

Short text

Prophylaxis of infective endocarditis

Revision of the march 1992 consensus conference

Recommendations 2002

Supported by the Société de Pathologie Infectieuse de Langue Française (SPILF) and the collaboration of the Société Française de Cardiologie (SFC).

With the participation of the :

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- Société Française de Parodontologie et d'Implantologie Orale,
- Société de Stomatologie, de Chirurgie Maxillo-faciale et Chirurgie Plastique de la Face,
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INTRODUCTION

Infective endocarditis is a rare but severe disease the incidence of which has seemed stable in the last decades. Streptococci are the most frequent infectious agents. The incidence of infective endocarditis is assessed from transversal epidemiological surveys. In France, it ranges from 25 to 30 cases per million inhabitants per year (around 1500 cases per year). The profile of patients presenting with infective endocarditis is changing: an increased proportion of old patients, a decrease of endocarditis due to oral streptococci. Currently, surgical valve treatment for endocarditis is performed in around one case out of two. Nevertheless, the death rate remains high, between 15% and 25%.

Since 1992, date of the French consensus conference on the prophylaxis of infective endocarditis, new data have been published, requiring an update of its conclusions. These new data feature the following points:

- endocarditis remains a severe disease;
- bacteremia, which may induce infective endocarditis, are probably more due to a daily crossing of bacteria from mouth to blood, than to occasional buccodental care;
- there is no scientific proof concerning the efficacy or non-efficacy of antibiotic prophylaxis;
- in France, antibiotic prophylaxis is currently used in less than one patient with valvular risk out of two, before buccodental care;

Table 1
Heart diseases at risk of infective endocarditis

Group A: High risk heart diseases	Group B: Lesser risk heart diseases
<ul style="list-style-type: none"> • Valvular prostheses (mechanical, homograft, or bioprostheses) non operated congenital cyanosis due to heart diseases and surgical by-pass (pulmonary-systemic) • History of infective endocarditis 	<ul style="list-style-type: none"> • Valvular diseases: AI, MI, AC*, MVP* with MI and/or valvular thickening • bicuspid aortic valve • congenital non-cyanogenic heart diseases except for IAC* • Obstructive hypertrophic cardiomyopathy (with murmur on auscultation)

* AI: aortic insufficiency; MI: mitral insufficiency; AC: aortic constriction; MVP: mitral valve prolapsus; IAC: inter-auricular communication (non-risk heart diseases).

- the large use of antibiotic prophylaxis, supposing that it is totally efficient, would prevent only a low number of endocardites in France;
- a worrying increase of bacteria with decreased susceptibility to antibiotics has been reported in France.

Consequently the work group suggests:

- to maintain the principle of antibiotic prophylaxis when performing risk surgery in patients with risk heart diseases; but
- to limit its indications to cases for which the individual benefit/individual and collective risk ratio is the highest.

Recommendations of the work group cannot override the physician's evaluation of individual risk for a given patient.

Recommendation 1: definition of risk groups

Two groups of patients must be defined: Group A, « high risk », for which the incidence and morbidity-mortality of infective endocarditis are high and Group B, with a lesser risk (lesser incidence and severity) (Table 1).

Besides groups A and B, there are cardiac conditions for which there is no increased risk of infective endocarditis compared to the global population. The following conditions should be mentioned: inter-auricular communication, pace-makers (the risk of endocarditis is essentially linked to the implantation of the stimulator requiring an antibiotic prophylaxis), coronary angioplasty with or without implantation of an endoprosthesis, dilated cardiomyopathy without any significant MI, isolated mitral constriction, minimal valvular regurgitation only detected by Doppler ultrasonography.

Recommendation 2: importance of hygiene measures

General hygiene measures are the most important. They have for aim to decrease the risk of bacteremia, whatever its origin, especially for bacteremia caused by cardiac tropism bacteria. They include prevention and fight against infectious foci in the organism: strict and permanent buccodental and skin hygiene to prevent any rupture of the skin or mucosal barriers, disinfection of wounds, curative antibiotherapy of any infectious focus, strict compliance to asepsis

when performing operations at risk of infection, eradication or decrease of the bacterial inoculum in case of chronic skin carriage (renal dialysis), urinary if possible. A systematic surveillance of the buccodental state must be made at least twice a year in patients with a heart disease.

