

## Management of urinary tract infection during pregnancy

*Manejo de la infección del tracto urinario durante el embarazo*

*Manejo de infecção urinária durante a gestação*

### Abstract

The aim was to verify the strategies used in prenatal care for the prevention of urinary infections during pregnancy. This is an integrative review of the literature, carried out in July 2023, on the Virtual Health Library Database Platform, to identify research related to the prevention of urinary infection during pregnancy from 2018 to 2023. Using the Descriptors in Health Sciences: "pregnancy", "urinary infection", "prenatal care", "primary prevention" and "health education" which were integrated using the Boolean operator "AND". Five articles were selected. Effective strategies for controlling urinary tract infections during pregnancy, such as regular monitoring, specific treatments, and promotion of hygienic habits, are essential to guarantee maternal and fetal health, preventing complications during pregnancy. It is concluded that research concerning urinary infections is incipient and it is up to the health team to guide the correct technique for collecting urine, request tests early to diagnose and treat cases, and institute more appropriate and effective antimicrobial treatment, as the sooner the infection is controlled, the better the results.

**Descriptors:** Pregnancy; Urinary Infection; Prenatal Assistance; Primary Prevention; Health Education.

### Resumén

El objetivo fue verificar las estrategias utilizadas en la atención prenatal en relación a la prevención de infecciones urinarias durante el embarazo. Se trata de una revisión integradora de la literatura, realizada en julio de 2023, en la Plataforma de Base de Datos de la Biblioteca Virtual en Salud, con el objetivo de identificar investigaciones relacionadas con la prevención de la infección urinaria durante el embarazo del 2018 al 2023. Utilizando los Descriptores en Ciencias de la Salud: "embarazo", "infección urinaria", "atención prenatal", "prevención primaria" y "educación para la salud" los cuales se integraron mediante el operador booleano "Y". Se seleccionaron cinco artículos. Estrategias efectivas para controlar las infecciones del tracto urinario durante el embarazo, como seguimiento periódico, tratamientos específicos y promoción de hábitos higiénicos, son fundamentales para garantizar la salud materna y fetal, previniendo complicaciones durante el embarazo. Se concluye que la investigación en relación a las infecciones urinarias es incipiente y corresponde al equipo de salud orientar sobre la técnica correcta de recolección de orina, solicitar pruebas tempranas para diagnosticar y tratar los casos e instaurar un tratamiento antimicrobiano más adecuado y eficaz, así como cuanto antes se controle la infección, mejores serán los resultados.

**Descriptores:** Embarazo; Infección Urinaria; Asistencia Prenatal; Prevención Primaria; Educación para la Salud.

### Resumo

Objetivou-se verificar as estratégias utilizadas no pré-natal em relação à prevenção de infecção urinária na gestação. Trata-se de uma revisão integrativa da literatura, realizada em julho de 2023, na Plataforma de Base de Dados da Biblioteca Virtual em Saúde, com o intuito de identificar pesquisas relacionadas à prevenção de infecção urinária na gestação de 2018 a 2023. Mediante os Descritores em Ciências da Saúde: "gravidez", "infecção urinária", "assistência pré-natal", "prevenção primária" e "educação em saúde" que foram integrados por meio do operador booleano "AND". Cinco artigos foram selecionados. Estratégias eficazes no controle da infecção urinária na gestação, como monitoramento regular, tratamentos específicos e promoção de hábitos higiênicos, são essenciais para garantir a saúde materna e fetal, prevenindo complicações durante a gravidez. Conclui-se que pesquisas em relação às infecções urinárias são incipientes e cabe à equipe de saúde realizar orientações em relação a técnica correta da coleta de urina, solicitar exames precocemente para diagnosticar e tratar os casos, e instituir tratamento antimicrobiano mais adequado e eficaz, quanto mais cedo a infecção for controlada, melhores serão os resultados.

**Descritores:** Gravidez; Infecção Urinária; Assistência Pré-Natal; Prevenção Primária; Educação em Saúde.

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urine culture, can play a key role in the early detection of asymptomatic bacteriuria, allowing for timely interventions.

However, it is essential to question the availability and adherence to these protocols in clinical practice, highlighting possible gaps in the healthcare system that could compromise the effectiveness of preventive strategies.

