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REFLECTION ARTICLE

# The importance of patient safety and compliance with antibiotic prophylaxis in surgeries within one hour

*La importancia de la seguridad del paciente y el cumplimiento de la profilaxis antibiótica en cirugías en el plazo de una hora*

*A importância da segurança do paciente e o cumprimento da antibioticoprofilaxia nas cirurgias dentro de uma hora*

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**Abstract**

The aim was to understand the factors behind the non-use of the checklist and the relevance of using antibiotic prophylaxis for patient safety. This is a reflection study of secondary sources, carried out through the Virtual Health Library and ANVISA documents. In eight countries, the use of the checklist found a reduction from 11% to 7% in the occurrence of complications in surgical patients and a reduction in mortality from 1.5% to 0.8%. It is concluded that not using the checklist can pose risks to patient safety, increasing the percentage of errors, causing losses to institutions, and the imminent death of patients. It was evident that antibiotic prophylaxis must be carried out up to 60 minutes before the surgical incision, with it being carried out before 60 minutes or after the recommended time due to low efficacy.

**Descriptors:** Safe Surgery; Surgical Protocols; Patient Safety; Checklist; Antibiotic Therapy.

**Resumén**

El objetivo fue comprender los factores detrás de la no utilización de la lista de verificación y la relevancia del uso de profilaxis antibiótica para la seguridad del paciente. Este es un estudio de reflexión de fuentes secundarias, realizado a través de la Biblioteca Virtual en Salud y documentos de la ANVISA. En ocho países, se encontró una reducción del 11% al 7% en la aparición de complicaciones en pacientes quirúrgicos y una reducción de la mortalidad del 1,5% al 0,8% con el uso de la lista de verificación. Se concluye que no utilizar la lista de verificación puede presentar riesgos para la seguridad del paciente, aumentando el porcentaje de errores, provocando pérdidas a las instituciones, además de la muerte inminente de los pacientes. Se evidenció que el uso de profilaxis antibiótica debe realizarse hasta 60 minutos antes de la incisión quirúrgica, realizándose antes de los 60 minutos o después del tiempo recomendado por baja eficacia.

**Descriptores:** Cirugía Segura; Protocolos Quirúrgicos; Seguridad del Paciente; Lista de Verificación; Terapia con Antibióticos.

**Resumo**

Objetivou-se compreender os fatores da não utilização do *checklist* e a relevância do uso do antibioticoprofilaxia para segurança do paciente. Trata-se de um estudo de reflexão de fontes secundarias, realizado por meio da Biblioteca Virtual de Saúde e documentos da ANVISA. Em oito países encontrou-se uma redução de 11% para 7% da ocorrência de complicações em pacientes cirúrgicos e uma diminuição de mortalidade de 1,5% para 0,8% com o uso da lista de verificação. Conclui-se que a não utilização do *checklist* pode trazer riscos à segurança do paciente, aumentando o percentual de erros, favorecendo prejuízos para as instituições, além da eminência de óbitos dos pacientes. Evidenciou-se que o uso do antibioticoprofilaxia deve ser realizado até 60 minutos que antecedem a incisão cirúrgica, sendo irrelevante a realização anterior aos 60 minutos ou posterior ao tempo preconizado devido à baixa eficácia.

**Descritores:** Cirurgia Segura; Protocolos Cirúrgicos; Segurança do Paciente; Checklist; Antibioticoterapia.

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## Introduction

The objective of this study is to discuss the importance of patient safety within the surgical center and demonstrate that the checklist carried out is useful to avoid possible errors, and reduce the rate of surgical complications, and the importance of prophylactic antibiotics being administered 60 minutes before surgery. procedure.

In the years 2007/2008, the World Health Organization (WHO) implemented the surgical safety checklist, this list contains simple and quick questions that can help to know which procedure the patient will undergo, with which surgeon, whether they have allergies, comorbidities, etc. This instrument covers the actions carried out within the surgical center at three different moments: before anesthetic induction, before the surgical incision, and at the end of the surgery[1].

The problem of surgical safety is recognized throughout the world. In developed countries, studies confirm the magnitude and generalization of the problem. In the developing world, the poor state of infrastructure and equipment, supplies and quality of medicines that do not inspire confidence, failures in organizational management and infection control, inadequate staff training, and severe underfunding[2].

