

Update on prevention and antimicrobial prophylaxis of infective endocarditis

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Summary

The Swiss expert group published revised guidelines on the prevention and antibiotic prophylaxis against infective endocarditis in 2021. In this viewpoint article, the group reports on their experiences two years after implementing the new prevention concept, which included information flyers and antimicrobial prophylaxis cards. Challenges included communicating the concept and indications for antimicrobial prophylaxis to both high-risk patients and providers.

Introduction

The indication and adequate use of antibiotic prophylaxis against infective endocarditis is frequently discussed in clinical practice. The growing use of implantable cardiac devices, advanced techniques in minimally invasive heart valve implantation, and the increasing number of adults with congenital heart disease have led to an increased number of patients at risk, emphasising the importance of preventing infective endocarditis. In 2021, the Swiss expert group published revised guidelines on the prevention and antibiotic prophylaxis against infective endocarditis [1]. This article reviews the cornerstones of these guidelines, highlights prevention strategies, and provides a 2024 update on the most recent adaptations [2].

The aim of antibiotic prophylaxis against infective endocarditis is to prevent bacterial attachment to the endocardium following transient bacteraemia after invasive procedures in high-risk patients. Earlier guidelines recommended antibiotic prophylaxis for almost all patients with any cardiac condition that could predispose them to infective endocarditis, and prior to a variety of invasive procedures. However, transient bacteraemia frequently occurs during daily activities, such as brushing teeth, flossing, or chewing, making it impossible to prevent all instances. Broad

and uncritical use of antibiotic prophylaxis increases the risk of adverse events and contributes to rising antimicrobial resistance.

In 2007, the American Heart Association (AHA) restricted antibiotic prophylaxis use to high-risk patients only [3]. In 2008, the United Kingdom's National Institute for Health and Care Excellence (NICE) advised against any antibiotic prophylaxis, regardless of risk category [4]. In subsequent years, an increase in infective endocarditis cases was observed, though without evidence of causality or an associated increase in mortality [5, 6]. The 2015 European Society of Cardiology (ESC) guidelines aligned with the second set of infective endocarditis AHA recommendations published in 2007 [7]. In 2019, a Swiss expert committee on infective endocarditis prevention revised the existing recommendations from 2008 [8], adapting the 2015 ESC guidelines [7] while considering issues relevant to the Swiss healthcare system. These recommendations were published in 2021 [1, 2] and were launched alongside an information campaign in collaboration with the Swiss Heart Foundation for both healthcare providers and patients [9]. In 2024, minor updates were implemented following the release of the 2023 ESC guidelines [10].

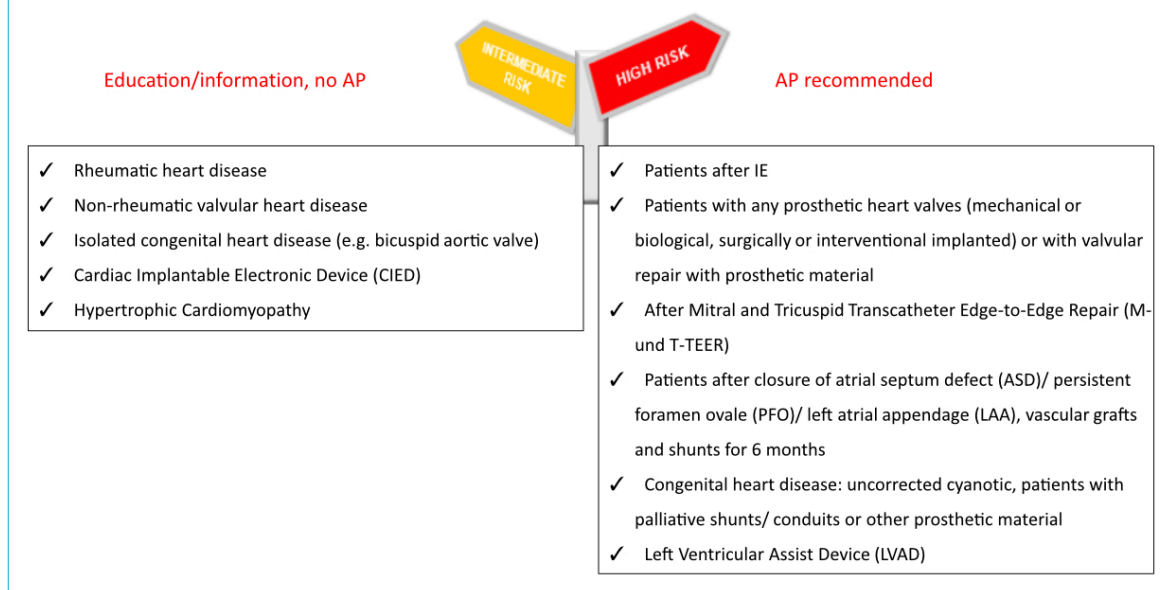
Reminder: What was new in 2021?

