

# TRAINING OF CORE TRAINERS

## CPG

### Antibiotic Prophylaxis in Oral And Maxillofacial Surgery for Prevention of Surgical Site Infection (3<sup>rd</sup> Edition)



#### Lecture 2: SPECIAL POPULATION

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# Special population

Include **pregnant and breastfeeding patients**, as well as those with:

- ▶ **Specific medical conditions**  
(e.g., immunocompromised, cardiac conditions)
- ▶ **Treatment-related conditions**  
(e.g., chemotherapy, bisphosphonate therapy)

# Rationale for Prophylaxis

These patients are at increased risk for:

- ▶ Surgical Site Infections (SSIs).
- ▶ Serious distant site infections (e.g., infective endocarditis).

Prophylactic antibiotics aim to:

- ▶ Reduce infection risk and associated morbidity.
- ▶ Balance infection prevention with minimizing antibiotic resistance.

# Specific medical conditions:



## Diabetes Mellitus

# Diabetes Mellitus



## Systematic Review Findings (Sykara et al., 2022):

Two cohort studies examined the relationship between DM and delayed healing post-dental extractions.

- No statistically significant association was found between DM and delayed healing, regardless of AP use.
- **First study:** Higher odds of delayed healing in the control group (30.9%).
- **Second study:** Higher odds of delayed healing in DM patients (35.0%).

*Delayed healing was defined as:*

*- Dry socket, necrotic bone, excessive granulation tissue, or infection.*

# Diabetes Mellitus

For **well-controlled Type 2 Diabetes Mellitus** (T2DM) patients (blood glucose level  $<10$  mmol/L, HbA1c  $<7.5\%$ ) who are on hypoglycaemic therapy, **AP is not recommended** for simple oral procedures such as tooth extractions.

Limitations of the evidence:

- Insufficient sample sizes.
- Lack of homogeneity across studies

Although the preceding systematic review did not suggest AP for DM patients, the CPG **DG opines AP is generally unnecessary for well-managed diabetic patients** undergoing simple procedures.

Clinicians should consider other factors, such as age, smoking habits, presence of local infection and presence of co-morbidities that weaken the patient's defensive ability.



# Diabetes Mellitus



## **Key Message 8**

- Antibiotic prophylaxis administration for routine dental extractions should not be prescribed for patients with well controlled diabetes mellitus.
- Clinicians should consider patients blood glucose level, Hemoglobin A1c or glycated hemoglobin (HbA1c) and extent of surgery prior to AP prescription.

## **Recommendation 11**

- Among uncontrolled diabetes mellitus patients (BGL >10 mmol/dL and HbA1c >7.5%), antibiotic prophylaxis should be provided prior to any oral surgical procedure.

# Specific medical conditions:



## Immunocompromised Patients





# Immunocompromised Patients

## **Guideline-Based Recommendations (Squire et al., 2019):**

A summary of AP indications for various immunocompromised conditions:

Condition	Recommendation
Patients on immunosuppressive therapy	- <b>AP indicated</b> when absolute neutrophil count is <b>1000-2000/mm<sup>3</sup></b> .
	- <b>Defer</b> dental procedures if neutrophil count <b>&lt;1000/mm<sup>3</sup></b> .
HIV Patients	- <b>AP</b> based on CD4 count and if neutrophil count <b>&lt;500/mm<sup>3</sup></b> .
Neutrophil Disorders	- <b>AP recommended</b> for all patients.
Complement Deficiency	- <b>AP only added</b> if patients are <b>unstable</b> on their standard prophylaxis regimen.
Antibody Deficiency	- <b>AP generally not required</b> prior to dental procedures.



# Immunocompromised Patients

Additional Insights (Divyadarshini, 2022):

- ▶ HIV patients under antiretroviral therapy with controlled viral loads do not require AP for dental procedures.

## **Key Message 9**

- For immunocompromised patients who undergo surgical procedure, there are factors to consider prior to AP such as glucose level, HbA1c, neutrophils counts and CD4 level.

