

# **DENTAL INTERVENTION AND THE RISKS OF BACTERIAL ENDOCARDITIS IN THE HOSPITAL ENVIRONMENT**

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**Abstract:** The oral cavity is a very large entrance for various periodontal diseases and the development of systemic pathologies. Therefore, not taking proper care of oral health can lead to the development of much more than inflammation, and this becomes even more worrying when it involves patients hospitalized in the hospital environment with valvular cardiovascular disease. Bacterial endocarditis is a serious disease that settles in the endocardium and that can compromise the functioning of the heart muscle with serious risks, due to carelessness in relation to bacterial manifestation. The objective of this work is to analyze the main risks in relation to bacterial endocarditis in the hospital environment, as well as when the patient is submitted to some dental intervention. A search was carried out in the databases: Scielo and PubMed, using the following keywords: Bacterial endocarditis; hospital environment; risks, covering the period from 2000 to 2021. Bacterial endocarditis sets in when bacteria penetrate the bloodstream, migrate to the endocardium and adhere. Microorganisms begin to multiply and cause vegetation to appear, which are structures made up of cell debris, fibrin, platelets and bacteria, making it difficult for the heart to pump blood and leading to a risk of heart failure. It is concluded that bacterial endocarditis is a serious disease that can lead the patient to death, as it has a high risk of heart failure. For this reason, it is important to have a multidisciplinary team together with the dental surgeon in the hospital environment to develop therapeutic and prophylactic protocols for patients who need dental intervention.

**Keywords:** Bacterial endocarditis; hospital environment; risks.

## INTRODUCTION

Bacterial endocarditis is a disease, which results from the invasion of bacteria in the

bloodstream and adhere to the structures of the endocardium or the prosthetic material of the heart. This bacterial infection is described by two forms, acute and subacute.<sup>1</sup>

The acute manifestation arises with severe toxicity and can evolve over days or even weeks to deteriorate valve structures and metastatic infection. The subacute manifestation, on the other hand, can evolve over weeks or even months, with modest toxicity, with a rare cause of metastatic infection.<sup>2</sup>

The main factors that can cause risks of bacterial endocarditis are injuries to the structures of the endocardium, which were caused by some congenital or even acquired disease. In dentistry, the main factors that can cause bacterial endocarditis are periodontal diseases, caries lesions, alveolar abscesses, consequences of oral surgery or some other procedure that involves bleeding, thus, these factors are the main factors for a possible bacteremia.<sup>1,2</sup>

Thus, maintenance, prevention, planning, correct protocols are extremely important measures for the treatment and reestablishment of the patient in the hospital environment. Thus, bacterial endocarditis is a disease with serious consequences whose cause may be correlated with dental procedures. Thus, it is essential for dentists to be well informed and disciplined along with a multidisciplinary team to intervene with caution and precision.<sup>2,3</sup>

## OBJECTIVE

The objective of this study is to analyze and describe the main risks of bacterial endocarditis within the hospital environment, under the need for dental intervention, as well as prevention protocols and treatment management.

## **MATERIALS AND METHODS**

The stages of this work comprise a bibliographic review on the subject, which will be used a bibliographical exploration in the PubMed, Scielo and Lilacs databases. With this review, we intend to deepen the knowledge about the risks of bacterial endocarditis in the hospital environment.

All studies that met the criteria were included in the work, those that did not meet the requirements were excluded. For the inclusion and exclusion of works, the level of relevance, year of publication and modality of the journal were used, following the Qualis of the 2021 journal.

Therefore, with this search strategy in the databases, 55 articles were found; of these, 26 productions were selected according to the inclusion and exclusion criteria.

## **LITERATURE REVIEW**

Bacterial endocarditis is a serious disease that affects the endocardium, that is, it causes inflammation in the tissue that lines the internal structure of the heart and heart valves. Therefore, it comes from bacteria that invade and circulate in the bloodstream and that settles in the endocardium, damaging the intimate layer of blood vessels. Thus, it is an infection with a high risk of mortality and that can be associated with several complications.<sup>4</sup>

## **CLASSIFICATION**

Bacterial endocarditis can be described in two ways, one being as acute bacterial endocarditis, which is an infection that develops over a short period of time, which causes intense symptoms and is easy to identify. Subacute bacterial endocarditis, on the other hand, may have an identification time of weeks or months and demonstrates less specific symptoms in relation to acute bacterial endocarditis.<sup>6,7</sup>

## **SIGNALS AND SYMPTONS**

Symptoms vary according to the type of infection, in acute bacterial endocarditis they include chills, shortness of breath, very high fever, excessive tiredness, localized swelling in the legs and feet, small foci of bleeding in the feet and hands.<sup>8</sup>

