

IQ Joint study

Toolbox

Content of Toolbox

In this toolbox we offer starting points for quality improvement initiatives based on the currently available literature. The chapters are ordered according to the performance outcomes as offered in the monthly feedback. It is noted that this is not an exhaustive list.

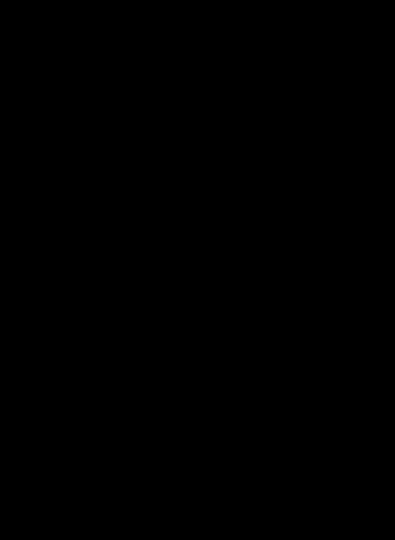
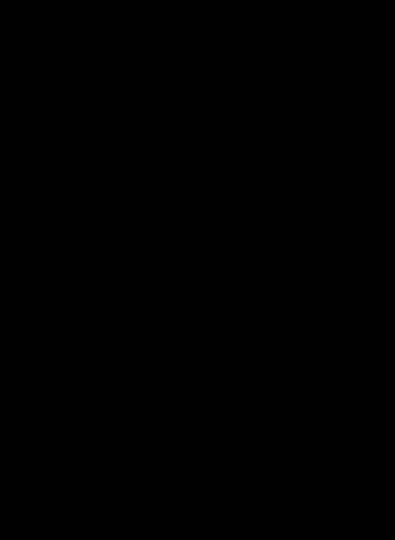
We advise to implement quality improvement initiatives according to the Plan-Do-Check-Act cycle.

Plan-Do-Check-Act cycle

2

Performance outcomes

- 1-year revision rate due to infection (THA & TKA) 3
- 1-year revision rate due to prosthesis loosening (THA & TKA) 5
- 1-year revision rate due to dislocation (THA) 7
- 1-year revision rate due to technical failure (TKA) 9
- Length-of-stay in hospital 11
- Readmissions 13
- Textbook Outcome & Ordinal Composite Outcome Measure 15

