AAOS Guideline on The Diagnosis of Periprosthetic Joint Infections of the Hip and Knee

Summary of Recommendations

The following is a summary of the recommendations in the AAOS’ clinical practice guideline, The Diagnosis of Periprosthetic Joint Infections of the Hip and Knee. This summary does not contain rationales that explain how and why these recommendations were developed nor does it contain the evidence supporting these recommendations. All readers of this summary are strongly encouraged to consult the full guideline and evidence report for this information. We are confident that those who read the full guideline and evidence report will note that the recommendations were developed using systematic evidence-based processes designed to combat bias, enhance transparency, and promote reproducibility.

This summary of recommendations is not intended to stand alone. Clinical decisions should be made in light of all circumstances presented by the patient. Procedures applicable to the individual patient rely on mutual communication between patient, physician, and other healthcare practitioners.

1. In the absence of reliable evidence about risk stratification of patients with a potential periprosthetic joint infection, it is the opinion of the work group that testing strategies be planned according to whether there is a higher or lower probability that a patient has a hip or knee periprosthetic infection.

Strength of Recommendation: Consensus

Description: The supporting evidence is lacking and requires the work group to make a recommendation based on expert opinion by considering the known potential harm and benefits associated with the treatment. A Consensus recommendation means that expert opinion supports the guideline recommendation even though there is no available empirical evidence that meets the inclusion criteria of the guideline’s systematic review.

Implications: Practitioners should be flexible in deciding whether to follow a recommendation classified as Consensus, although they may set boundaries on alternatives. Patient preference should have a substantial influencing role.

Note: Please see page 17 of this document for a definition of “higher and lower probability”.
2. We recommend erythrocyte sedimentation rate and C-reactive protein testing for patients assessed for periprosthetic joint infection.

Strength of Recommendation: Strong

Description: Evidence is based on two or more “High” strength studies with consistent findings for recommending for or against the intervention. A Strong recommendation means that the benefits of the recommended approach clearly exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a strong negative recommendation), and that the strength of the supporting evidence is high.

Implications: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

3. We recommend joint aspiration of patients being assessed for periprosthetic knee infections who have abnormal erythrocyte sedimentation rate AND/OR C-reactive protein results. We recommend that the aspirated fluid be sent for microbiologic culture, synovial fluid white blood cell count and differential.

Strength of Recommendation: Strong

Description: Evidence is based on two or more “High” strength studies with consistent findings for recommending for or against the intervention. A Strong recommendation means that the benefits of the recommended approach clearly exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a strong negative recommendation), and that the strength of the supporting evidence is high.

Implications: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.
4. We recommend a selective approach to aspiration of the hip based on the patient’s probability of periprosthetic joint infection and the results of the erythrocyte sedimentation rate (ESR) AND C-reactive protein (CRP). We recommend that the aspirated fluid be sent for microbiologic culture, synovial fluid white blood cell count and differential.

**Selection of Patients for Hip Aspiration**

<table>
<thead>
<tr>
<th>Probability of Infection</th>
<th>ESR and CRP Results</th>
<th>Planned Reoperation Status</th>
<th>Recommended Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>+ + or + −</td>
<td>Planned or not planned</td>
<td>Aspiration</td>
</tr>
<tr>
<td>Lower</td>
<td>+ + or + −</td>
<td>Planned</td>
<td>Aspiration or Frozen Section</td>
</tr>
<tr>
<td>Lower</td>
<td>+ +</td>
<td>Not planned</td>
<td>Aspiration</td>
</tr>
<tr>
<td>Lower</td>
<td>+ −</td>
<td>Not planned</td>
<td>Please see Recommendation 6</td>
</tr>
<tr>
<td>Higher or Lower</td>
<td>− −</td>
<td>Planned or not planned</td>
<td>No further testing</td>
</tr>
</tbody>
</table>

**Key for ESR and CRP results**

- + + = ESR **and** CRP test results are abnormal
- + − = either ESR **or** CRP test result is abnormal
- − − = ESR **and** CRP test results are normal

**Strength of Recommendation: Strong**

Description: Evidence is based on two or more “High” strength studies with consistent findings for recommending for or against the intervention. A Strong recommendation means that the benefits of the recommended approach clearly exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a strong negative recommendation), and that the strength of the supporting evidence is high.

Implications: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

5. We suggest a repeat hip aspiration when there is a discrepancy between the probability of periprosthetic joint infection and the initial aspiration culture result.

**Strength of Recommendation: Moderate**

Description: Evidence from two or more “Moderate” strength studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention. A Moderate recommendation means that the benefits exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the strength of the supporting evidence is not as strong.

Implications: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.
6. In the absence of reliable evidence, it is the opinion of the work group that patients judged to be at lower probability for periprosthetic hip infection and without planned reoperation who have abnormal erythrocyte sedimentation rates OR abnormal C-reactive protein levels be re-evaluated within three months. We are unable to recommend specific diagnostic tests at the time of this follow-up.