Symptoms of subacute endocarditis can include weight loss, lack of appetite, low-grade fever, night sweats, easy tiredness, small painful nodules on the feet and hands, and some ruptured blood vessels in the eyes, inner cheeks, roof of the mouth, and chest.<sup>8,9</sup>

## **DIAGNOSIS**

For the diagnosis of bacterial endocarditis, a careful anamnesis must be carried out, carrying out a survey of the clinical history and the symptoms that the patient presents.<sup>10, 11, 12</sup> After that, rely on the physical examination. In addition, blood culture is a type of test that has shown to be indispensable for identifying the type of bacteria responsible for the infection and also for guiding the treatment.<sup>13, 14</sup>

Another crucial type of examination is the echocardiogram, which uses sound waves to construct images of the structure of the heart, thus reproducing the conditions in which the heart valves are found and recognizing the presence of clots.<sup>15, 16</sup>

In addition, magnetic resonance imaging and computed tomography are other types of imaging tests that may be useful in certain situations, as they allow the recognition of the characteristics of bacterial endocarditis.<sup>17, 18</sup>

## **TREATMENT**

Since, with suspicion of infection, treatment protocols must be started and the same must be done in a hospital environment due to the indication of very high doses of antibiotics, intravenously for several weeks, depending on the clinical stage.<sup>18, 19</sup>

Thus, the application of this therapy is to avoid injuries to the heart valves and other complications of the disease. Broad-spectrum antibiotics must be prescribed until blood culture tests are conclusive. Also, surgery may be indicated as a resource to correct the defect and improve cardiac function, and this applies when there is no time to control the infection, thus avoiding damage to the endothelium structures.<sup>20,21</sup>

## PREVENTION

Currently, the indication of antibiotic prophylaxis is reserved for patients with risk factors for bacterial endocarditis before procedures, whether dental, urological or gastrointestinal.<sup>22</sup>

Among the patients at risk for bacterial endocarditis are patients with prosthetic valves, cyanotic congenital disease, patent ductus arteriosus, aortic regurgitation, aortic stenosis, mitral regurgitation, double mitral lesion, intraventricular septal defects, coarctation of the aorta, and surgically repaired intracardiac lesions, who have an abnormality residual hemodynamics.<sup>22,23</sup>

Thus, in dentistry, antibiotic therapy for this risk group consists of 2 grams of amoxicillin 1 hour before the procedure and 1 gram 8 hours after the first dose, when the patient is not allergic to penicillin. When the patient is allergic to penicillin, 600 mg of clindamycin 1 hour before or 500 mg of azithromycin 1 hour before can be chosen, according to the adult profile.<sup>18,23</sup>

For children it consists of 50 mg/kg of amoxicillin 1 hour before, when they are not allergic. When allergic, 20 mg/kg of clindamycin 1 hour before or 15mg/kg of azithromycin 1 hour before.<sup>18,23</sup>

## RECOMMENDATIONS

Within oral health recommendations, carry out regular dental appointments, try

to introduce a healthy diet, try to reduce sugar consumption, avoid or try to minimize cigarettes for those who smoke, exercise good oral hygiene, thus avoiding the formation and adhesion of bacterial plaque.<sup>24</sup>

## DENTAL INTERVENTION AND THE RISKS

The oral health condition of patients hospitalized in the hospital environment depends on many factors, that is, it is multifactorial, among which we can mention immunity, oral microbiota and dental biofilm. Such factors mentioned may favor the accumulation of biofilm, periodontal problems, coating on the tongue, as well as the emergence of opportunistic infections. Among the infections that are opportunistic, there is bacterial endocarditis, which is a manifestation and proliferation of bacteria in the bloodstream, causing them to migrate to the endocardium and adhere to the walls, leading to serious health risks.<sup>24, 25</sup>

Thus, many patients hospitalized in the hospital environment need to undergo a dental procedure, and monitoring by a qualified dentist in Hospital Dentistry is extremely important. The dentistry professional is paramount in assessing the presence of periodontal diseases, oral biofilm, caries lesions, oral lesions resulting from systemic fungal and viral infections and traumatic lesions that present risks to patients who are hospitalized. Studies report that care and good clinical planning in the face of dental interventions significantly reduce the increase of bacteria in the oral cavity, thus preventing a future complication of bacterial endocarditis or even softening the condition of patients who have a higher risk of developing this illness.<sup>25, 26</sup>

Aiming at this context, the presence of the dental surgeon in the hospital environment is indispensable, as he develops activities to

implement oral hygiene with hospitalized patients, since this practice plays an important role in the control of infections and pain.<sup>23, 26</sup>

Studies also show that a multidisciplinary team in hospital environments has contributed to minimize the risks of bacterial endocarditis infections, better quality of life, reduced length of stay and the patient contemplates a more humanized and complete care.<sup>26</sup>