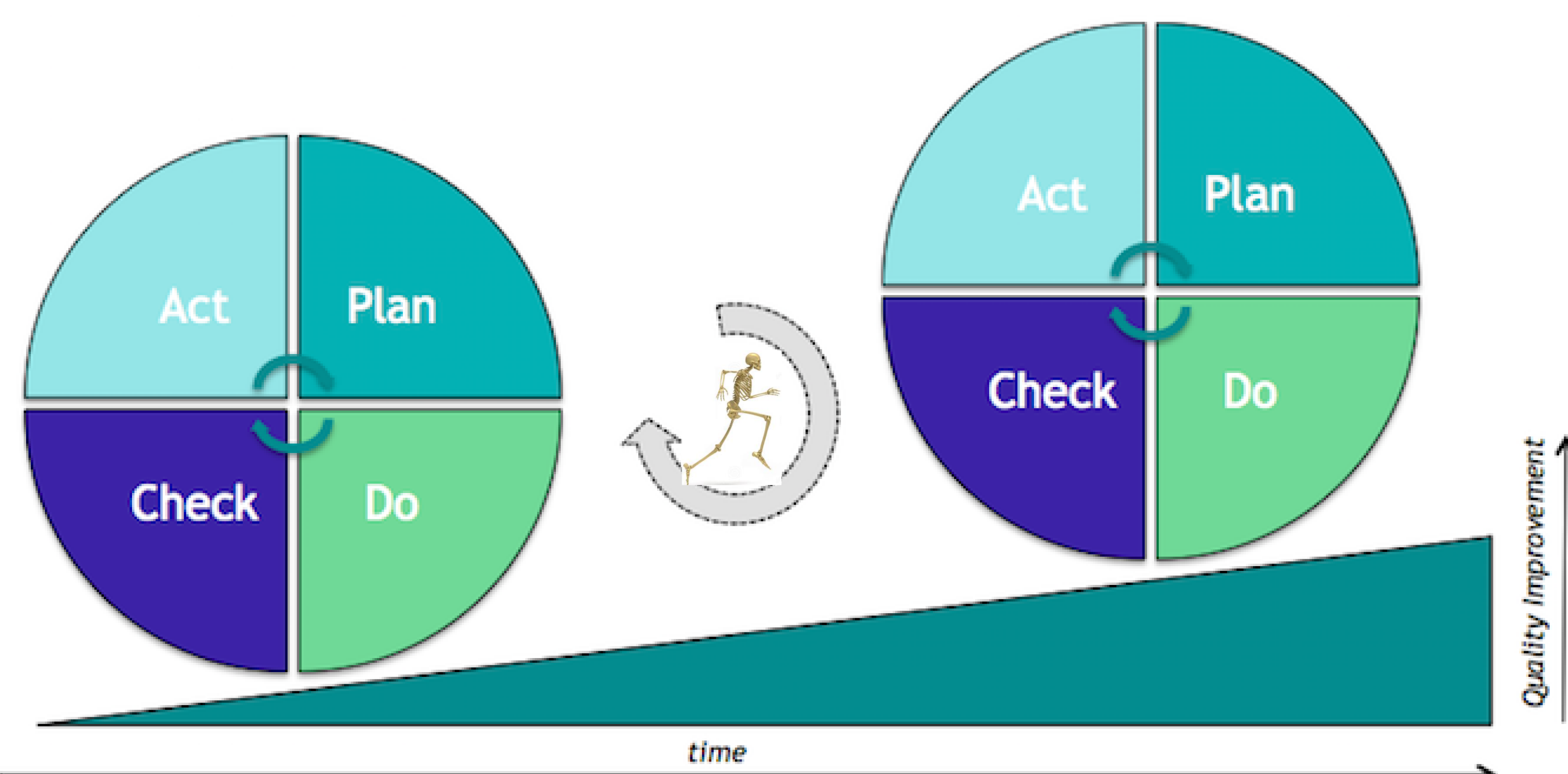


Check

1. What is the effect and is it as desired.
 - Example: Check the electronic patient files to see if the last 100 patients have all received antibiotic prophylaxis. No, 1 patient did not.

Act

1. Adopt the improvement/change or abandon it.
 - Example: Adopt the change because it has led to a substantial improvement.
2. Run through the cycle again.

