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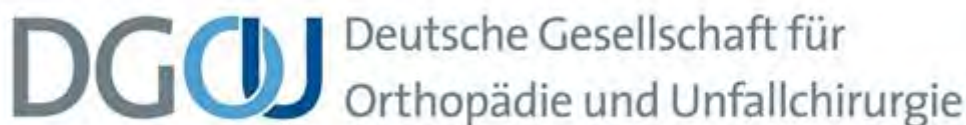
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Short Version of the S3 Clinical Guideline

Prevention and Treatment of Knee Osteoarthritis

by the

German Society for Orthopaedics and Trauma Surgery e.V.



and

Professional Association for Orthopaedics and Trauma Surgery (BVOU)

German Society for General Practice and Family Medicine (DEGAM)

German Society for Arthroplasty (AE)

Drug Commission of the German Medical Association (AkdÄ)

German Society for Nuclear Medicine (DGN)

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German Knee Society (DKG)

German Rheumatism League Federal Association (DRL)

German Pain Society e.V.

German Occupational Therapy Association (DVE)

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Society for Phytotherapy e.V. (GPT)

Interdisciplinary Society for Orthopaedic and Trauma Surgical Pain Therapy (IGOST)

Association for Technical Orthopaedics (VTO)



DEUTSCHE GESELLSCHAFT FÜR ENDOPROTHETIK



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Physiotherapie (ZVK) e.V.



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No.	Grade of Recommendation	Recommendation
2.1 General information		
Statement 1		Osteoarthritis of the knee refers to all degenerative diseases of the joint (femoro-tibial and femoro-patellar) that are characterized by progressive destruction of the articular cartilage with involvement of the joint structures such as ligaments, bones, synovial and fibrous joint capsule and periarticular muscles.
2.1.3 Classification		
Recommendation 2	EK ↑	We suggest classifying the extent of joint damage according to radiographic criteria.
2.1.4 ICD coding		
Recommendation 3	EK ↑↑	We recommend using the correct ICD coding with the last digit.
Recommendation 5	EK ↑↑	For more sustainable healthcare, we recommend the: - Use of environmentally friendly materials and equipment: Preference for products with certificates such as the EU Ecolabel or the Blue Angel. - Reduction of energy consumption and waste production: e.g. use of energy-efficient appliances, energy-saving lighting and reuse of materials. - Promotion of environmentally friendly lifestyles: education and advice on plant-based nutrition, active mobility (such as walking and cycling) and sustainable everyday practices. - Prioritization of resource-saving treatment options (if the therapy is equivalent): Recommend non-surgical measures such as exercise therapy, behavioral modification and weight management before considering invasive procedures. - Consideration of the life cycle analysis when recommending orthopaedic aids: Selection of products made from recyclable materials and with low environmental impact during their manufacture, use and disposal. - Environmentally conscious handling of diclofenac ointments (avoidance of water contamination during application), see also the practical note in the recommendation on topical NSAIDs on page 79 in the long version.

2.2 Assessment of osteoarthritis of the knee in statutory accident insurance		
Statement 4 evidence based		Osteoarthritis of the knee is a recognized occupational disease under the German Ordinance on Occupational Diseases (BKV) (number 2112). If there is a justified suspicion of an occupational disease, doctors are obliged to report this to the accident insurance institution (employers' liability insurance associations, accident insurance funds) or to the body responsible for medical occupational health and safety (§ 202 SGB VII).
2.3 Advice, prophylaxis, general measures		
Recommendation 6	EK ↑↑	We recommend that patients are informed about the disease, prevention of disease progression, improvement of quality of life and mobility, conservative and surgical treatment options (motivational counseling).
2.3.1 Preventive measures for osteoarthritis of the knee		
Recommendation 7	EK ↑↑	We recommend avoiding non-physiological and knee-straining activities in everyday life, at work and in sport.
Recommendation 8	EK ↑↑	a) We recommend regular strength and flexibility training according to instructions at an early stage. b) We recommend carrying out learned helpful exercises independently with occasional checking of results.
Recommendation 9	EK ↑↑	We recommend weight reduction for overweight and obesity with practical advice on how to achieve this (weight management). Every decrease towards normal weight means less pain, better mobility and slower progression of osteoarthritis.
2.3.2 Medical history		
Recommendation 10	EK ↑↑	a) When making a diagnosis, we recommend integrating a specific medical history, physical examination and the interpretation of X-ray images.
	EK ⇔	b) Imaging is not required for the initial treatment. *