# Treatment-Related Conditions:



**Patients with  
Prosthetic Joints**



# Patients with Prosthetic Joints

Prosthetic Joint Infections (PJIs) and Dental Procedures

**Systematic Review Findings : (Sollecito et al., 2015 level II-2, Alshmari et al., 2024 level II-2 ):**

Both reviews concluded:

- AP does not provide meaningful protection against PJI in patients with TJA
- No evidence supporting routine AP before dental procedures for these patients

# Patients with Prosthetic Joints



- ▶ American Dental Association (ADA, 2015):
  - AP is **not routinely indicated** to prevent PJIs.
  - AP **may be considered** for patients with a **history of complications from joint replacement surgery** undergoing dental procedures with gingival manipulation or mucosal incision.
  - **Consult** the patient's orthopedic surgeon before prescribing AP.
  - Obtain a **complete medical history** to assess the patient's status.

# Patients with Prosthetic Joints



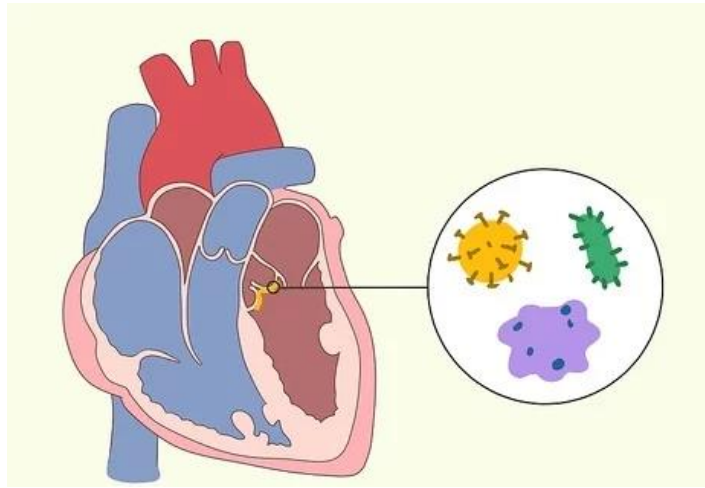
## Prosthetic Joint Infections (PJIs) and Dental Procedures

- ▶ DG members agree there **is no justification for routine AP** before dental procedures
- ▶ Emphasis on evidence-based practice to prevent unnecessary antibiotic use

### **Key Message 10**

- Antibiotics prophylaxis is not indicated for patients with prosthetic joints.
- Consultation with orthopaedic surgeon is suggested for patients with history of complications associated with prosthetic joint replacement.

# Treatment-Related Conditions:



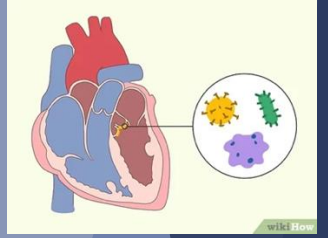
**Patients with Risk  
of Infective  
Endocarditis**

# Patients with the Risk of Infective Endocarditis

- ▶ IE is a known complication following dental procedures for patients with certain heart conditions
- ▶ High mortality associated with IE has led to guidelines recommending the use of antimicrobial agents prior to invasive medical or dental procedures.



# Patients with the Risk of Infective Endocarditis

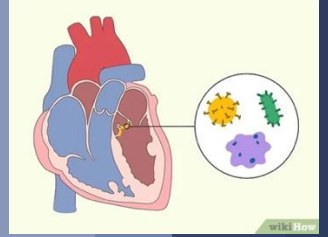


## Thornhill et al., 2024 showed:

- Significantly higher IE incidence following Invasive Dental Procedures (IDP) (OR = 6.58, 95% CI 2.76 to 20.33).
- Significant reduction in IE incidence among patients receiving AP compared to those not receiving AP (OR = 0.20, 95% CI 0.06 to 0.53).
- No significant effect of AP on developing IE in individuals at moderate or low/unknown risk.

Findings from this study is consistent with AHA guidelines, which are also the main references for the Malaysia Clinical Practice Guidelines for the Prevention, Diagnosis and Management of Infective Endocarditis

# Patients with the Risk of Infective Endocarditis



*Table 3: List of Cardiac Conditions Associated with the Highest Risk of Adverse Outcome from Endocarditis for Which Prophylaxis with Dental Procedures is Reasonable*

Condition	Description
Prosthetic Cardiac Valves	Includes transcatheter-implanted prostheses and homografts.
Prosthetic Material for Cardiac Valve Repair	Materials such as annuloplasty rings, chords, or clips used in valve repair.
Previous Infective Endocarditis (IE)	A history of infective endocarditis increases the risk for recurrence.
Unrepaired Cyanotic Congenital Heart Defect (CHD)	Patients with unrepaired CHD or repaired CHD with residual shunts or valvular regurgitation at the site of or adjacent to a prosthetic patch or device.
Cardiac Transplant with Valve Regurgitation	Cardiac transplant recipients with valve regurgitation due to structurally abnormal valves.