Any surgery leading to a mucosal and/or skin wound must be prevented. Thus, piercing is strictly contraindicated in risk patients with a heart disease. Acupuncture should be used only after informing the patient of the possible risk of infective endocarditis and with an adequate clinical surveillance following the treatment. Using infusion catheters should be limited to cases for which they are mandatory, especially in risk patients. If required, they should be used according to procedures recommending a systematic replacement of the peripheral catheter every 3 or 4 days, peripheral catheters should be used rather than central catheters, and a strict surveillance of the infusion needle entry should be made for inflammation.

Recommendation 3: buccodental care

In group A and B patients, it is recommended to use local chlorhexidine based antiseptics as mouth-wash for 30 s before dental care, and to give buccodental care in as few sessions as possible. If care requires several sessions, they must be given at least 10 days apart if possible, if the practitioner uses antibiotic prophylaxis. Indications for systemic antibiotic prophylaxis (Table 2):

Indications according to the kind of procedure are described in Addendum 1

In group A patients, using antibiotic prophylaxis according to the following rules is recommended for non contraindicated invasive buccodental care.

Some care is contra-indicated: prostheses on teeth to be pulpectomized, inserting implants and periodontal surgery, pulp diseases, periodontal diseases, and trauma requiring extraction. Endodontic care in group A patients must be as infrequent as possible. It can be given only after checking the tooth's vitality by adequate tests, using a sterile operating area, in one session, making sure that the dental lumen is accessible in totality. This treatment must be reserved for monoradicular teeth, and eventually for the first premolar if

Table 2

Indications for antibiotic prophylaxis in patients with infective endocarditis having undergone buccodental care, according to the group of risk heart diseases

	Antibiotic prophylaxis	
	Group A Diseases at high risk of infective endocarditis	Group B Diseases at lesser risk of infective endocarditis
Buccodental care with risk	Recommended	Optional
Buccodental care without risk	Not recommended	

the two canals are accessible. Separating the roots should be avoided if possible and may be performed only in the absence of all periodontal disorders.

In Group B patients, antibiotic prophylaxis is *optional*. Choosing antibiotic prophylaxis is to be decided by the physician managing the patient, taking into account the nature of care and the patient's state. Factors for this choice are listed in Table 3. Whatever the choice, it must be made after informing the patient and obtaining his consent to the offered strategy. This must be written down on a follow-up file given to each patient. The patient should know that in case of fever or symptoms, especially in the month following dental care, he must consult a physician as soon as possible, before starting any drug therapy, and inform him of the previous dental care so that hemocultures be made « eventually » before initiating any antibiotherapy (Fig. 1). This concerns the patient's education as well as advice on general and especially buccodental hygiene which is given to him.

Radicular treatment may be undertaken under three conditions: it must be performed using a sterile operating area, all the endodentrium must be easily accessible, it must be performed in one session. If these three conditions are not met, extraction is recommended. Inserting implants, periodontal surgery, and some other procedures (Addendum 2) are contra-indicated.

For other cardiac conditions, antibiotic prophylaxis is not recommended.

Antibiotic prophylaxis is indicated before valvular surgery, as for group A patients, except in the case of emergency. A complete radiological dental assessment must be made; only pulped teeth or teeth presenting a perfect endodontic treatment (more than a year before) without periodontal enlargement, and with a healthy periodontium are kept. Pulpectomized teeth with an incomplete endodontic treatment, teeth presenting with periodontal lesions, persisting roots and apex are extracted at least 15 days before cardiac surgery. In case of emergency surgery, buccodental care is given as soon as possible according to the context.

Recommendation 4: risk procedures other than buccodental

Recommendations are based on professional consensus, in the absence of scientific data, and cannot override the operating physician's judgment (Table 4). These recommendations do not contradict those concerning pre-operative antibiotic prophylaxis of surgical procedures.