		(*See Apparative diagnostics on page 71 in the long version)
2.3.4 Therapy		
Recommendation 11	EK ↑↑	We recommend that doctors inform patients about treatment options and alternatives (if available) and ideally make a decision about treatment together with them. The aim is to discuss and evaluate patients' expectations on the one hand and doctors' options for action on the other.
Rekommandation 12	EK ↑↑	We recommend that the indication for knee arthroplasty is examined together in the case of advanced osteoarthritis of the knee and that doctors and patients discuss together before surgery what results can and cannot be expected. See also chapter 1.4.2.1.1 Indication (page 184 long version) 1.4.2.1.2 Preoperative preparation/information (page 184 long version)
2.3.6 Biomarkers		
Recommendation 13	↓↓	We recommend currently not to use biomarkers for diagnosis, prognosis determination and therapy monitoring in patients with osteoarthritis of the knee, they are reserved for specific research questions or clinical studies.
2.4 Conservative therapy		
2.4.1 Medication		
Recommendation 14	EK ↑	If pharmacological therapy is required for osteoarthritis of the knee, we suggest that it is used: • alongside non-pharmacological treatments and to support exercise therapy • in the lowest effective dose over the shortest possible period of time.
2.4.1.1 NSAIDS		
Recommendation 15	↑↑	We recommend that patients with osteoarthritis of the knee are offered a topical non-steroidal anti-inflammatory drug (NSAID).
	↑	advice: Due to the ecotoxicity of diclofenac, according to

		the Pharmacists' Drug Commission, hands should first be carefully wiped with a cloth (dispose of in the residual waste) after topical application before washing.
Recommendation 16	↑↑	If topical NSAIDs are ineffective or unsuitable, we suggest using an oral NSAID for osteoarthritis of the knee, bearing in mind the following: - Possible gastrointestinal, hepato-renal, and cardiovascular toxicity - All risk factors that may be present in the person concerned, including age, pregnancy, current medication and concomitant illnesses.
Recommendation 17	↑↑↑	We recommend gastroprotective treatment with a proton pump inhibitor in patients with osteoarthritis of the knee while taking an NSAID, ...
	EK	...if there is an increased risk of a gastroduodenal ulcer and/or ulcer complication.
<i>2.4.1.2 Paracetamol</i>		
Recommendation 18	↓↓↓	We recommend that patients with osteoarthritis of the knee are not routinely treated with paracetamol unless • it is only rarely used for short-term pain relief and • all other pharmacological treatments are contraindicated, are not tolerated or are ineffective.
<i>2.4.1.3 Metamizole</i>		
Recommendation 19	EK ↑↑	For patients with osteoarthritis of the knee, we suggest using metamizole only for severe pain when other analgesic measures are not suitable, contraindicated or not effective.
	EK ↑↑↑	When prescribing this medication, it is recommended to document the indication and the patient's information about potential side effects and the safety information (what the patient should do if unexpected signs of infection occur).
<i>2.4.1.4 Opioids</i>		
Recommendation 20	↓↓↓	We do not recommend the routine treatment of patients with osteoarthritis of the knee with weak opioids unless: - they are only used occasionally for short-term pain relief and - all other pharmacological treatments are contraindicated, are not tolerated or are ineffective.