**\* Except for the conditions listed above, antibiotic prophylaxis before dental procedures is NOT recommended for other types of CHD.**

# Patients with the Risk of Infective Endocarditis

Based on AHA 2020, antibiotic prophylaxis for prevention of IE prior to the invasive dental procedures is summarized in Table 4.

Table 4: Antibiotic Prophylactic Regimens for Dental Procedures Regimen- Single dose 3—to 60 minutes before procedure

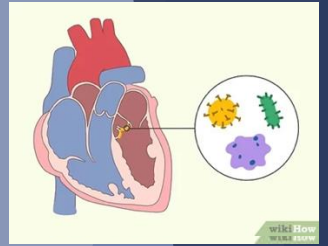
Situation	Agent	Adults	Children
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral medication	Ampicillin OR	2 g IM or IV	50 mg/kg IM or IV
	Cefazolin or ceftriaxone	1 g IM or IV	50 mg/kg IM or IV
Allergic to penicillins or ampicillin - oral regimen	Cephalexin* OR	2 g	50 mg/kg
	Azithromycin or clarithromycin	500 mg	15 mg/kg
	Doxycycline	100 mg	<45 kg: 2.2 mg/kg >45 kg: 100 mg
Allergic to penicillin or ampicillin and unable to take oral medication	Cefazolin or ceftriaxone†	1 g IM or IV	50 mg/kg IM or IV

Clindamycin is no longer recommended for antibiotic prophylaxis for a dental procedure.

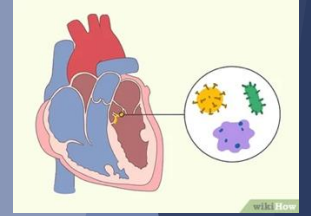
IM indicates intramuscular; and IV, intravenous.

Other first- or second-generation oral cephalosporin in equivalent adult or pediatric dosing.

†Cephalosporins should not be used in an individual with a history of anaphylaxis, angioedema, or urticaria with penicillin or ampicillin.



# Patients with the Risk of Infective Endocarditis



According to NAG 2024, **Clindamycin and Erythromycin are no longer recommended** as AP for prevention of IE

## **Recommendation 12**

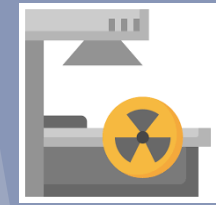
- Antibiotic prophylaxis should be given to patients with high risk of developing infective endocarditis undergoing invasive oral procedure.
- Clindamycin and Erythromycin should not be given as antibiotic prophylaxis for prevention of infective endocarditis.

# Treatment-Related Conditions:



**Patients Exposed to  
Radiotherapy/  
Chemotherapy**

# Patients Exposed to Radiotherapy/Chemotherapy



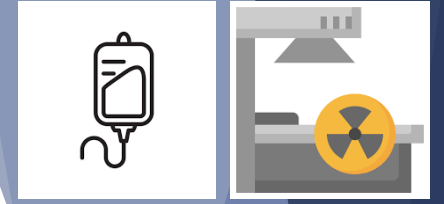
## Evidence of AP in Radiotherapy Patients

- ▶ Scarce evidence for AP use in patients exposed to radiotherapy before oral surgery.
- ▶ Commonly used in head and neck oncologic surgeries due to the clean-contaminated nature of procedures.

## **Study Findings (Busch et al., 2016):**

- Compared short-term (< 7 days) and long-term AP on SSIs in 418 oncology patients.
  - No significant differences (NS) in SSI rates between groups.
  - There was also NS difference in SSIs rates between patients with and without pre-operative radiotherapy
  - No clear information on AP use for pre-operative radiotherapy patients.