Heart disease

Antibiotic prophylaxis against infective endocarditis has been recommended since 2008 for high-risk patients only. However, from 2021, antibiotic prophylaxis is no longer recommended for patients with uncorrected ventricular septum defect or uncorrected patent ductus arteriosus Botalli. For heart transplant recipients, with or without valvulopathy, a case-based discussion is recommended [1, 2]. The number of individuals with heart transplants is low in Switzerland [11]. The existing evidence on this topic re-

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Figure 1: Patient risk categorisation according to the Swiss Infective Endocarditis Expert Group 2024 and adapted from the 2023 European Society of Cardiology (ESC) guidelines on infective endocarditis [7]. For heart transplant recipients, with or without valvulopathy, a case-based discussion is recommended [1, 2]. AP: antibiotic prophylaxis.



mains limited [12]. A list of high-risk conditions is provided in figure 1.

Invasive procedures

Based on the frequency of questions arising in clinical practice and for the purposes of teaching infective endocarditis prevention, invasive procedures with a risk of bacteraemia were divided into two categories, namely dental and non-dental procedures. Recommendations on antibiotic prophylaxis for dental procedures are noted on an infective endocarditis prophylaxis card, which is handed to patients at high risk for infective endocarditis. The current card replaces the previous cards that had different colours. Recommendations on antibiotic prophylaxis for non-dental interventions are displayed in publications for healthcare professionals [1, 2] and on websites [11].

Education

One of the most central elements of the infective endocarditis prevention strategy is the education of *all* patients at *any* level of risk for infective endocarditis. Therefore, the Swiss infective endocarditis expert group, in collaboration with the Swiss Heart Foundation, released a flyer for all at-risk patients in 2021 (figures 2 and 3). However, antibiotic prophylaxis is only recommended for high-risk patients. Moreover, raising awareness of the signs and symptoms of infective endocarditis triggers patients to seek medical help earlier in the course of the disease. New infective endocarditis cards were introduced, replacing the old ones, to help physicians identify at-risk patients and increase patient awareness.

How good is the information and communication strategy?

As outlined earlier, the prevention campaign was directed at *all* patients at risk for infective endocarditis. The information strategy included the following key elements: (a)

knowledge transfer to increase awareness of good dental and skin hygiene and (b) education about symptoms consistent with infective endocarditis and the appropriate steps to take when these symptoms occur (i.e., contact a doctor). Two years after the release of the Swiss guidelines, the expert group, together with the Swiss Heart Foundation, reviewed and evaluated how well the information and

Figure 2: Introduction of new endocarditis cards for high-risk patients, provided by the Swiss Heart Association (available in German, French, Italian and English at www.swissheart.ch).

