4'091
<b>Z80.96.10</b>	Arthroskopisch Exzision am Kniegelenk	51	39.2	104	58	32	284
<b>Z80.96.20</b>	Arthroskopisch $\neg$ Entnahme eines Knorpeltransplantat am Kniegelenk	21	57.1	26	12	8	124
<b>Z81.47.11</b>	Arthroskopisch $\neg$ Refixation eines osteocondral Fragment am Kniegelenk	28	35.7	10	7	4	85
<b>Z81.47.13</b>	Arthroskopisch $\neg$ Subchondral Spongiosaplastik am Kniegelenk	5	40.0	9	11	2	67
<b>Z81.47.18</b>	Arthroskopisch $\neg$ Knorpeltransplantation und Implantation von in-vitro hergestellten Gewebekultur am Kniegelenk	4	25.0	5	1	1	36
<b>Z81.47.22</b>	Arthroskopisch $\neg$ Knorpelglättung am Kniegelenk	1'029	26.8	4'587	2'063	509	8'215
<b>Z81.47.24</b>	Arthroskopisch $\neg$ Subchondral Knocheneröffnung am Kniegelenk	363	32.2	670	541	270	1'876
<b>Z81.47.25</b>	Arthroskopisch $\neg$ Subchondral Knocheneröffnung am Kniegelenk mit Einbringen eines azellulär Implantat	29	24.1	26	15	7	101

<b>Z81.47.51</b>	Arthroskopisch $\neg$ Knorpeltransplantation mit OATS (osteoarticular transfer system)-Verfahren, Mosaikplastik am Kniegelenk	7	57.1	5	2	5	76
<b>Z81.47.90</b>	Arthroskopisch $\neg$ Sonstige Rekonstruktion am Kniegelenk	11	18.2	11	13	14	67
<b>Z81.99.1A</b>	Arthroskopisch Revision eines Gelenk, Kniegelenk	8	62.5	12	17	8	108
<b>Z81.99.3A</b>	Arthroskopisch Operation am Gelenkknorpel und an den Meniskus, Kniegelenk	25	40.0	33	13	12	123
<b>Z81.99.82</b>	Arthroskopisch Operationen an Gelenk und Gelenkstruktur, Kniegelenk $\neg$ Sonstige	18	16.7	21	21	7	84
<b>Total</b>		<b>22'116</b>	<b>32.4</b>	<b>16'880</b>	<b>8'332</b>	<b>2'967</b>	<b>51'134</b>

The analysis of DRG codes regarding the selected CHOP codes showed that 81.4% of the patients hospitalized for a knee problem received an arthroscopic knee intervention.

Table 5: DRG vs. CHOP codes in 2014

<b>DRG Code</b>	<b>Description</b>	<b>N</b>	<b>CHOP codes*</b>
<b>I04Z</b>	Revision or replacement of the knee with complicating diagnose or arthrodesis	157	18
<b>I12B</b>	Infection/Inflammation of Bone and Joint W Misc Musculoskeletal Procs W Sev or Mod CC	514	313
<b>I18A</b>	Arthroscopy, incl. Biopsy or other interventions on bone or joints, age < 16 years	291	206
<b>I18B</b>	Arthroscopy, incl. Biopsy or other interventions on bone or joints, age > 15 years	11'361	13'192
<b>I30Z</b>	Complex knee interventions	7'796	4'724

<b>I59Z</b>	Other interventions on Humerus, Tibia, Fibula, ankle joint or relatively complex interventions on knee joint, elbow joint and forearm	2'546	2
<b>Total</b>		<b>22'665</b>	<b>18'455</b>
* the CHOP codes include the main arthroscopic intervention and up to three secondary arthroscopic intervention			

### 5.3.2 Preliminary literature search

The results of the preliminary search are reported below. In short, the identified studies have discordant opinions concerning the cost-effectiveness of meniscectomy in patients.

Given the limited number of identified articles, additional clinical terms (e.g. meniscus injury, knee arthroscopy, arthroscopic debridement, cartilage micro-fracturing, knee fracture, etc.) will be investigated for the final literature review in the main project. Hence, the final list of search terms will be prepared in collaboration with all involved parties (the clinical assessment team).