# Patients Exposed to Radiotherapy/Chemotherapy



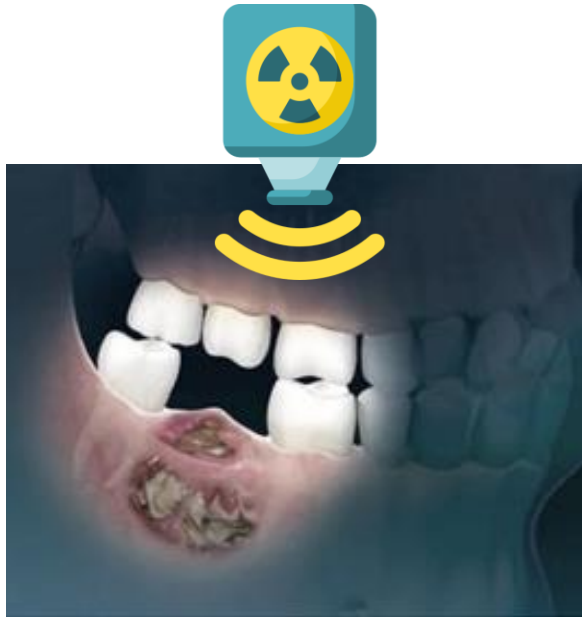
## *Narrative Review Findings (Squire et al., 2019, level III):*

- **AP recommended** for dental procedures when ANC is between **1000-2000/mm<sup>3</sup>**.
- Dental procedures **deferred** when ANC is **<1000/mm<sup>3</sup>**.

### **Recommendation 13**

- Antibiotic prophylaxis should be given for patients exposed to radiotherapy/chemotherapy prior to oral and maxillofacial surgery.
- In patients undergone chemotherapy antibiotic prophylaxis should be given when absolute neutrophils count is between 1000-2000mm<sup>3</sup>.

# Treatment-Related Conditions:



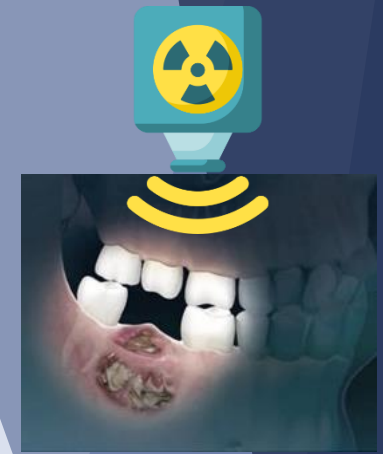
## Osteoradionecrosis



# Osteoradionecrosis

Osteoradionecrosis (ORN):

- ▶ ORN is a severe complication of radiation therapy (RT) for head and neck cancer (HNC).
- ▶ Characterized by exposed, non-healing bone in the irradiated area for more than three months without local tumor recurrence.
- ▶ Significance:
  - ORN poses significant challenges for treatment and patient quality of life.
  - Prevention through prophylactic measures is essential.



# Osteoradionecrosis

## **Retrospective Study (Palma et al., 2021, level II-2) on 49 irradiated HNC patients;**

- Clindamycin 300 mg three times daily, started 3 days before extraction & continued 10 days.
- Only 3.7% (2 patients) developed ORN post-extraction.

## **Prospective Study (Al-Bazie et al., 2016, level II-2) on 89 irradiated HNC patients;**

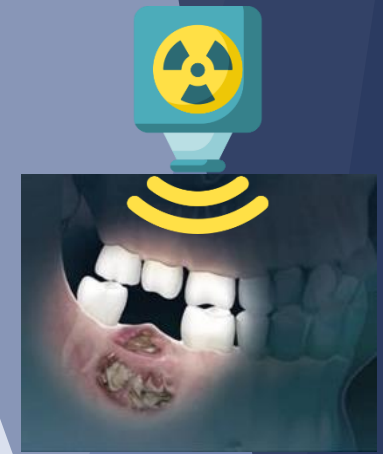
- Amoxicillin 500 mg three times daily + Chlorhexidine Gluconate 0.2% solution every 12 hours.
- Prophylaxis started 10 days before extraction and continued for 7 days post-extraction.
- Result: No ORN cases reported.

### ***Key Insight:***

***•AP may reduce ORN incidence, but lack of control groups and randomized trials limits the strength of evidence.***

#### **Recommendation 14**

- Antibiotic prophylaxis should be given in post-irradiated patients prior to oral and maxillofacial surgical procedures .