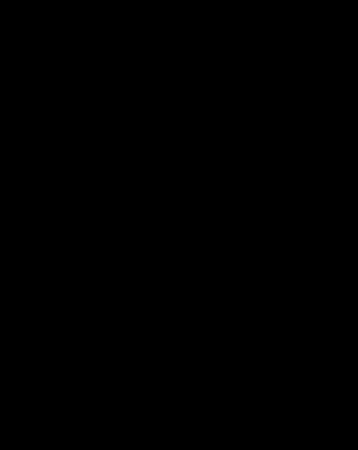
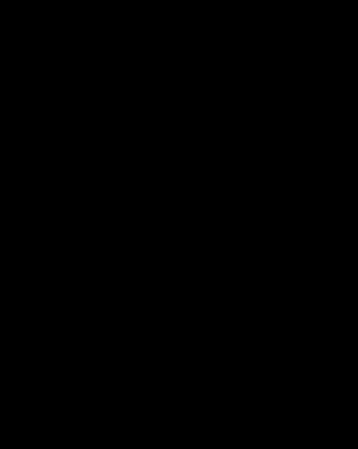
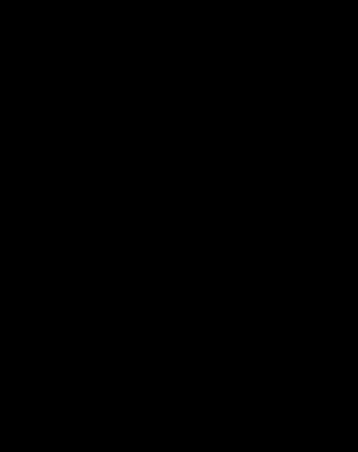
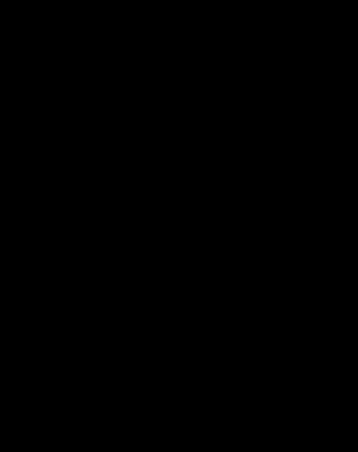
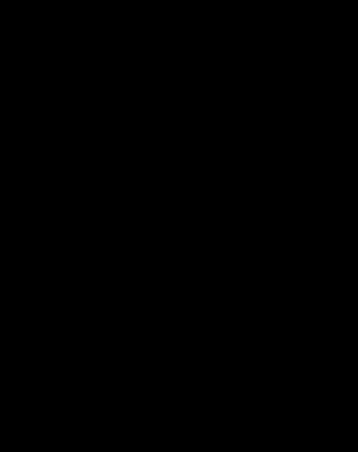
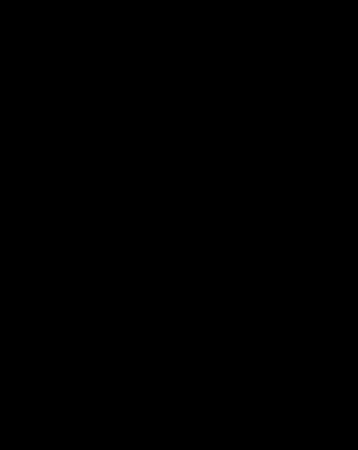
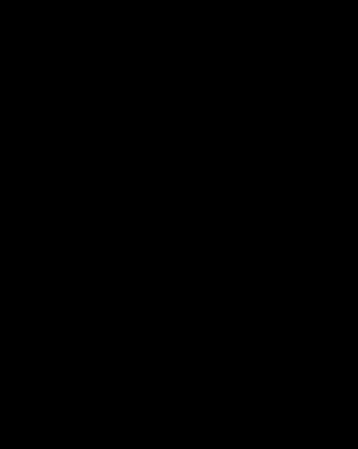


Plan-Do-Check-Act cycle - Tague, Nancy R 2005

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Intra-operative

Lavage

- Consider 3 minutes lavage with dilute antiseptic (betadine/chlorhexidine).¹⁹ Avoid lavage with surfactants or antibiotics.²³ Use a low-pressure delivery system for a <2L volume of solution.²³

Prevent transfusions

- Check pre-operative hemoglobin level and correct if necessary preoperatively.
- Tranexamic acid might help minimize blood loss and wound infection.^{20,21}

Cement loaded with antibiotics

- As recommended in NOV-guidelines ([NOV guidelines - Antibiotica-laden cement](#)).

Surgical approach

- Lateral surgical approach results in more infections compared to posterior approach.⁶ However, each of the approaches has their own set of complications and benefits.

Bearing surface

- Ceramic-on-ceramic and ceramic-on-polyethylene surfaces are associated with lower risk of revisions for infection after 12 and 24 months respectively compared to metal-on-polyethylene.⁶

Post-operative

Antibiotic prophylaxis

- As recommended in NOV-guidelines ([NOV guideline - systemic antibiotic prophylaxis](#)).

Wound leakage

- Is a wound leakage protocol available and is it followed sufficient?

Patient-specific factor optimization

- Blood glucose levels: Fasting blood glucose value <200mg/dl is suggested.²²



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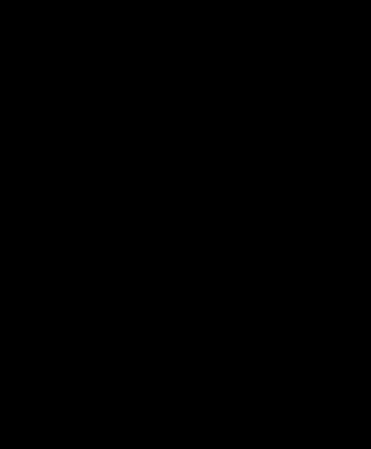
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Ase

Surgical factors

THA &TKA

- Has a new prosthesis been implemented recently? Has sufficient training taken place? Schedule a meeting where experiences can be shared.