Losina 2014 - Defining the Value of Future Research to Identify the Preferred Treatment of Meniscal Tear in the Presence of Knee OA. PLoS One. 2015 Jun.<sup>7</sup>

Marsh 2016 - Cost-effectiveness analysis of arthroscopic surgery compared with non-operative management for OA of the knee. BMJ Open. 2016 Jan.<sup>8</sup>

Feeley 2016 - The cost-effectiveness of meniscal repair versus partial meniscectomy: A model-based projection for the United States. Knee. 2016 May.<sup>9</sup>

Sihlvonen 2013 - Arthroscopic partial meniscectomy versus sham surgery for a degenerative meniscal tear. N Engl J Med. 2013.<sup>10</sup>

## 5.4 Planned approach for the health economic part of the main study

### 5.4.1 General approach

The economic part of the main study will consist of two elements:

In the first part, a budget impact analysis will be conducted using Swiss epidemiological data and cost data. In case of missing Swiss information, data from the international literature will be used.

In the second part, the available economic literature will be systematically reviewed, in order to investigate the impact of meniscectomy in terms of cost-effectiveness from a Swiss perspective. Eligible studies will be assessed for quality and transferability to the Swiss setting. A numeric adaptation of costs and incremental cost-effectiveness ratios (ICERs) will be undertaken and discussed in detail.

#### **5.4.2 Definition of the decision problem**

The population of interest are patients with symptoms due to degenerative changes of the knee joint – irrespective of whether they are primarily due to meniscal damage, OA of the knee or a mix of both – undergoing meniscectomy and/or other arthroscopic interventions at the knee as listed in 3.2.2. The overall costs of these patients as well as the cost-effectiveness of the intervention will be investigated.

Health economic endpoints to be considered will include costs, life year gained (LYG), quality-adjusted life years (QALYs), and ICERs (i.e. costs per LYG or QALY gained). Costs will be reported broken down in direct (i.e. inpatient, outpatient, and treatment costs) and indirect (i.e. productivity loss) costs, where available. Additional endpoints that may have been used by some studies may also be reported.

Based on the available studies, we will aim to gain an understanding of the cost-effectiveness of meniscectomy from a 'KVG perspective' (considering the direct medical costs of all health care services covered by the Swiss statutory health insurance, irrespective of actual payer) and from a societal perspective.

#### **5.4.3 Budget impact analysis**

The expenditure for knee/meniscus derangement and its impact on the Swiss healthcare system will be investigated. Swiss epidemiological data concerning the frequency of performed meniscectomies will be combined with the estimated costs of knee/meniscus derangement in Swiss hospitals or in ambulatory settings. This will help to determine the annual budget impact for these interventions in Switzerland (in various indications). The analyses will be performed for the last few years to get an idea about possible trends.

Moreover, if possible, the frequency and burden of meniscectomy will be analysed for inpatient and outpatient care separately.

The main sources for cost information will be the TARMED, the flat rate per case depending on SwissDRG codes ("Fallpauschalen in Schweizer Spitalern"), and national/ international literature. Costs data from health insurance companies (e.g. Helsana) will be considered. Patients would need to be identified via DRG codes, Tarmed codes and/ or ICD-10 codes (if available).

#### **5.4.4 Systematic review of the literature**

The health economic analysis will comprise the following steps, which are detailed in the following sections:

Literature search in PubMed, the Cochrane Library, the Centre of Reviews and Dissemination (DARE and HTA database), and the Economic Evaluation Database from the UK National Health Service (NHS EED).

Screening of the search results to identify eligible cost-effectiveness studies and of studies that may be of secondary interest (e.g. providing relevant cost parameters).

Quality assessment of the eligible cost-effectiveness studies by applying the “Consolidated health economic evaluation reporting standards” (CHEERS) checklist<sup>11</sup> and data extraction.

Assessment of the eligible cost-effectiveness studies in terms of transferability to Switzerland.

For the studies found to be transferable, adaptation of reported ICERs to Switzerland

Synopsis of findings.

#### **5.4.5 Additional remarks**

Changes to the described approach may be necessary given the results of the literature search and considering data availability. Possible modifications will be discussed in the research group and reported to the SFOPH and to the reviewer group.

## 6 References

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