Recommendation 21	↓↓↓	We do not recommend the treatment of patients with osteoarthritis of the knee with strong opioids.
<i>2.4.1.5 Glucosamine</i>		
Recommendation 22	↓↓↓	We do not recommend glucosamine for patients with osteoarthritis of the knee. If patients ask about glucosamine, explain that there is no clear evidence for the benefits of glucosamine.
Statement 23	EK	At present, there is no reliable evidence for a structure-modifying (chondroprotective) effect of glucosamine in patients with osteoarthritis of the knee.
<i>2.4.1.6 Corticosteroids</i>		
Recommendation 24	↑	a) We suggest intra-articular corticosteroids for the short-term treatment of painful osteoarthritis of the knee: - if other pharmacological forms of therapy are ineffective or unsuitable or - if this supports physical forms of therapy.
	↑↑	b) We recommend informing patients that this is a <u>short-term</u> therapeutic effect (2-10 weeks).
Recommendation 25	EK ↑↑	We recommend that all intra-articular injections are only carried out by physicians trained in this technique and in compliance with the hygiene guidelines*. *Recommendation of the Commission for Hospital Hygiene and Infection Prevention at the Robert Koch Institute (RKI) "Hygiene requirements for punctures and injections"
<i>2.4.1.7 Hyaluronic acid</i>		
Statement 26 evidence based		Due to the contradictory evidence, no recommendation can be made on the use of intra-articular hyaluronic acid injections.
<i>2.4.1.8 Platelet-rich plasma (PRP)</i>		
Recommendation 27	↔	Platelet-rich plasma (PRP) may be considered in patients with symptomatic osteoarthritis of the knee when other analgesic and function-improving measures are inappropriate, contraindicated or ineffective. The methodological quality of the clinical studies is heterogeneous and a recommendation for a specific manufacturing process cannot yet be made.

<i>2.4.1.9 Radiosynovioorthesis</i>		
Recommendation 28	EK ⇔	Radiosynovioorthesis (off-label use) can be considered for patients with persistent florid synovitis in failed medical, orthopaedic and physiotherapeutic therapy for osteoarthritis of the knee in radiological stages I and II according to Kellgren and Lawrence. The indication for joint-preserving surgical procedures must be distinguished.
Recommendation 29	EK ⇔	Radiosynovioorthesis (off-label use) can be recommended for patients with persistent florid synovitis in radiographic stage III and IV osteoarthritis of the knee according to Kellgren and Lawrence if surgical therapies are not possible and other pain therapy measures are not sufficiently effective.
<i>2.4.2 Non-pharmacological treatment</i>		
<i>2.4.2.1 Orthopaedic technology - Orthopaedic shoe technology</i>		
Recommendation 30	↑	We suggest using walking aids (e.g. crutches) to relieve the strain.
Recommendation 31	↓↓	We do not recommend the routine use of shoe fittings or orthoses.
	⇔	Shoe adjustments or orthoses can be considered if: • previous exercise therapy was ineffective, or • this is insufficient without the use of the above-mentioned aids, • there is significant joint instability, or • an abnormal biomechanical load, or an improvement in the mobility and function of the joint can be expected with the above-mentioned aids.
<i>2.4.2.2 Tapes</i>		
Recommendation 32	↓↓	We do not recommend the routine use of tape for people with osteoarthritis of the knee.
	⇔	The use of tape can be considered if: • there is joint instability or abnormal biomechanical stress and • therapeutic exercises without tape are ineffective or unsuitable and • an improvement in the mobility and function of the joint can be expected through the use of tape.

2.4.2.3 Physical therapy (methods and therapeutic agents)

2.4.2.3.1 Aquatic based exercise

Recommendation 33	↑	We suggest aquatic exercise therapy for the treatment of patients with osteoarthritis of the knee to reduce pain, improve function and enhance quality of life.
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2.4.2.3.2 Land-based exercise

Recommendation 34	↑↑	We recommend that patients with osteoarthritis of the knee should undergo exercise therapy tailored to their individual needs.
	↑	We suggest that exercise therapy should be carried out under supervision.
	↑↑	We recommend informing patients that joint pain may increase at the beginning of exercise therapy and explaining that • regular and consistent exercise is good for the joints, even if it may initially cause pain or discomfort. (Caution: for the condition of activated osteoarthritis, see page 42 in the long version) • long-term adherence to an exercise plan increases its benefits by reducing pain and increasing functional capacity and quality of life.