Cementation techniques

- Distal and proximal prosthesis centralization
- Adequate canal preparation with pulsatile lavage to increase cement penetration and interdigitation.
- Is there profit to be gained within one of the phases: mixing, waiting, working or setting?
- Check the most recent manual for use of the cement.

Septic loosening

Take a look at the toolbox for infection



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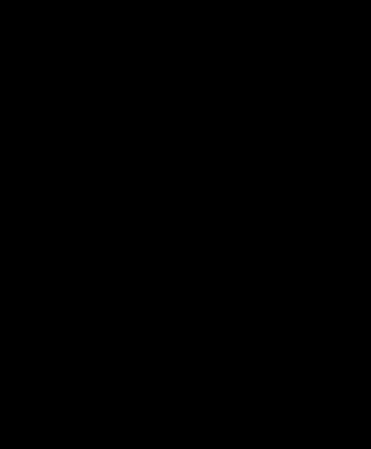
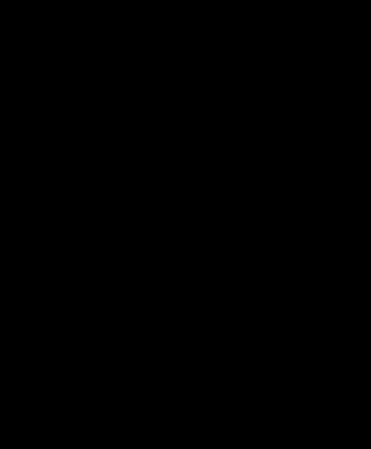
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Intra-operative

- Some registries report increased dislocation rates for posterior approach when compared to anterior and direct lateral at 6-year follow-up.^{10,11} However, the revision rate for all other revisions was higher with anterior approach and lowest with posterior approach.¹⁰
- If the posterior approach is chosen, surgeons should reconstruct the posterior capsule and the external rotators to prevent dislocations ([NOV guideline - surgical approach](#)).

Dual mobility cup

- Dual mobility articulations are a viable alternative in cases with increased risk of instability or dislocation, however, evidence is limited ([NOV guideline - dual mobility cup](#)). Following patient groups have an increased risk of dislocations and may benefit from a dual mobility cup: spinal injury, poliomyelitis, cerebral palsy, femoral neck fracture, acetabular dysplasia, muscular dystrophy and intellectual impairment.¹²⁻¹⁶
- The 5-year cup revision rates are comparable to that of traditional unipolar cups.¹⁷

Stability Assessment

- Minimize impingement by removing osteophytes, thickened capsule or increase offset.
- A lipped liner can offer stability in extremes of movement.¹⁸

New prosthesis

- Has sufficient training taken place?
- Schedule a meeting where experiences can be shared.

Post-operative

Hip dislocation precaution

- Early dislocation rates do not decrease with hip dislocation precaution.^{16,19} Evidence is limited and included only studies with anterolateral and posterolateral approaches. Further, abandoning mobilization restrictions increases patient satisfaction through earlier return of daily activities to preoperative levels.^{20,21}



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Instability

rupture or laxity of the posterior cruciate ligament or medial collateral ligament and patellar tendon rupture or patella fracture.¹¹⁻¹⁶

- Some patient are prone to instability. Those who have rheumatoid arthritis, connective tissue disease, severe osteoporosis, neuromuscular pathology, gross deformities who need severe correction with ligament release, foot deformities and quadriceps/medial thrust hip abductor weakness.^{15,17}

Patient-specific factor optimization

- Overweight: Aim for a BMI < 30 kg/m². Obesity is a risk factor because it complicates surgical exposure, jeopardizes the collateral ligament.¹⁵