Indications according to the kind of procedure are described in Addendum 3.

Risks associated to sclerotherapy and to esophageal dilation seem high, which is why the work group recommends systematic antibiotic prophylaxis for heart diseases in groups A and B. The same indications as for buccodental care are given for a whole series of other procedures (Addendum 3) associated to a high risk of infective endocarditis: antibiotic prophylaxis recommended for group A, optional for group B. An optional antibiotic prophylaxis is suggested for some procedures which may seem to present a lesser risk for group A (Addendum 2). The factors guiding the choice (Table 3) may help to take a decision as for buccodental care.

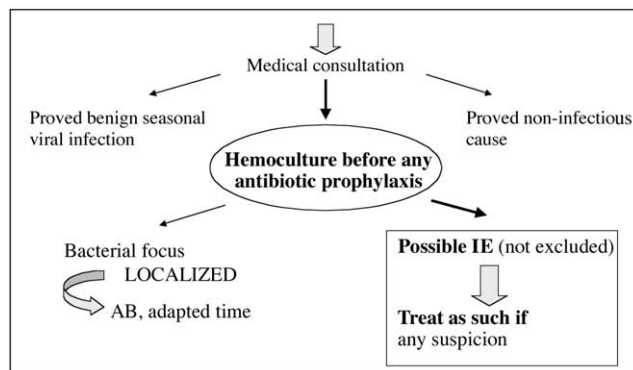


Fig. 1. Febrile patient with heart disease at risk of IE (Group B) < 3 months after a risk procedure, a fortiori without antibiotic prophylaxis*.

* This recommendation concerns any patient with fever or any other acute symptom, and a heart disease at risk; it is especially mentioned here for the patient or physician, in case there was no antibiotic prophylaxis before a risk procedure.

Table 3
Factors guiding the choice when antibiotic prophylaxis for infective endocarditis is optional

Arguments for the prescription
Age: age > 65 years
Associated conditions
Cardiac, renal, respiratory, and hepatic insufficiency, Diabetes, Acquired (splenectomy), constitutional or therapeutic (corticosteroids, immunosuppressors)
immuno-depression
Buccodental state
Inadequate buccodental hygiene especially
Procedure
Important bleeding (intensity, duration)
Technically difficult procedure (prolonged procedure)
Patient's opinion after information
Arguments against prescription
Allergy to several antibiotics
Patient's opinion after information
Arguments against prescription
Allergy to several antibiotics
Patient's opinion after information

Table 4
Indications for antibiotic prophylaxis in patients with infective endocarditis having undergone procedures than buccodental according to the group of risk heart diseases

	Antibiotic prophylaxis	
	Group A Diseases at high risk of infective endocarditis	Group B Diseases at lesser risk of infective endocarditis
Procedures with a very high risk	Recommended	
Procedures with a high risk	Recommended	Optional
Procedures with a lesser risk	Optional	Not recommended
Procedures with a negligible risk	Not recommended	

Antibiotic prophylaxis is not recommended for other cardiac conditions.

Recommendation 5: antibiotic prophylaxis prescription

The work group considers that the evolution of infective endocarditis epidemiology in France is an argument to maintain mode of antibiotic prophylaxis administration.

General modes of antibiotic prophylaxis administration

Generally, antibiotic prophylaxis, when justified, is initiated in the hour before the procedure according to the mode described further down. Nevertheless, if problems possibly leading to a specific infectious risk could arise during or immediately after a procedure without prior antibiotic prophylaxis (abundant bleeding, long and difficult procedures), it might be indicated to initiate antibiotic prophylaxis, as soon as possible, in the hour following the procedure. This decision is to be taken by the operating physician.

The modes of antibiotic prophylaxis administration do not apply if a curative antibiotherapy is indicated (Tables 5 – 7).

In other cases where the antibiotic prophylaxis concerns a procedure for which the bacterium is a staphylococcus, the antibiotic used should be pristinamycin unless contraindicated.