The topic of patient safety has gained relevance. The basis for this report was two surveys carried out in New York, Utah, and Colorado, addressing the incidence of adverse events. The report found that around 100,000 people died each year in hospitals from adverse events in the USA. In Brazil, on average, 10% of hospitalized patients suffer some type of adverse event and, of these, 50% are preventable[3,4].

The surgical checklist (SSC) was developed by the WHO and is applied and established as criteria for performing surgeries to provide patient safety. This list includes criteria based on effective evidence to combat, there are already reports that the introduction of the list in operating rooms reduces the risks of morbidity, complications, and even mortality, reducing SSI[2].

It is a simple and easy-to-apply list, it is carried out by a healthcare professional, in many places it is known as a checklist or patient safety checklist, this list is carried out before starting the surgical procedure.

The creation of this list was made up of three steps, the first is simplicity, being easy to carry out, and having simple and objective questions that do not make the professional or the patient feel exhausted when answering them. The second stage is broad scope, in which the list can be modified according to the needs of the institution/environment. And the last step is the possibility of measurement. If all these steps are followed, the safe surgery checklist is performed correctly.

The list is divided into three different periods, before anesthetic induction, carried out in the operating room verbally with the entire team present, this stage is called identification, where the patient's name is confirmed, whether they have allergies, comorbidities, procedure to be performed, location of the incision, if there is a risk of blood loss, difficult airway, etc.

In the period before the surgical incision, the professionals in the room are checked, such as the surgeon and his name, the material that will be used is checked, whether the antibiotic was used, this step is called confirmation, and the last and not least before the end of the surgery, where the compresses are checked depending on the surgical procedure, the count of instruments and needles used.

It is through this simple list, but very helpful, that we can avoid several mistakes, from the beginning, such as the procedure that the patient will undergo, to checking the instruments, for this process to be successful it is important that the entire multidisciplinary team is focused with the same objective, which seeks to pass on knowledge to the entire team and who are willing to carry them out.

The Checklist conductor verbally confirms with the patient their identification, the type of procedure planned, the surgical site, and the signature of the consent for surgery. When confirmation by the patient is not possible, such as children or incapacitated patients, a guardian or family member may assume this role[5].

Many factors contribute to a surgical procedure being carried out safely: trained professionals, environment, equipment, and materials suitable for carrying out the procedure, and compliance with current legislation, among others. However, this protocol specifically addresses the systematic use of the Safe Surgery Checklist as a strategy to reduce the risk of surgical incidents. It is based on the Safe Surgery Checklist and the Safe Surgery Manual developed by the WHO[5].

Given the above, the objective was to present the importance of patient safety by complying with the administration of antibiotic prophylaxis in surgeries within one hour.

## Methodology

This is a reflection study, of a critical and descriptive nature, with data collection carried out from secondary sources, through a bibliographic survey in the Virtual Health Library (VHL) and the collection of the National Health Surveillance Agency (ANVISA). The search for studies occurred using the following descriptors: “Safe Surgery”, “Antibiotic prophylaxis” and “Checklist”. The search period will be between February to July 2023, to select the articles, the titles, and respective summaries of all those that appeared in the search results were read and subsequently the full text. Next, the study selection process will be presented (Figure 1).