2.4.2.3.3 Manual therapy

Recommendation 35	↑	We suggest manual therapy for people with osteoarthritis of the knee only in combination with exercise therapy suggest to explain that there is insufficient evidence to support the use of manual therapy alone.
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2.4.2.3.4 Massage therapy

Statement 36 evidence based		There is insufficient evidence to recommend the use of massage for osteoarthritis of the knee.
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2.4.2.3.5 Vibration therapy

Statement 37 evidence based		The current evidence is not sufficient to assess the use of vibration therapy for osteoarthritis of the knee.
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2.4.2.3.6 Traction treatment (device supported and manual)

Statement 38 evidence based		a) Due to the small number of studies, some of which were methodologically flawed, no recommendation can be made for device supported traction treatment.
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		b) No recommendation can be made for manual traction due to a lack of evidence.
2.4.2.3.7 Electrotherapy		
Recommendation 39	↓↓↓	We recommend that the following electrotherapeutic interventions are not performed in people with osteoarthritis of the knee due to insufficient evidence of benefit: • Transcutaneous electrical nerve stimulation (TENS) • Ultrasound therapy • Interference current • Laser therapy • Pulsed short-wave therapy • Neuromuscular electrical stimulation (NMES)
2.4.2.3.8 Occupational therapy		
Statement 40 evidence based		The current evidence is not sufficient to assess the use of occupational therapy for osteoarthritis of the knee.
2.4.2.3.9 Combined programs		
Recommendation 41	↑↑	We suggest exercise therapy in combination with an educational program or behavior change interventions to maintain regular consistent exercise.
2.4.2.3.10 Sport with osteoarthritis of the knee		
Recommendation 42	EK ↑↑↑	Sporting activity is recommended for people with osteoarthritis of the knee,...
	EK ↑↑	...and should be adapted to individual needs.
<u>2.4.2.5 Classical natural medicine treatments</u>		
2.4.2.5.1 Leech therapy (MAGICapp Export)		
Statement 43 evidence based		The current evidence is not sufficient to recommend the use of leeches for osteoarthritis of the knee.
2.4.2.5.2 Topical Phytotherapy		
Statement 44	EK	A recommendation for or against the use of comfrey extract, arnica gel and other topical phytotherapeutics cannot be made on the basis of the data available.

2.5 Surgical therapy

2.5.1 Joint-preserving therapy*

2.5.1.1 Arthroscopic lavage/debridement

Recommendation 45	↓↓	Arthroscopy alone with lavage and/or debridement is not recommended for patients with clinically and radiologically confirmed osteoarthritis of the knee.
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* In order to avoid duplication, the chapter on arthroscopy for meniscus damage, including recommendation 46, was deleted during the consultation phase.

2.5.1.3 Arthroscopic or open cartilage replacement procedures

Statement 47 evidence based		Due to a lack of evidence, no recommendation can be made for cartilage regenerative surgery in patients with osteoarthritis of the knee.
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2.5.1.4 Osteotomy

2.5.1.4.1 High tibial osteotomy

Recommendation 48	↔	In patients with clinically and radiologically confirmed osteoarthritis of the knee (Kellgren Lawrence $\leq$ III.°) and tibial extra-articular varus malalignment, a corrective high tibial osteotomy (HTO) can be performed.
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2.5.2 Joint replacement

2.5.2.1 General knee arthroplasty

2.5.2.1.2 Preoperative preparation/information

Recommendation 49	EK ↑↑	For patients with osteoarthritis of the knee who are about to decide to undergo knee arthroplasty, we recommend providing information about • the principle of the knee endoprosthesis, • the technique recommended in the individual case (incl. implant type, patella replacement, alignment), • the typical course of treatment and • the expected result. We recommend explicitly asking the patient's expectations and discussing the likelihood of realizing these expectations for the knee endoprosthesis together.
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2.5.2.1.3 Risk factors Management