# Treatment-Related Conditions:



**Patient at Risk of  
Medication-Related  
Osteonecrosis of  
the Jaw (MRONJ)**

# Patient at Risk of Medication-Related Osteonecrosis of the Jaw (MRONJ)



MRONJ is a severe complication associated with medications such as antiresorptive, antiangiogenic, and chemotherapeutic agents.

Common triggers include tooth extractions, dental implants, and other invasive dental procedures.

## Key Facts:

- ▶ **Osteoporosis Patients:**
  - MRONJ incidence: 0.06%.
  - Incidence rate: 22.9 per 100,000 person-years.
- ▶ **Cancer Patients:**
  - MRONJ incidence: 1.47%.
  - Incidence rate: 1,232 per 100,000 person-years.

# Patient at Risk of Medication-Related Osteonecrosis of the Jaw (MRONJ)



## Risk of MRONJ with Dental Procedures

### Dental Extraction Risk:

- ▶ Osteoporosis patients:
  - Incidence: 2.7% (95% CI 1.6 to 4.6%).
- ▶ Cancer metastasis patients:
  - Incidence: 26.4% (95% CI 20.4 to 34.2%).

### Clinical Implications:

- ▶ High-risk patients include those with cancer undergoing invasive dental procedures.
- ▶ **Assessment of medications (antiresorptive and non-antiresorptive) is critical for prevention and management.**

# Patient at Risk of Medication-Related Osteonecrosis of the Jaw (MRONJ)



## Meta-Analysis Findings (Liu et al., 2022):

Single cohort study reported a significant reduction of 57 MRONJ cases per 100 individuals in the AP group versus the control group.

- Risk difference (RD): -0.57% (95% CI -0.85% to -0.29%).
- Common AP Regimens: Amoxicillin and Penicillin-based antibiotics.
- Limitation: High risk of bias due to non-randomized studies included in the meta-analysis.

# Patient at Risk of Medication-Related Osteonecrosis of the Jaw (MRONJ)



## **Systematic Review Findings**

***(Bermúdez-Bejarano et al., 2017; Cabras et al., 2021):***

- Most commonly used antibiotic:
  - Amoxicillin or Amoxicillin-clavulanate.
- Alternative for Penicillin-allergic patients:
  - Clindamycin.
- AP Duration:
  - Pre-procedure: 3 to 7 days.
  - Post-procedure: 7 to 17 days.
- Quality Assessment:
  - Moderate to high risk of bias noted in studies

# Patient at Risk of Medication-Related Osteonecrosis of the Jaw (MRONJ)

## Royal Australian College of General Practitioners (RACGP) Recommendations:

Antibiotic Prophylaxis (AP) is advised for patients at **high risk of MRONJ**, including:

- Cancer-related treatment patients.
- Treatment duration of >4 years.
- Patients with risk factors:
  - Poor oral hygiene.
  - Smoking.
  - Corticosteroid use.
  - Angiogenesis inhibitors.
  - Comorbid conditions (e.g., anemia, diabetes mellitus).





# Patient at Risk of Medication-Related Osteonecrosis of the Jaw (MRONJ)



- ▶ *Local Practices for AP in MRONJ Prevention;*
  - AP is **prescribed for all patients** at risk of developing MRONJ before invasive dental procedures.
  - Emphasis on assessing and addressing individual risk factors to minimize complications.

# Patient at Risk of Medication-Related Osteonecrosis of the Jaw (MRONJ)



## **Key Message 11**

- Most AP used in preventing MRONJ is Penicillin-based.
- The duration of the AP should be given pre and post-operatively based on:
  - the medication for cancer related treatment
  - treatment for > 4 years
  - other risks factors (eg poor oral hygiene, smoking, on corticosteroids or angiogenesis inhibitors or medical comorbidities such as anemia and diabetes mellitus)
- Patients at risk of MRONJ should be referred to OMFS prior to any invasive dental procedures.

## **Recommendation 15**

- Antibiotic prophylaxis should be given to patients at risk of developing Medication-Related Osteonecrosis of the Jaw (MRONJ) prior to invasive dental procedures.



**THANK YOU**

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**ANTIBIOTIC PROPHYLAXIS**  
**ORAL AND MAXILLOFACIAL SURGERY**