Furthermore, it is essential to critically analyze the role of prenatal education in raising awareness among pregnant women about the importance of regular monitoring, adopting appropriate hygiene habits and seeking specific treatment in the face of symptoms. Effective dissemination of information and promotion of a patient-centered approach are crucial aspects to be considered in the management of urinary tract infections during pregnancy.

Therefore, this study aims to fill gaps in current knowledge, providing an in-depth analysis of the strategies used in prenatal care to prevent urinary tract infections during pregnancy. By doing so, we seek to contribute to improving clinical practices, promoting a healthier pregnancy, and reducing the risks associated with complications arising from urinary tract infections.

Therefore, the objective of the study was to verify the strategies used in prenatal care in relation to the prevention of urinary infections during pregnancy.

**Methodology**

This is an integrative review of the literature, carried out in July 2023, on the Virtual Health Library (VHL) Database Platform, with the aim of identifying research related to the prevention of urinary tract infections during pregnancy in the last five years (2018 to 2023).

**Introduction**

Urinary tract infection (UTI) is common during pregnancy and is most often caused by the bacteria *Escherichia Coli*<sup>1,2</sup>. The pathology occurs mainly due to changes in the hormonal and immunological profile during this period, in addition to the reduced length of the female urethra. The UTI occurs when the normal flora of the periurethral area is replaced by uropathogenic bacteria, which ascend through the urinary tract and can be symptomatic or asymptomatic. Infection occurs due to factors related to the virulence of the bacteria and the susceptibility of the host, which allow better adherence and colonization of microorganisms. Asymptomatic bacteriuria is the most common, therefore, screening through urine culture is essential<sup>3,4</sup>.

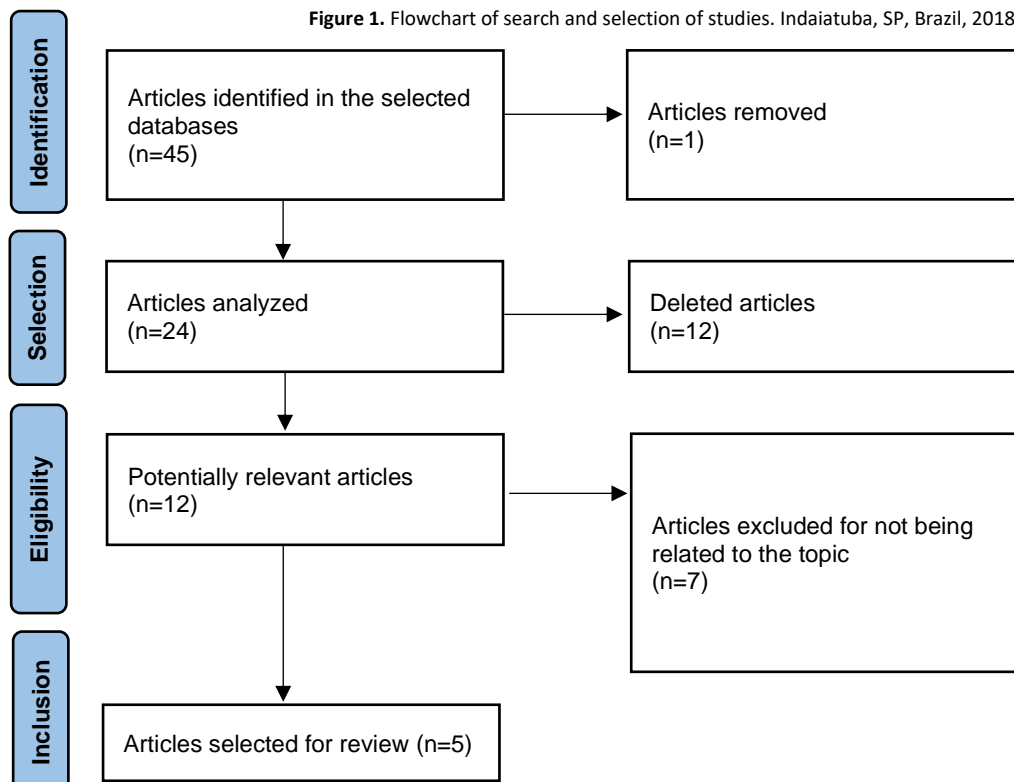
Study<sup>5</sup> carried out in a Hospital in the South of Santa Catarina, from 2012 to 2017, aimed to verify fetal death from preventable causes. Risk factors for fetal death were fewer than six prenatal consultations, fever upon admission, hypertension, history of urinary tract infection during pregnancy, positive screening for maternal syphilis and fetal congenital malformations. Prenatal care and tetanus vaccination in less than five years demonstrated risk factors.