Pre-operative / intra-operative

- Evaluation the state of the lateral and medial collateral ligament and posterior cruciate ligament (PCL) with physical examination in order to select the right implant for each patient.¹⁶ Instability can be prevented in most cases with appropriate prosthesis selection and good surgical technique (e.g. prevent soft tissue damage, correct implantation of components in every plane).^{12,14} Posterior stabilized implants should be utilized in those patients with PCL insufficiency and in those with increase risk of posterior instability (e.g. rheumatoid arthritis, need to resect the PCL, flexion contracture or previous tibial osteotomy). If the choice is made to preserve the PCL, it is important to take special care in maintaining its integrity when the tibial cut is made. In case of doubt, it is preferable to convert the arthroplasty to a posterior stabilized design. In some patients with marked instability (medial or lateral collateral loss, massive bone loss including the femoral condyles, complete or insufficiency of the PCL, poliomyelitis, or Charcot arthropathy), a primary constrained or linked hinge implant may be indicated.¹⁶

Patellar dislocation

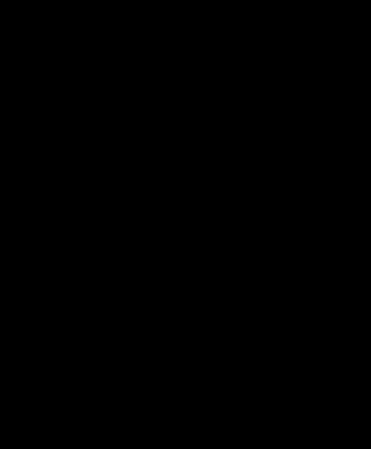
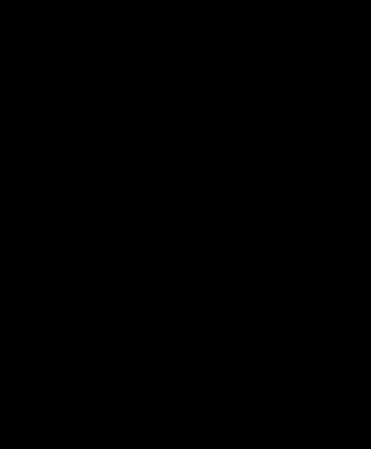
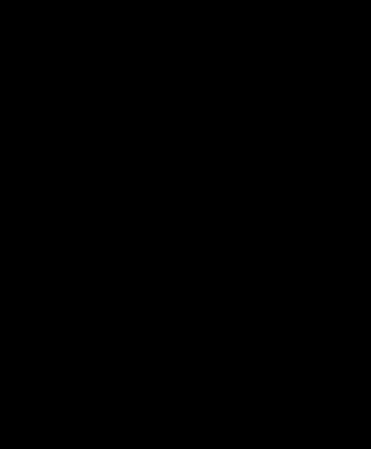
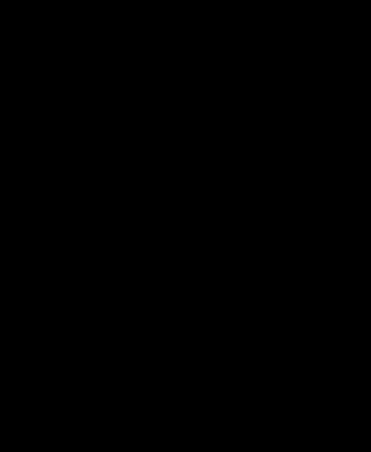
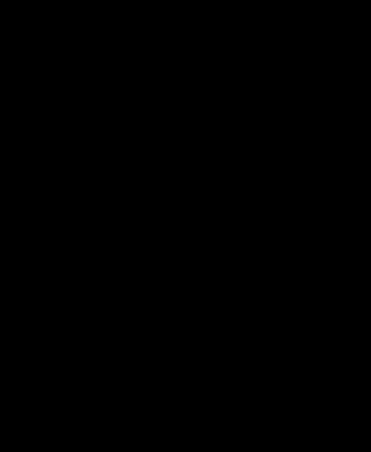
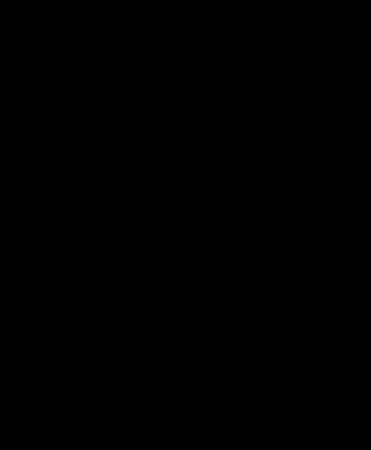
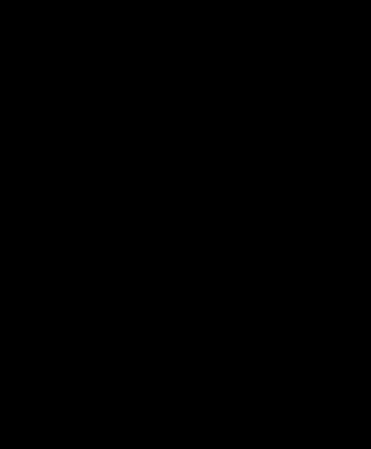
Intra-operative