Endocarditis prophylaxis

for adults with a high risk of infectious endocarditis

Swiss Heart Foundation
Fighting Heart Disease and Stroke

Endocarditis is an infection of the inner lining of the heart that is caused by bacteria. It is a rare but serious disease. You have a high risk of endocarditis. Therefore, you have to protect yourself from infection before dental treatment or dental hygiene procedures. Each time, you must take a dose of antibiotic (known as antibiotic prophylaxis or endocarditis prophylaxis).

☐ Mrs ☐ Ms ☐ Mr

Surname: _____

First name: _____

Date of birth: _____

Heart condition: _____

Penicillin allergy – delayed reaction* (skin rash)
☐ yes ☐ no

Penicillin allergy – immediate reaction** (hives, angioedema, bronchospasm, anaphylaxis)
☐ yes ☐ no

Doctor: _____

Date: _____

This endocarditis card is personal and will be filled out by your doctor. Show this card to everyone involved in your healthcare:

- before every visit to the dentist/ dental hygienist
- before every surgical procedure
- before an endoscopic examination

Antibiotic prophylaxis before dental treatment and dental hygiene

Antibiotic prophylaxis is recommended for any dental treatment that may cause bleeding, especially for:

- Manipulations of the gums or around the root of the tooth (periapical region; endodontics)
- Perforation of the mucous membranes in the mouth during dental surgery

Antibiotic prophylaxis should be taken one hour before the intervention. The following antibiotics are recommended:

Amoxicillin 2g
Alternatives for penicillin allergy
• Cefuroxime axetil 1g po
• Clindamycin 600mg po

If unable to swallow medication
Amoxicillin 2g iv
Alternatives for penicillin allergy if unable to swallow medication
• Cefazolin 1g iv or
• Ceftriaxone 2g iv
• Clindamycin 600mg iv or
• Vancomycin 1g iv

Antibiotic prophylaxis for other interventions (operations)

The recommendations can be found at <https://ssi.guidelines.ch> (– Infective endocarditis/Prevention).

If you have any questions on endocarditis and antibiotic prophylaxis, please ask your cardiologist.

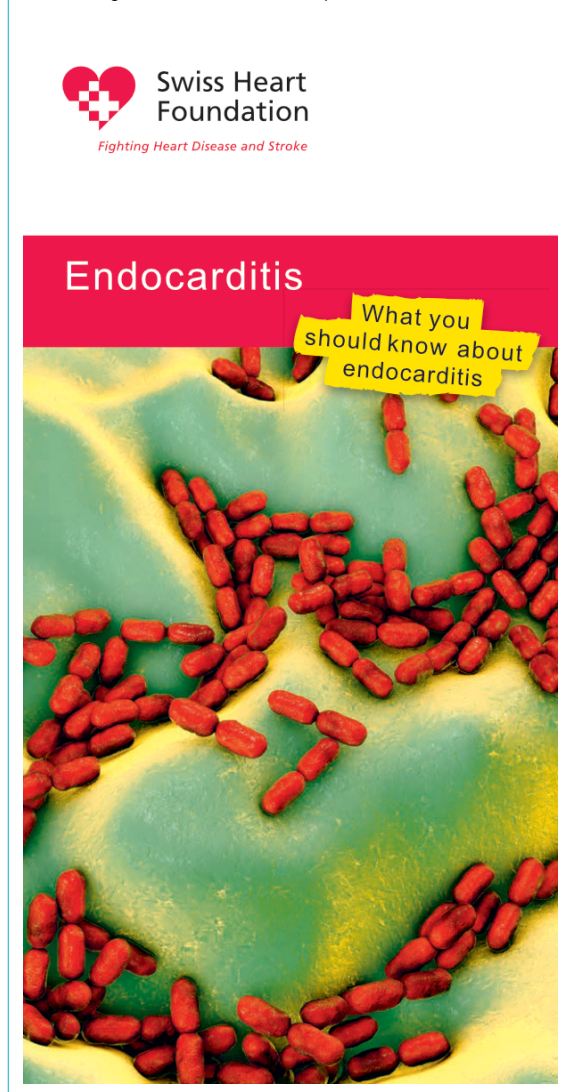
Recommendations drawn up by the Swiss Society for Infectious Diseases, the Swiss Society of Cardiology, the Swiss Society of Paediatric Cardiology and the Paediatric Infectious Disease Group of Switzerland.