2.5.2.1.3.1 Nicotine consumption

Recommendation 50	↑↑	We recommend that patients with osteoarthritis of the knee who are undergoing knee arthroplasty should refrain from smoking. It is recommended to abstain from smoking for at least four weeks before surgery*. *Oriented to an evidence-based recommendation from: Evidence- and consensus-based indication criteria for total hip arthroplasty in hip osteoarthritis (point 5.1.1 in the long version)
2.5.2.1.3.2 Diabetes mellitus		
Recommendation 51	↑↑	For patients with diabetes mellitus, we recommend adjusting blood glucose levels before implanting a knee endoprosthesis in accordance with the individually agreed treatment goals* *based on National Care Guideline Type II Diabetes 2023 (Version 3.0) AWMF Reg. no.: nvl-001
Recommendation 52	EK ↑	An HbA1c value below 8% should be aimed for.
2.5.2.1.3.3 Depression		
Recommendation 53	↑	We suggest that patients with depression or poor mental health status are informed about a higher risk of a worse postoperative outcome in terms of pain and function after knee arthroplasty.
Recommendation 54	↑	To improve the treatment outcome, we suggest that patients with diagnosed depression and a planned knee replacement undergo a preoperative specialist consultation and, if necessary, optimization of the therapy.
2.5.2.1.4 Perioperative management		
2.5.2.1.4.1 General anesthesia versus regional anesthesia		
Recommendation 55	↑↑	For patients who are undergoing knee arthroplasty, we recommend the following anesthetic procedures • spinal anesthesia (SA) or • general anesthesia (AA). Both anesthetic procedures should be carried out in combination with local anesthesia. Where local anesthesia is either a - Local infiltration anesthesia (LIA) is strongly recommended or a - nerve block is weakly recommended.

		(see recommendation 56 on page 217 of the long version of the guideline)
2.5.2.1.4.2 Local infiltration anesthesia (LIA)/peripheral nerve block (NB)		
Recommendation 56	↑↑	As a local anesthetic that can be combined with the anesthetic procedure (see recommendation 55 on page 214 in the long version) - we recommend local infiltration anesthesia (LIA) or
	↑	- suggest a peripheral nerve block.
2.5.2.1.4.3 Drains		
Recommendation 57	↓↓ (upgraded)	We do not recommend to use drains in knee arthroplasty.
2.5.2.1.4.4 Tourniquets		
Recommendation 58	↔	a) In adult patients who undergo knee arthroplasty and have no known contraindication, a tourniquet can be used during the operation after weighing up the benefits and risks.
	↑	b) The duration of use should be kept as short as possible.
2.5.2.1.5 Supporting technologies		
2.5.2.1.5.1 Navigation		
Recommendation 59	↔	After prior consultation navigation systems can be used for knee arthroplasty. There is no benefit with regard to the functional result.
2.5.2.1.5.2 PSI (Patient Specific Instruments)		
Recommendation 60	↔	Patient Specific Instruments (PSI) can be used in knee arthroplasty. There are no improved functional results or reduced complications.
2.5.2.1.5.6 Metal hypersensitivity		
Recommendation 61	EK ↑↑	For patients with an indication for knee arthroplasty who have a confirmed metal allergy, we recommend providing information about the very low risk of allergy-related complications when using standard implants and the higher revision rate of most allergy implants during the consultation and weighing up the risks.

		With the patient's consent, the use of a standard implant is possible.
2.5.2.1.5.7 Volume outcome Relationship		
Statement 62 evidence based		The available evidence confirms the correlation between a high number of cases per hospital and a better outcome in the case of primary knee arthroplasty.
Recommendation 63	EK ↑↑	The government regulation on minimum quantity should be complied with. *
	EK ↑	* Mindestmengenregelung des gemeinsamen Bundesausschusses gemäß § 136b Absatz 1 Satz 1 Nummer 2 SGB V für nach § 108 SGB V zugelassene Krankenhäuser. (Minimum quantity regulation of the Joint Federal Committee) Endoprosthetic procedures of a higher degree of difficulty, such as knee arthroplasty revisions, should therefore also be performed in centers with larger case numbers.
Recommendation 64	↑	We suggest to perform unicompartmental arthroplasty by an experienced surgeon.
2.5.2.2 Unicompartmental arthroplasty		
2.5.2.2.1 Obesity as a risk factor		
Recommendation 65	↑↑	Overweight patients who undergo unicompartmental knee arthroplasty have an increased risk of revision. However, the gain in function and quality of life is comparable to that of non-overweight patients. We recommend pointing out this increased risk to overweight patients and taking a particularly critical look at the indication for BMI >40 kg/m² in conjunction with other risk factors. A general withholding of a unicompartmental knee arthroplasty is not justified.
2.5.2.2.2 Medial unicompartmental arthroplasty		
2.5.2.2.2.1 Versus other surgical therapies		
Recommendation 66	↑↑	For patients with clinically and radiologically confirmed isolated high-grade medial osteoarthritis of the knee, we recommend a medial unicompartmental arthroplasty.