Propositions

The work group made the following propositions so as to ensure screening, le follow-up, and information of patients with a risk heart disease (Table 8):

- Before undertaking a risk procedure, screening for a risk heart disease in the patient's history is mandatory. In case of doubt for a patient without cardiologic follow-up (cardiac murmur for example), echocardiography is recommended before undertaking a procedure so as to determine the possibility of a risk heart disease;
- the echocardiography-Doppler report must describe in a precise manner the morphological anomalies eventually observed and specify the pathological or non-pathological aspect. If there are any valvular anomalies, it must specify their importance and bearing. The

Table 5

Antibiotic prophylaxis for infective endocarditis in dental care and procedures on upper respiratory tract—ambulatory care

	Antibiotic	Dosage and route of administration single intake in the hour before the procedure	
		Before (in the hour before the procedure)	After (6 h later)
No allergy to beta-lactams	Amoxicillin	3 g per os*	
Allergy to beta-lactams	Pristinamycin or** Clindamycin	1 g per os 600 mg per os	

* Two grams per os if the patient's weight < 60 kg.

Pediatric dosage per os: amoxicillin 75 mg/kg; clindamycin 15 mg/kg; pristinamycin: 25 mg/kg.

** The respective percentage of streptococci strains with a decreased susceptibility to these two antibiotics must be taken into account for the choice.

Administration of antibiotics respecting contraindications and usual conditions of use and surveillance. It is recommended to separate dental care sessions by at least 10 days if they require antibiotic prophylaxis.

Table 6

Antibiotic prophylaxis for infective endocarditis in dental care and procedures on upper respiratory tract—general anesthesia

	Antibiotic	Dosage and route of administration	
		Before (in the hour before the procedure)	After (6 h later)
No allergy to beta-lactams	Amoxicillin	2 g IV (infusion 30 min)	1 g per os
Allergy to beta-lactams	Vancomycin or Teicoplanin	1 g IV (infusion ≥ 60 min) 400 mg IV (bolus)	No 2nd dose

Pediatric dosage: amoxicillin 50 mg/kg IV before, 25 mg/kg per os 6 h later; vancomycin 20 mg/kg (maximum 1 g); teicoplanin: no official approval for antibiotic prophylaxis in children.

IV: intravenous.

Administration of antibiotics respecting contraindications and usual conditions of use and surveillance.

Table 7

Antibiotic prophylaxis for infective endocarditis during urological and digestive procedures

	Antibiotic	Dosage and route of administration	
		Before (in the hour before the procedure)	After (6 h later)
No allergy to beta-lactams	Amoxicillin then Gentamycin	2 g IV (infusion 30 min) 1.5 mg/kg IV (infusion 30 min) or IM	1 g per os pas de 2 ^e dose
Allergy to beta-lactams	Vancomycin or Teicoplanin then Gentamycin	1 g IV (infusion ≥ 60 min) 400 mg IV (bolus) 1.5 mg/kg IV (infusion 30 min) or IM	No 2nd dose

Pediatric dosage: amoxicillin 50 mg/kg IV before, 25 mg/kg per os 6 h later; gentamycin 2 mg/kg (maximum 80 mg); vancomycin 20 mg/kg (maximum 1 g); teicoplanin: no official approval for antibiotic prophylaxis in children.

IM: intramuscular, IV: intravenous.

Administration of antibiotics respecting contraindications and usual conditions of use and surveillance.

Table 8

Propositions for the assessment and diffusion of recommendations

1. Identification of the risk level related to a valvular disease (specify group A or B) according to the:
 - ultra-sonography report,
 - clinical file,
 - infective endocarditis prevention card
2. Heart disease health-care file for patients with a risk heart disease, in group A and B
3. Setting-up a cohort registrar of patients with a risk heart disease undergoing dental care
4. National registrar recording risk procedures and antibiotic prophylaxis preceding infective endocarditis

report's conclusion must, if necessary, indicate the presence of a risk heart disease for infective endocarditis as well as its risk class as defined in the recommendations (group A or B);

- a systematic and methodical follow-up of patients with a heart-disease undergoing risk procedures must be made using a personal follow-up file. This surveillance should concern all patients in Groups A and B. This systematic follow-up would allow diagnosing and thus an early treatment of infective endocarditis whatever its origin (due to daily bacteremia or a procedure). This follow-up file should mention the patient's group (A or B), allergy to b lactams, risk procedures undergone if any and the date they were made, use of antibiotic prophylaxis if any and type, infectious events.