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Figure 3: Introduction of new flyers for all at-risk patients, provided by the Swiss Heart Association (available in German, French, Italian and English at www.swissheart.ch).



communication strategy was distributed (Meeting at the Swiss Heart Foundation, Bern, Switzerland, December 5, 2022). The impression of the members was that the flyer was not as frequently distributed to *all* patients with any level of risk for infective endocarditis as expected. Although patients at the highest risk for infective endocarditis often received the flyer and the antibiotic prophylaxis card (i.e., they required antibiotic prophylaxis before dental intervention), those at intermediate (also called moderate) risk for infective endocarditis were missed. Consequently, providers were urged to distribute the flyer to *all* at-risk patients. This message will need to be continuously reinforced at education sessions, conferences, and meetings that include the topic of infective endocarditis across Switzerland.

Update 2023 from the European Society of Cardiology and adaptations to the Swiss guidelines

In 2023, the European Society of Cardiology released new guidelines on infective endocarditis [10], eight years after the previous update [7]. Antibiotic prophylaxis for high-

risk patients only and a patient-centred management approach continue to be the two cornerstones. The task force of the European Society of Cardiology members strengthened some preexisting specifications and elevated the classes of recommendations for several topics.

Dental procedures

Although antibiotic prophylaxis was “considered” for high-risk patients in the 2015 guidelines (Class IIa recommendation), the wording was changed to “indicated” (Class I) in the 2023 guidelines. Furthermore, there is stronger evidence that patients with previous infective endocarditis are at the highest risk (new evidence level B) [13].

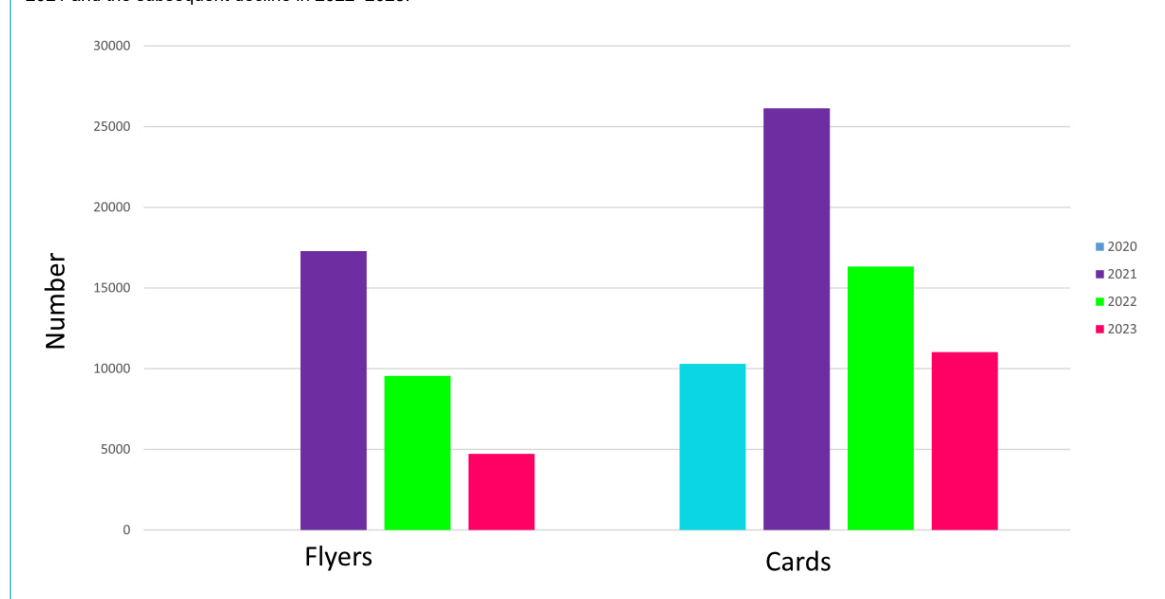
A new recommendation includes antibiotic prophylaxis for patients with a left ventricular assist device at destination therapy (Class I, evidence level C), and may be considered for heart transplant recipients (Class IIa). This was mentioned in the previous Swiss guidelines, though without a class of recommendation or level of evidence.