2.5.2.2.2 Supporting technologies Robot assistance systems		
Recommendation 67	↔	Robotic assistance systems can be used for the implantation of a medial unicompartmental arthroplasty after prior consultation. There is no benefit with regard to the functional result.
2.5.2.2.3 Lateral unicompartmental arthroplasty		
Statement 68 evidence based		The evidence is not sufficient for a broad recommendation for lateral unicompartmental arthroplasty in isolated lateral high-grade osteoarthritis of the knee. In justified cases, see recommendation 69 below.
Recommendation 69	EK ↔	In patients with clinically and radiologically confirmed isolated lateral high-grade osteoarthritis of the knee, a lateral unicompartmental arthroplasty can be considered in experienced centers as an alternative to total knee arthroplasty.
2.5.2.2.3.1 Supporting technologies Robot assistance systems		
Statement 70 evidence based		Due to a lack of evidence, a recommendation on robotic assistance systems for lateral unicompartmental arthroplasty is not possible. The guideline commission assumes similar results for lateral unicompartmental knee joint replacement and patello femoral arthroplasty with regard to the radiological and functional outcome through the use of robotic assistance systems as for medial unicompartmental knee joint replacement (see recommendation 67 on page 241 of the guideline long version).
2.5.2.2.4 Patellofemoral Arthroplasty		
2.5.2.2.4.1 Versus other surgical therapies		
Recommendation 71	↔	In patients with clinically symptomatic and radiologically confirmed isolated patellofemoral osteoarthritis, implantation of an isolated patellofemoral joint replacement can be considered.
Recommendation 72	EK ↑	Due to the higher revision rate, we suggest that implantation of an isolated patellofemoral joint replacement should only be performed in centers with larger case numbers.
2.5.2.2.5 Total Knee Arthroplasty		
2.5.2.2.5.1 Obesity as a risk factor		

Recommendation 73	↑↑	Overweight patients who undergo total knee arthroplasty have an increased risk of complications, especially with a BMI > 40 kg/m². However, the gain in function and quality of life is comparable to that of non-overweight patients. We recommend that overweight patients should be made aware of this increased risk of complications and that the indication for BMI > 40 kg/m² should be examined particularly critically in conjunction with other risk factors. A general withholding of total knee arthroplasty is ethically not justified.
2.5.2.2.5.2 Tranexamic acid		
Recommendation 74	↑↑	In patients who are undergoing total knee arthroplasty, we recommend the administration of tranexamic acid if there are no contraindications: • Intravenous application • without renal impairment additionally 1 g to 2 g topical (intra-articular) tranexamic acid, ensuring that the total combined dose of tranexamic acid does not exceed 3 g. • With renal impairment dose reduction of intravenously administered tranexamic acid.
2.5.2.2.5.3 Cruciate ligament sacrificing versus cruciate ligament retaining arthroplasty (MAGICapp Export)		
Recommendation 75	↔	Patients who undergo a total knee arthroplasty can be fitted with cruciate ligament sacrificing and cruciate ligament-retaining arthroplasty. There are no differences with regard to clinical and functional results or the occurrence of complications
2.5.2.2.5.4 Cemented versus uncemented total knee arthroplasty		
Recommendation 76	↔	Patients who undergo total knee arthroplasty can undergo both (partially) cemented and cementless arthroplasty, as the different types of fixation have comparable results in terms of functional outcome, complications, reoperations, etc. Recent registry data and meta-analyses appear to show age- and gender-dependent differences, but the data are contradictory.
2.5.2.2.5.5 Patella Resurfacing		
Recommendation 77	↔ (downgraded)	In patients undergoing total knee arthroplasty, the implantation of a patellar resurfacing component can be performed.

2.5.2.2.5.6 Supporting technology Robot assistance systems (MAGICapp Export)		
Recommendation 78	↔	Robotic assistance systems or conventional alignment instruments can be used to implant a total knee endoprosthesis. There are no differences in terms of clinical and functional results or the occurrence of complications compared to the conventional technique.

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