Finally, it seems necessary to assess the validity of new recommendations and their bearing on the epidemiology of infective endocarditis by any appropriate means and especially the setting up of longitudinal registrars for patients with risk heart diseases, as well as registrars for risk procedures and conditions in patients with a documented endocarditis. A new epidemiological survey, similar to that of 1991 and 1999, should be planned within 5–10 years.

ADDENDUM 1

Specific dental terminology

Dental reimplantation: repositioning of a dislocated tooth in its alveolus after an accidental dislocation. A temporary restraint will keep it in place.

Dental transplantation: autogenous graft of a tooth from its alveolus to an empty alveolus.

Endodentrium: part of the tooth including the pulp and radicular canals.

Frenotomy: excision of a frenum or muscular membrane attachment (tongue frenum, upper or lower lip frenum...).

Germectomy: surgery for the excision of a tooth germ, that is to say the developing tooth included in the maxilla for an orthodontic purpose. It usually concerns wisdom teeth, but not exclusively.

Intra-ligamentous anesthesia: technique used to inject a few drops of local anesthetic in the periodontal ligament.

Periodontal probing: measuring the depth of a periodontal pouch with a sharp graded instrument.

Periodontal ligament: see periodontal ligament in the paragraph « alveolus ».

Polishing: instrumental polishing of the tooth's radicular surface. It is used as a complement of calculus removal.

Radicular amputation: a necessary surgery for the extraction of a radicle on a multiradicular tooth.

Radicular separation: surgery used to dissociate roots of a pluriradicular tooth so as to make its extraction easier.

Sub-gingival irritation: instillation of an antiseptic fluid between tooth and gum.

The sterile operating area: a latex sheet placed at the collum of one or several teeth so as to isolate them from saliva and mouth microbial flora. It is maintained with hooks.

ADDENDUM 2**Indications for infective endocarditis antibiotic prophylaxis concerning procedures for the buccodental area depending on the group of risk heart disease**

	Contraindicated acts (groups A and B)	
<ul style="list-style-type: none"> Intraligamentous local anesthesia Endodontic care: treating teeth with devitalized pulp, including further surgical pulp canal treatment 		
Surgical procedures		
Radicular amputation		
Transplantation/Reimplantation		
Periapical surgery		
Periodontal surgery		
Implant surgery		
Inserting filling material		
<ul style="list-style-type: none"> Dento-facial orthopedics 		
Preorthodontal surgery of impacted teeth		
	Antibiotic prophylaxis	
<ul style="list-style-type: none"> Setting up a sterile operating area Non surgical periodontal care <ul style="list-style-type: none"> Calculus removal with or without polishing, probing Endodontic care: treating teeth with live pulp* Prosthetic procedures with a risk of bleeding Surgical procedures 	Group A ↓	Group B ↓
Dental avulsion	Recommended	Optional
Healthy tooth		
Alveolectomy		
Separation of roots**		
Impacted tooth or disimpaction		
Germectomy		
Frenotomy		
Optional biopsies of salivary glands		
Bone surgery		
<ul style="list-style-type: none"> Dento-facial orthopedics 		
Inserting braces		
Non-invasive buccodental procedure (without important risk of bleeding)		
<ul style="list-style-type: none"> Prevention procedures 		
Application of fluor		
Coronal sealing		
<ul style="list-style-type: none"> Conservative procedures (coronal restoration) Non-bleeding prosthetic procedures (impression) Post-operative removal of sutures Inserting removable orthodontic prostheses Inserting or adjusting orthodontic devices Dental X-rays Non-intraligamentous local anesthesia 		Not recommended
In case of infection		Non adapted antibiotic prophylaxis Mandatory curative antibiotherapy

Recommendations defined by professional consensus, CIP: contraindicated procedure par accord professionnel.