## Results

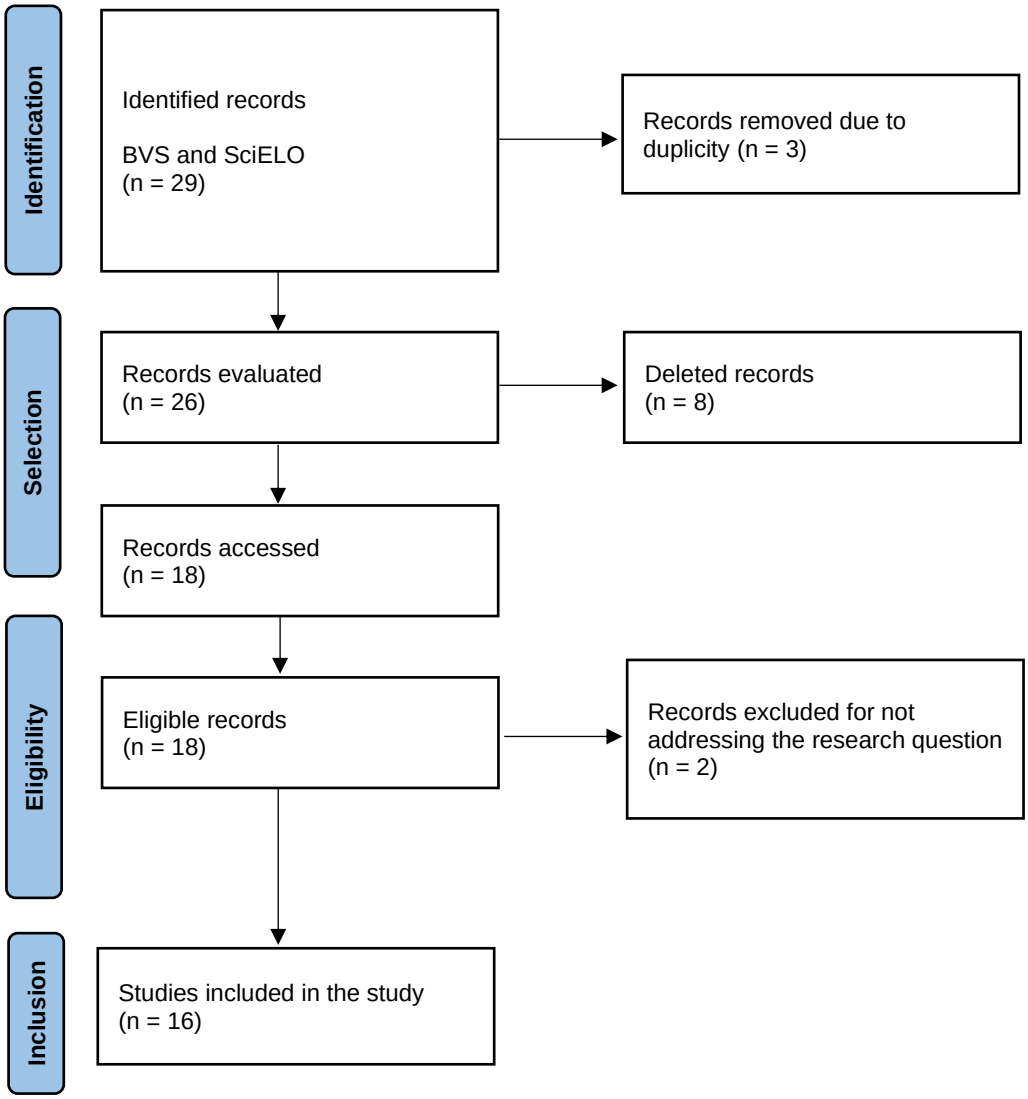
### Antibiotic

To start talking about antibiotics, we need to go back to the beginning, where it all began, the first antibiotic created was penicillin by Alexander Fleming, around 1928, being the first to research penicillin, and it was through its discovery that opened doors for new antibiotic research.

The advent and knowledge of prophylactic action developed in the 1960s, in which we learned greatly from the

ability of bacteria to develop and transmit resistance to new drugs, causing antibiotics to be modified over the years[6].

**Figure 1.** Study search and selection flowchart. Tatuí, SP, Brazil, 2023




Surgical antibiotic prophylaxis refers to the prevention of infectious complications by administering an effective antimicrobial agent prior to exposure to contamination during surgery. Successful antibiotic prophylaxis requires the release of the antimicrobial agent in effective concentrations at the operative site before contamination occurs[7].

In some cases, an increase in surgical wound infection was observed, in addition to the emergence of resistant strains. However, with better knowledge of the appropriate use of antibiotics for prophylactic purposes, the incidence of infections in clean surgeries was reduced from 5.1% to 0.8%, in potentially contaminated surgeries from 10.1% to 1.3%, and in contaminated ones from 21.9% to 10.2%[8].

The antimicrobial chosen for surgical prophylaxis must have minimal toxicity, low cost, be a weak inducer of resistance, have a parenteral presentation, and have adequate pharmacokinetics, in addition to being endowed with activity against most pathogens that cause surgical site infections (SSI)[9].

Antibiotic prophylaxis is indicated in clean, potentially contaminated, and contaminated surgeries. The difference between these surgeries is the antibiotic that will be performed, this choice being made by protocols that exist in institutions, whether in the public or private network. The right way to carry out antibiotic prophylaxis is up to 60 minutes before the surgical incision, choose the drug to be used according to the site to be operated on, and discontinue the drug within 24 hours. The antibiotic can be administered by the room circulator, nurse, or anesthesiologist, and must be administered intravenously, and the dose to be administered is calculated according to the patient's weight.