Because of the increasing number of transcatheter edge-to-edge valve repair cases, the European Society of Cardiology proposed antibiotic prophylaxis in these patients up to six months following their repair (figure 1). The benefits of this strategy appear to outweigh the risks of antibiotic side effects in this patient group, characterised by higher ages and morbidity and relatively low life expectancy. However, this matter is debated and should be decided on a case-by-case basis.

Non-invasive dental procedures

Recent studies from Sweden and England using nationwide databases have shown a link between non-dental invasive procedures and the risk of infective endocarditis. A Swedish study [14] compared infective endocarditis risk during two periods: 12 weeks before endocarditis and the same period one year earlier. In 7013 infective endocarditis patients, coronary artery bypass grafting, skin and wound procedures, transfusions, dialysis, bone marrow puncture, and some endoscopies, particularly bronchoscopy, were strongly associated with increased infective endocarditis risk. An English study [15] compared infective endocarditis hospital admissions in the 3 months before infective endocarditis (case period) with the preceding 12 months (control period), involving almost 15,000 admissions. It found associations between infective endocarditis and non-dental invasive procedures, such as permanent pacemaker and defibrillator implantations, gastrointestinal endoscopies, bone marrow biopsies, bronchoscopies, and blood transfusions. Based on this evidence, the European Society of Cardiology decided that a class III recommendation against antibiotic prophylaxis for high-risk patients undergoing non-dental medical procedures was no longer appropriate, supporting instead a class IIb recommendation. Our group feel that the evidence is too low, and we do not recommend antibiotic prophylaxis for non-dental invasive procedures. However, physicians should be aware of these findings and take special care with high-risk patients, adhering to infection control measures.

Figure 4: Distribution of endocarditis flyers and cards by the Swiss Heart Foundation from 2020 to 2023. Flyers have been available since 2021, meaning there was no distribution in 2020 (i.e., the missing blue column on the left). A new version of the endocarditis cards and flyers was printed in 2021 and then distributed gradually over the following years. This explains the high number of flyers and cards distributed in 2021 and the subsequent decline in 2022–2023.



Outlook

We are convinced that our efforts to improve patient education and prevention strategies are heading in the right direction; however, further promotion is necessary. All disciplines involved must work together. Over the last three years, since the publication of the Swiss Update Initiative in 2021, the most challenging aspect of our campaign has been the dissemination of information to providers who have direct patient contact. Figure 4 shows the number of endocarditis cards distributed by the Swiss Heart Foundation from 2021–2023.

Infective endocarditis is a systemic disease with a non-specific clinical presentation. First contact with medical personnel can involve various specialists, with cardiologists often being last. Therefore, education concerning early diagnosis must be provided. Many disciplines are involved in the management and prevention of infective endocarditis. A broad dissemination campaign targeting healthcare professionals, in particular general practitioners and medical practice assistants, is essential to reach as many people as possible to promote consideration of infective endocarditis early in the diagnostic process. Another goal is to increase the awareness of risks and hygiene precautions for *all* at-risk patients. These goals underscore the importance of educating both patients and doctors.

Potential competing interests

All authors have completed and submitted the International Committee of Medical Journal Editors form for disclosure of potential conflicts of interest. No potential conflict of interest related to the content of this manuscript was disclosed.

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