Given this scenario, it is imperative to understand the relevance of preventing and adequately managing urinary tract infections during pregnancy, considering their direct implications for maternal and fetal health.

The literature highlights that untreated urinary tract infections can lead to serious complications, including premature birth, low birth weight and increased risk of neonatal infections.

It is crucial to highlight the need for assertive prenatal strategies to identify risk factors early and implement preventive measures. Systematic testing, such as

Figure 1. Flowchart of search and selection of studies. Indaiatuba, SP, Brazil, 2018-2023



The integrative review is a methodological approach to article reviews that allows for the inclusion of both theoretical and empirical studies. This form of research addresses various definitions of concepts, review of theories and evidence, and analysis of methodological problems of a particular topic on the topic to be investigated<sup>6</sup>.

The elaboration of the guiding question was based on the PICo strategy<sup>7</sup>, acronym for Patient, Intervention and Context. Following this order, the question “What is the importance of preventing UTI in pregnant women during prenatal care?”

A search was carried out for articles indexed in the databases Latin American and Caribbean Health Literature (LILACS), Revolving Fund for Strategic Public Health Provisions (PAHO IRIS), System Biology Research Group (BIGG), Regional Base of Information on Evaluación de Tecnologías en Salud de las Américas (BRISA), Regional Observatory of Health Human Resources and PIE – via VHL -, using the Health Sciences Descriptors (DeCS): “pregnancy”, “urinary infection”, “pre- natal”, “primary prevention” and “health education” which were integrated using the Boolean logical operator “AND”, not finding any document related to the search. Afterwards, the search for articles was carried

out using the DeCS in two stages: 1st: “prenatal care” “AND” “urinary infection”, seven articles were found in the VHL, however, nonrelevant to the study; 2nd: “pregnancy “AND” urinary infection - VHL 45 articles.

The inclusion criteria were articles that addressed the topic of urinary infection, pregnancy, and prenatal care. Articles that did not have complete texts published in full were excluded.

Firstly, 45 works were found, one of which was excluded because it was around veterinary medicine. 24 studies were selected through reading titles and abstracts. After analyzing the abstracts, 12 articles potentially relevant to the research were selected. Seven articles that were not related to urinary tract infections during pregnancy were discarded. Therefore, five articles were included in the study.

**Results**

Chart 1 presents the main information of the articles selected to compose this systematic review, presenting the title of the article, year of publication, authors, objectives, methods, and main results of each article.

**Chart 1.** Studies selected for the review. Indaiatuba, SP, Brazil, 2018-2023

AUTHORITY/ YEAR/ ARTICLE	OBJECTIVE	METHOD	RESULTS
Mahmud, et al. (2021) Fatores gestacionais relacionados aos óbitos fetais em um hospital do Sul de Santa Catarina: um estudo caso controle	Verify risk factors in pregnancies with fetal death (FO) in a hospital in the south of Santa Catarina, Brazil.	Control case study	Fetal mortality rate corresponded to 6.08/1,000 births. There was statistical significance between OF and fewer than six prenatal consultations (OR=3.91; 95%CI=2.27-6.74); fever upon admission (OR=5.68; 95%CI=1.07-29.98); hypertension (OR=3.16; 95% CI=1.55-6.44); urinary infection during pregnancy (OR=2.73; 95%CI=1.48-5.04); positive screening for maternal syphilis (OR=7.49; 95%CI=2.0-27.98); fetal congenital malformations (OR=7.45; 95%CI=2.35-23.61); vaginal birth (OR=5.63; 95%CI=3.12-10.17); gestational age less than 37 weeks (OR=9.76; 95% CI=5.2-18.31); tetanus vaccination less than five years ago (OR=0.36; 95% CI=0.15-0.86) and prenatal care (OR=0.12; 95% CI=0.03-0.44).
Santos, et al. (2018) Prevalência de infecções urinárias e do trato genital em gestantes atendidas em Unidades Básicas de Saúde	Determine the prevalence of factors associated with urinary tract and genital infections in pregnant women.	Quantitative descriptive study	33.08% of the medical records analyzed presented infections of the urinary tract, genital tract, or both. Of these patients, 15.66% had episodes of urinary tract infections, 14.41% were affected by some type of genital infection and 3.01% were co-infected. Most genital tract infections were caused by Gardnerella vaginalis (43/37.39%) and Candida sp. (34/29.57%).
Almeida, et al. (2022) Complicações na gravidez associadas a Infecção Urinária	Evaluate the complications and consequences of urinary tract infections during pregnancy.	Systematic review	Urinary tract infection is a complication of several others that can occur during pregnancy. Pregnant women require early diagnosis and appropriate treatment for UTI urinary tract infections, with the main interest of avoiding perinatal complications.
Ezekiel, et al. (2023) Urinary Tract Infection and Associated Factors among Pregnant Women Receiving Antenatal Care at a Primary Health Care Facility in the Northern Region of Ghana	Determine the prevalence of UTI in pregnant women receiving antenatal care at a primary health facility in Kumbungu, northern Ghana, as well as the associated risk factors and the antibiotic susceptibility profile of the implicated etiological agents.	Cross-sectional study	The overall prevalence of UTI among pregnant women in this study was 39.8%. The prevalence of UTI among symptomatic pregnant women was 33.0% while that of asymptomatic women was 41.8%. Women who had four or more pregnancies were at higher risk of UTIs. Participants who frequently practiced genital cleaning after sex had a lower chance of contracting a UTI. We also found that those using public defecation facilities and individuals practicing open defecation were five and nine times, respectively, more likely to contract UTIs. The majority of bacterial isolates from pregnant women's urine samples were gram-negative, with E. coli being the most common. Most isolates are susceptible to gentamicin.