In cases of vancomycin and ciprofloxacin, it is up to two hours before the incision, and for most surgical procedures a single dose of the antibiotic is sufficient. Additional doses should be administered for procedures lasting more than two half-lives of the drug or if there is blood loss greater than 1.5 liters.[10].

It is observed that some of the antibiotic prophylaxis used, such as 1st generation cephalosporins,

which are the drugs of choice for most surgical specialties; cefazolin has a half-life of two hours and therefore covers surgeries lasting up to 3-4 hours; cephalothin has a shorter half-life (28 minutes) requiring reuse every hour of surgery[11].

Antibiotics are among the most used medications in hospitals. According to a study carried out in 2014, the inappropriate use of antibiotics was evidenced in 50% of the prescriptions analyzed. In addition to the wrong choice of antimicrobial agents, the incorrect duration of treatments was also found[12].

A retrospective analysis of 114,677 patients hospitalized in a hospital unit between the years 2009 and 2011 reported that surgical patients who developed complications of infection had higher mortality than non-surgical patients with complications of infection (14.4% vs 3. 7%, by < 0.001). Adding all complications, there was significantly higher mortality[13].

The function of antibiotic prophylaxis is to prevent infections at surgical sites, which does not intend to prevent other infections - such as urinary tract infections -, even if administered incorrectly, it results in costs for the institution. In addition to the physical, psychological, and financial losses to affected patients, SSIs can prolong the patient's stay by an average of seven to eleven days, in addition to increasing the chance of hospital readmission, additional surgeries and, consequently, exorbitantly increasing healthcare costs for the patient. treatment, which could reach US$ 1.6 billion annually[7].

**Antibiotic prophylaxis protocol**

It is observed that there are measures to evaluate the use of antibiotic prophylaxis in institutions, such as indicators that serve to identify and monitor what is being done and, when necessary, propose improvements. It is through them that you can have a realistic and objective analysis of the effectiveness of managing your results.

Education is an essential component for the success of the Antimicrobial Use Management Program, which permeates all or almost all its strategies. An important aspect is continued training for the entire institution on the program and the actions and strategies for specific sectors involved. It is important to establish educational priorities according to the main difficulties detected and the most prevalent problems[14].

The development of clinical protocols based on scientific evidence and consensus practices is of fundamental importance to guide the actions of health professionals, both technicians and managers. It has been demonstrated that the adoption of protocols for the use of antimicrobials is effective in promoting the correct use of these drugs and, therefore, this strategy has been adopted by several countries. Health services must develop or adapt their own protocols, according to clinical characteristics and profiles[14].

**Microbial resistance**

The World Economic Forum in 2017 identified antibiotic resistance as a global risk. This problem is far beyond the reach of any organization or nation to manage or mitigate alone. In general, there is little awareness of the social, economic, and financial impacts of this problem. In developed economies, this problem increases healthcare expenses and increases care costs. It is known that many bacteria already have a natural resistance character, intrinsic resistance. However, it is noteworthy that many of the behaviors toward antibiotics are decisive for preserving the sensitivity profile to available drugs. Measures that contribute to containing antimicrobial resistance include adequate prescription, community education, surveillance of resistance and infections associated with healthcare, and compliance with legislation on the use and dispensing of antimicrobials[15,16].

Considering the high impact of inappropriate use of antibiotics in the context of care for surgical patients, the establishment of management programs for the use of antibiotics is also strengthened in the context of surgical antibiotic prophylaxis. These management programs are likely the most effective way to control the spread of antibiotic resistance, prevent surgical site infections, and increase patient safety[16].

**Surgical site infection**

Postoperative infection, even over the years, continues to be a concern for health professionals, its incidence varies from hospital to hospital, from procedure to procedure, and, mainly, from patient to patient[6].

The risk of SSI has decreased significantly over the past three decades, primarily due to advances in hygiene requirements, sterile procedures, and antibiotic prophylaxis[17].

SSIs are those that occur as a complication of surgery, compromising the incision, tissues, organs or manipulated cavities, and can be diagnosed between 30 days after the procedure and up to three months, depending on the procedure and the presence or absence of a prosthesis. SSIs can be classified into skin and subcutaneous cellular tissue: Superficial incisional SSI that affects the skin and subcutaneous cellular tissue; fascia and muscle: Deep incisional SSI that affects fascia and muscle; organ and space: SSI that affects organs and spaces[18].