* Endodontic care in group A patients must be exceptional. It can be undertaken only after checking the tooth's vitality using adequate tests, using a sterile operating area, in a single session, making sure that the entire pulp canal be accessible. This treatment must thus be reserved for monoradicular teeth, and eventually to the first bicuspids if both pulp canals are accessible.

** Separating roots should be avoided if possible and performed only in the absence of any periodontal condition.

ADDENDUM 3**Indications for infective endocarditis antibiotic prophylaxis in procedures other than buccodental according to the patient's group of risk heart-disease.****3.1 ENT procedures**

	Antibiotic prophylaxis	
	Group A	Group B
Tonsillectomy and adenoidectomy	Recommended	Optional
Endoscopic surgery for chronic sinusitis		
Rigid bronchoscopy		
Flexible bronchoscopy	Optional	Not recommended
Nasal or oral intubation*	Not recommended	
Nasal aspiration		
Laryngeal mask		
Percutaneous dilation of tracheostomy		

* Except in case of difficult and/or traumatic intubation, group A.

These recommendations do not contradict those concerning pre-operative antibiotic prophylaxis of surgical procedures.

3.2. Digestive procedures

	Antibiotic prophylaxis	
	Group A	Group B
Esophageal dilation		Recommended
Sclerotherapy*		
Retrograde cholangiography and sphincterotomy	Recommended in case of biliary obstruction or pseudo pancreatic cyst	
Elastic ligature of esophageal varices*	Optional	Not recommended
Colonoscopy**		
Fine needle puncture guided by ultrasonography		Not recommended
Gastroscopy		
Hepatic biopsy		

* Except during emergency hemostatic treatment.

** Possibility to use antibiotic prophylaxis after initiating the procedure if a neoplasm is discovered after biopsy, polypectomy, or mucosectomy or in case of difficult examination.

*** No data on risk of bacteremia after mucosectomy.
risk of bacteremia after mucosectomy) or in case of difficult examination.

3.3. Urological procedures

Trans-urethral prostatic resection Infected urines	Contra-indicated procedures (Groups A and B)	
	Antibiotic prophylaxis	
	Group A	Group B
Removal of a catheter inserted during an urological surgical procedure Infected urines		Recommended*
Trans-urethral prostatic resection Sterile urines	Recommended	Optional
Prostatic biopsy**		
Urethral dilation		
Extra-corporeal lithotripsy	Optional	Not recommended
Urethral catheter		Not recommended
Cystoscopy***		
Removal of a catheter inserted during an urological surgical procedure Sterile urines		

* The antibiotic is chosen according to results given by cytobacteriological examination of urines and antibiogram.

** Systematically preceded by rectal enema.

*** Procedure contraindicated in case of infected urines, antibiotic prophylaxis if biopsy, group A patient.

These recommendations do not contradict those concerning pre-operative antibiotic prophylaxis of surgical procedures.

3.4. Gyneco-obstetrical procedures

Intra uterine device	Contra-indicated procedures (Groups A and B)	
	Antibiotic prophylaxis	
	Group A	Group B
Low tract delivery	Optional*	Not recommended
Cesarean section**		Not recommended
Cervical or endometrial biopsy		
Curettage		

* In case of premature rupture of the amniotic membrane and labor onset 6 h before admission.

** Follow SFAR recommendations for the global population.

These recommendations do not contradict those concerning pre-operative antibiotic prophylaxis of surgical procedures.

3.5 Cardiac procedures

	Antibiotic prophylaxis	
	Group A	Group B
Trans-esophageal ultrasonography		Not recommended
Intra-aortic counterpulsation balloon		
Percutaneous coronary angioplasty with or without endoprosthesis		

3.6. Skin care and procedures

	Antibiotic prophylaxis	
	Group A	Group B
Instrumental treatment of furuncles		Recommended
Excision of skin lesions ulcerative or not		Optional