## DISCUSSION

According to Anguita et al.<sup>1</sup> (2021), bacterial endocarditis is an inflammatory process involving the endocardium, which is caused by bacteria that adhere to and form biofilm on the valves and endothelial surfaces of the heart. This pathological process causes bacteremia to occur, that is, bacteria circulating in the blood. Bascones-Martínez et al.<sup>2</sup> (2012) describe that this condition can occur with individuals with heart valves that do not present anatomophysiological alterations, and the circulation of bacteria in the bloodstream will not cause damage, since these are destroyed by the cells of the immune system. But when the individual has valve disease, microorganisms can adhere to the walls of the myocardium and proliferate.<sup>1,2,22</sup>

In this sense, Duval et al.<sup>7</sup> (2019) state that dental procedures are responsible for approximately 40% of cases of bacterial endocarditis. Dental procedures that involve manipulation of the gingival tissue or periapical region, or perforation of the buccal mucosa, such as single or multiple extractions, periodontal scraping, intra-ligamentous anesthesia, are considered favorable to bacteremia and bacterial endocarditis<sup>9,15</sup>

Fortini, McNeil<sup>9</sup> (2021) point out that patients with high-risk cardiac conditions, such as a previous history of infective endocarditis, prosthetic heart valves or prosthetic material used to repair heart

valves and others, must receive antibiotic prophylaxis.<sup>7,9,15</sup>

Thus, Montano et al.<sup>19</sup> (2021) argue that hospitalized patients may further increase the risk of developing bacteremia, due to the large number of infectious agents present at the site. The hospital environment offers varied and highly resistant infectious agents. Escudero-Sánchez et al.<sup>8</sup> (2021) also exposes in their study analyzes that hospitalized patients have a greater risk of acquiring infections due to the nature of the hospital, as they will be exposed to microorganisms that they would not come into contact with in their daily lives. These patients are more weakened and their defenses against infections are weakened.<sup>8,19,20</sup>

Many of the hospitalized patients require dental interventions, Rutheford et al.<sup>21</sup> (2022) report that approximately 68% of hospitalized patients have dental caries and periodontal pockets with a mean probing depth of 5.7 mm. Wu et al.<sup>25</sup> (2020) emphasize that periodontal disease is a risk factor for bacterial endocarditis because it is an infectious and inflammatory condition with a multifactorial character that affects the supporting tissues of the dental element. In the face of periodontal disease, the periodontal tissue is highly vascularized and the epithelium of the gingival sulcus or periodontal pockets may present with ulcers, allowing an intimate relationship between the microbial biofilm and the blood capillaries, which increases the risk of bacteremias.<sup>21,23,25</sup>

Furthermore, Villafuerte-Mollinedo et al.<sup>24</sup> (2020) point out that oral hygiene is considered deficient in 91.5% of hospitalized patients. It is known that poor oral hygiene and oral infections can develop transient bacteremia even if dental procedures are not performed. The occurrence and severity of bacteremia processes of oral origin, in general, are directly proportional to the

level of inflammation or infection of the oral tissues.<sup>24</sup>

With this, Wu et al.<sup>25</sup> (2020) makes clear the need for regular preventive dental care for patients at risk of heart disease, highlighting the importance of interaction between health professionals to integrate oral health as part of a comprehensive hospital care. Thus, Zegri-Reiriz et al.<sup>26</sup> (2018) argue that the multidisciplinary team, including the dentistry professional, must identify patients at high risk of developing or with a history of Infective Endocarditis, with the purpose of identifying the risk and adopting measures preventive measures of the disease, since most dental procedures are the main cause of transient bacteremia, which can lead to the evolution of this pathology.<sup>25,26</sup>

In addition, Zegri-Reiriz et al.<sup>26</sup> (2018) add that in the face of procedures that require intervention, technique, management, and mechanisms are needed to control and prevent microorganisms in the hospital environment from further increasing the risks of the disease. It is important to emphasize the need and responsibility of the hospital to guide patients, professionals and visitors, showing ways to prevent and control infection.<sup>26</sup>

## CONCLUSION

Bacterial endocarditis is an infectious disease with a high degree of morbidity, according to the cited studies. Thus, the evaluation of the oral cavity of patients with a history of infective endocarditis is paramount, as well as the medical history and the need for antibiotic prophylaxis in the face of any dental intervention in the hospital environment.

This way, the multidisciplinary hospital team, including the dentist, needs to carry out a clinical examination and a very detailed anamnesis of the patients. If the need arises for any dental intervention, the professionals involved must draw up a treatment plan and

carry out a safe protocol, preventing the risks of developing or aggravating infective endocarditis, which can lead to death. Furthermore, pay attention to infected agents in the hospital environment, as they contribute to increased risks.

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