**Strength of Recommendation: Consensus**

Description: The supporting evidence is lacking and requires the work group to make a recommendation based on expert opinion by considering the known potential harm and benefits associated with the treatment. A Consensus recommendation means that expert opinion supports the guideline recommendation even though there is no available empirical evidence that meets the inclusion criteria of the guideline’s systematic review.

Implications: Practitioners should be flexible in deciding whether to follow a recommendation classified as Consensus, although they may set boundaries on alternatives. Patient preference should have a substantial influencing role.

7. In the absence of reliable evidence, it is the opinion of the work group that a repeat knee aspiration be performed when there is a discrepancy between the probability of periprosthetic joint infection and the initial aspiration culture result.

**Strength of Recommendation: Consensus**

Description: The supporting evidence is lacking and requires the work group to make a recommendation based on expert opinion by considering the known potential harm and benefits associated with the treatment. A Consensus recommendation means that expert opinion supports the guideline recommendation even though there is no available empirical evidence that meets the inclusion criteria of the guideline’s systematic review.

Implications: Practitioners should be flexible in deciding whether to follow a recommendation classified as Consensus, although they may set boundaries on alternatives. Patient preference should have a substantial influencing role.

8. We suggest patients be off of antibiotics for a minimum of 2 weeks prior to obtaining intra-articular culture.

**Strength of Recommendation: Moderate**

Description: Evidence from two or more “Moderate” strength studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention. A Moderate recommendation means that the benefits exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the strength of the supporting evidence is not as strong.

Implications: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.
9. Nuclear imaging (Labeled leukocyte imaging combined with bone or bone marrow imaging, FDG-PET imaging, Gallium imaging, or labeled leukocyte imaging) is an option in patients in whom diagnosis of periprosthetic joint infection has not been established and are not scheduled for reoperation.

**Strength of Recommendation: Limited**

- **Description:** Evidence from two or more “Low” strength studies with consistent findings, or evidence from a single “Moderate” quality study recommending for or against the intervention or diagnostic. A **Limited** recommendation means the quality of the supporting evidence that exists is unconvincing, or that well-conducted studies show little clear advantage to one approach versus another.
- **Implications:** Practitioners should be cautious in deciding whether to follow a recommendation classified as **Limited**, and should exercise judgment and be alert to emerging publications that report evidence. Patient preference should have a substantial influencing role.

10. We are unable to recommend for or against computed tomography (CT) or magnetic resonance imaging (MRI) as a diagnostic test for periprosthetic joint infection.

**Strength of Recommendation: Inconclusive**

- **Description:** Evidence from a single low quality study or conflicting findings that do not allow a recommendation for or against the intervention. An **Inconclusive** recommendation means that there is a lack of compelling evidence resulting in an unclear balance between benefits and potential harm.
- **Implications:** Practitioners should feel little constraint in deciding whether to follow a recommendation labeled as **Inconclusive** and should exercise judgment and be alert to future publications that clarify existing evidence for determining balance of benefits versus potential harm. Patient preference should have a substantial influencing role.

11. We recommend against the use of intraoperative Gram stain to rule out periprosthetic joint infection.

**Strength of Recommendation: Strong**

- **Description:** Evidence is based on two or more “High” strength studies with consistent findings for recommending for or against the intervention. A **Strong** recommendation means that the benefits of the recommended approach clearly exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a strong negative recommendation), and that the strength of the supporting evidence is high.
- **Implications:** Practitioners should follow a **Strong** recommendation unless a clear and compelling rationale for an alternative approach is present.
12. We recommend the use of frozen sections of peri-implant tissues in patients who are undergoing reoperation for whom the diagnosis of periprosthetic joint infection has not been established or excluded.

Strength of Recommendation: Strong

Description: Evidence is based on two or more “High” strength studies with consistent findings for recommending for or against the intervention. A Strong recommendation means that the benefits of the recommended approach clearly exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a strong negative recommendation), and that the strength of the supporting evidence is high.

Implications: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

13. We recommend that multiple cultures be obtained at the time of reoperation in patients being assessed for periprosthetic joint infection.

Strength of Recommendation: Strong

Description: Evidence is based on two or more “High” strength studies with consistent findings for recommending for or against the intervention. A Strong recommendation means that the benefits of the recommended approach clearly exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a strong negative recommendation), and that the strength of the supporting evidence is high.

Implications: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.

14. We recommend against initiating antibiotic treatment in patients with suspected periprosthetic joint infection until after cultures from the joint have been obtained.

Strength of Recommendation: Strong

Description: Evidence is based on two or more “High” strength studies with consistent findings for recommending for or against the intervention. A Strong recommendation means that the benefits of the recommended approach clearly exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a strong negative recommendation), and that the strength of the supporting evidence is high.

Implications: Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.
15. We suggest that prophylactic preoperative antibiotics not be withheld in patients at lower probability for periprosthetic joint infection and those with an established diagnosis of periprosthetic joint infection who are undergoing reoperation.

Strength of Recommendation: Moderate

Description: Evidence from two or more “Moderate” strength studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention. A Moderate recommendation means that the benefits exceed the potential harm (or that the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the strength of the supporting evidence is not as strong.

Implications: Practitioners should generally follow a Moderate recommendation but remain alert to new information and be sensitive to patient preferences.