- Patella maltracking or dislocation is closely related to malalignment. In most patients, functional patellar tracking is achieved by a good prosthesis positioning by checking the femoral implant rotation, femoral implant flexion, femoral implants varus/valgus positioning, femoral implant mediolateral or medialization, tibial implant rotation. Excessive internal rotation of the tibial component or femur component promotes external rotation during walking, thereby increasing the risk of patellar dislocation. The more externally rotated the implant, the less risk there is for lateral patellar maltracking. However, this must not be at the expense of tibiofemoral alignment and stability.¹¹ Postoperative patella alta and non-medialized implantation of a patellar prosthesis are also risk factor.¹⁸

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References

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among TKA patients and leads to increased opioid consumption post-operative. It should be detected in pre-operative evaluation and the patient need to be persuaded to keep opioid use to a minimum.^{6,7}

- Social support; inadequate social support e.g. living alone, is associated with a longer LOS. Optimizing the organizational part of patient pathway and optimizing social support before admission for surgery avoids delayed discharge.^{8,9}

Medication

- A protocol of scheduled oral narcotics, cyclooxygenase-2 inhibitors, a local anesthetic for wound infiltration and no intrathecal narcotics (TKA: add femoral nerve catheter) shows significant improvements regarding LOS and post-operative pain-scores.¹⁰ However, another study showed only a significant improvement in pain-scores and opioid requirements, but showed an effect on LOS although not significant.¹¹
- A single dose of 125 mg methylprednisolone given pre-operatively, reduces pain in THA patient in the first post-operative 24 hours, thus enlarging the chance of satisfactory day-of-surgery mobilization and early discharge.^{12,13}

Surgical technique

- Direct anterior approach (DAA) shows an advantage regarding mean hospital stay compared with posterolateral (PL) approach in THA surgery.¹⁴

Delay of discharge

- Medical interventions; delay of discharge due to e.g. waiting for blood transfusion, start of physiotherapy or post-operative radiographic examination, should be avoided through multidisciplinary organization and planning.¹⁵
- Repeating / mentioning of the expected date and time of delay when there are no complications.

Oral pain treatment

- Oral treatment should be a combination of a NSAID, paracetamol and short acting-opioid.

Mobilization on day of surgery

- Mobilization on the day of surgery significantly increases the probability of early discharge.¹⁶

Intra-operative

Post-operative



IQ Joint studiegroep:

• **P van Schie, coördinerend arts-onderzoeker**

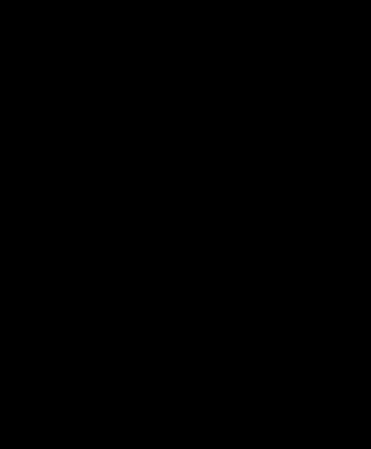
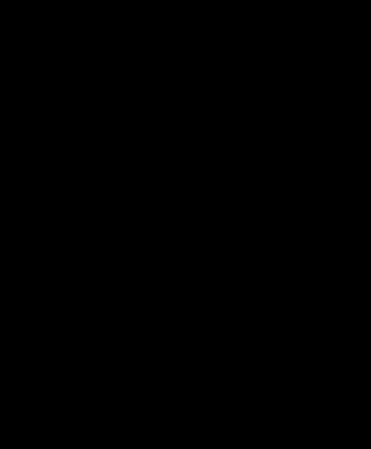
• **Prof. dr. RGHH Nelissen, orthopedisch chirurg**

• **Dr. PJ Marang-van de Mheen, assistent professor medisch beslistkunde**

IQ Joint studie

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What kind of readmissions are involved

- Smoking: Convince patients to participate in smoking cessation programs. Smoking increases the risk of 90-days readmission.^{8,10}

An example of a plan of approach for file investigation:

1. Take a closer look at 50 file. Exclude patients with relatively high mortality risk. These are the patients with probably a high disease burden and therefore relatively little chance of finding points for improvement.
2. How soon after discharge did the readmission take place (within a week or later)? Selection for early readmissions gives maximum chance to find improvement regarding potential too early discharge or incorrect information transfer. Selection for late readmissions often indicates complications after discharge.
3. Make a distinction between re-admissions in the same diagnosis group as the index admission versus in another diagnosis group. If the re-admission diagnosis group is the same as the index admission, this may be an indication that the patient was discharged too soon. If the re-admission concerns a different diagnosis group than the index admission, then there may be a re-admission with a complication. Of course it is possible that there is no relationship with the surgical procedure earlier.



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IQ Joint study

Toolbox

Outcome: Textbook Outcome & Ordinal Composite Outcome Measure

Topics are described where quality improvement initiatives could be considered.

Separately looking at the 3 indicators revision within 1 year, readmission within 30 days and prolonged length-of-stay (a length of stay in the upper tertile) have disadvantages. When conducting file investigations, there is a chance that the same file will be requested 3 times and that many must be investigated to find opportunities for quality improvement. Furthermore, single outcomes do not provide insight for professionals and patients into which part of the patients everything went well. For the above 3 indicators, a TO would mean that a patient did not undergo a revision within 1 year, had no readmission within 30 days and had a normal length-of-stay.

However, hospitals with a TO that differs significantly from the average gives little information about which outcome was specifically worse/good. Therefore the Ordinal Composite Outcome measure (Textbook Outcome Plus; TOP) has been developed. This is an extension of the TO with the additional element that the different combinations of the results are arranged (instead of all in 1 non-TO group), so that it could be seen in which group the hospital deviates from the average. The order is from the best to the worst outcome as follows:

- No revision within one year, no readmission within 30 days, no prolonged length-of-stay (**Textbook Outcome**)
- No revision within one year, no readmission within 30 days, prolonged length-of-stay
- No revision within one year, readmission within 30 days, no prolonged length-of-stay
- No revision within one year, readmission within 30 days, prolonged length-of-stay
- Revision within one year, no readmission within 30 days, no prolonged length-of-stay
- Revision within one year, no readmission within 30 days, prolonged length-of-stay
- Revision within one year, readmission within 30 days, no prolonged length-of-stay
- Revision within one year, readmission within 30 days, prolonged length-of-stay

This ordered outcome measure can also be corrected for patient-mix by using different funnel-plots where group 1 is compared with the rest, group 2 versus the rest, etc.. With this method, it can be indicated in which group your hospital differs significantly. These funnel-plots can be supplied on request.

If a hospital deviates from one of these groups, specific file investigation on these patients could be performed. For possible quality improvement initiatives, I refer to the Toolboxes for revision, readmission and prolonged length of hospital stay.