Surgeries are classified according to their potential for contamination: clean: elective, without invasion of mucous membranes or other colonized tract, potentially contaminated: affecting mucous membranes, digestive or female genital tract, or cervix with preparation; contaminated: involvement of highly contaminated fabrics; and infected: tissues with infection. Antimicrobial prophylaxis is not usually used in clean surgeries, where the risk of infection is low[19].

In Brazil, it is understood that surgical site infections rank third in healthcare-related infections, representing around 14 to 16% of cases presented by hospitalized patients. SSI is associated with increased mortality, in addition to prolonging the period of hospitalization. It has an average mortality rate of 3%, highlighting the fact that 75% of deaths of patients with surgical site infections are directly linked to the infectious process as the primary cause of death[20].

One of the first risk factors for surgical site infections is the patient himself who, in some cases, has comorbidities, such as high blood pressure, diabetes, distant infection, and immunosuppression, among others. The second factor is the surgical procedure, the lack or ineffectiveness of hand washing, incorrect disinfection in the area to be operated, long surgeries, etc.

Depending on the location of the procedure, it is necessary to instruct the patient to take a pre-operative bath with antiseptic solutions, such as chlorhexidine. The team must remove all decorations, wash their hands and forearms correctly, and have short, clean nails. In the case of antibiotic prophylaxis, perform the procedure only when indicated and be administered sixty minutes before the surgical incision. And, concerning the surgical environment, keeping the doors of the operating rooms closed, sterilizing the materials used, concurrent and terminal cleaning, among others.

**Discussion**

In the selected articles, the importance of dialogue between the surgical center team was verified, as this has improved communication between the team and the distribution of tasks between applying the checklist and administering antibiotic prophylaxis, in addition to communication with patients. The lack of this dialogue, and even the lack of knowledge and mastery of this technique, can result in costs for the institution and even lead to the death of the patient. The lack of knowledge on this topic is well addressed in the studies analyzed, hence the importance of training for teams.

The patient safety list is simple and easy to apply, it contains data such as the patient's name, what the procedure is, whether the patient has allergies, comorbidities, and laterality of the surgery, especially in orthopedic surgeries, among other questions.

The checklist is carried out in three different stages, before anesthetic induction, where it is checked whether it is the correct patient to undergo the procedure, whether the procedure is correct, and whether the antibiotic was administered 60 minutes before the incision. The second stage is before the incision, in which the name of the entire team and the role of each one is checked, as well as the material to be used in the room, and the last, but not least, is before leaving the room, in which the instruments are checked, the compresses used and whether material was collected for analysis.

It is important to highlight the importance of antibiotic prophylaxis, which, over the years and through research, has been improved and improved, and that its use must be carried out up to 60 minutes before the surgical incision, before or after this time it is not as effective as expected. Furthermore, every institution, through the multidisciplinary team, must create or adapt a protocol for its institution.

According to a study, the risk of SSI has decreased significantly over the last three decades, mainly due to advances in hygiene requirements, sterile procedures and antibiotic prophylaxis. However, this varies from institution to institution, to keep SSI numbers low, it is very important to raise awareness among health professionals through lectures and courses[17].

**Conclusion**

In conclusion, this work highlights the crucial importance of using the checklist in patient safety, showing that its non-use can result in significant risks, including an increase in errors, losses to institutions and even deaths. Furthermore, the importance of correct timing in the administration of antibiotic prophylaxis is highlighted, emphasizing that it is carried out up to 60 minutes before the surgical incision is crucial. It is noteworthy that institutions have specific antibiotic prophylaxis protocols for each type of surgery, reinforcing the need to adhere to these guidelines.

The active participation and continuous learning of healthcare professionals are fundamental in preventing surgical site infections, and institutions must promote training and awareness initiatives to further reduce this risk.

On the other hand, the prevention of surgical site infection also relies on the active engagement of healthcare professionals, who are committed to being part of a multidisciplinary team committed to improving their knowledge and skills. Therefore, it is imperative that healthcare organizations, globally, encourage their employees through training programs and lectures focused on this crucial topic. By promoting a culture of responsibility and awareness, it is possible to substantially reduce the risk of infections occurring at surgical sites, ensuring safer and more effective care for patients who depend on this professional care.

It is concluded that most institutions carry out the checklist correctly, however, there is still a flaw in the process, both in the safety list and in the administration of antibiotic prophylaxis.

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