<p>Veiga, et al. (2017)                  Incidência de infecções do trato urinário em gestantes e correlação com o tempo de duração da gestação</p>	<p>Check the incidence of urinary tract infections in pregnant women and correlate it with the duration of pregnancy.</p>	<p>Retrospective observational study</p>	<p>The 109 pregnant women underwent at least 3 urine tests, as recommended by the Rede Mãe Paranaense guide. 11 (10.1%) were diagnosed as having a urinary tract infection at least once during the gestational period, due to the presence of a positive reaction to the nitrite test on the reagent strip, and among these, 18.2% (2) of the cases had births before 37 weeks of gestation.</p>
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The chart presents a compilation of relevant studies on topics related to pregnancy, with a specific focus on gestational factors, urinary tract infections (UTI) and their complications. A critical analysis of the columns and rows highlights important nuances in each study.

A study<sup>5</sup> stands out for identifying risk factors associated with fetal deaths during pregnancy. The fetal mortality rate was substantial, and the significant association between fetal death and variables such as prenatal consultations, fever upon admission, hypertension and urinary infection highlights the complexity of gestational outcomes. However, the analysis would be strengthened with more details on the socioeconomic context and other factors that may influence these associations.

The study<sup>8</sup> addresses the prevalence of urinary tract and genital infections in pregnant women. The results indicate a considerable prevalence of these infections, with emphasis on the causative agents. However, the lack of coverage of pregnancy outcomes associated with these infections limits the understanding of the clinical impact of these conditions.

A systematic review<sup>9</sup> offers a comprehensive overview of the complications associated with urinary tract infections during pregnancy. Although it provides a solid basis for understanding these complications, the analysis could be enriched with a more in-depth discussion of the specific clinical implications and the heterogeneity of the included studies.

A study<sup>3</sup> examines the prevalence of UTI in pregnant women in Ghana, highlighting associated risk factors. The cross-sectional approach offers a valuable perspective, identifying specific prevalences in subgroups and relating hygiene practices to the incidence of UTIs. However, the analysis would be enhanced with a more detailed discussion of the specific challenges faced by this population in Ghana.

Finally, a study<sup>10</sup> investigates the incidence of urinary tract infections in pregnant women, correlating it with the duration of pregnancy. Although it provides useful information on incidence, the lack of a more detailed analysis of the perinatal outcomes associated with these infections limits a complete understanding of the clinical impact.

Taken together, these studies contribute to the understanding of different facets related to pregnancy and urinary tract infections, highlighting the continued need for more in-depth research and integrated approaches for a holistic understanding of these complex interactions.

To treat urinary tract infections in pregnant women or other patients, it is necessary to make an accurate diagnosis based on the literature and comparing the results of the urinalysis. UTI requires special attention during

pregnancy, as it can be harmful to both the pregnant woman and the fetus, including premature labor, resulting in hospitalizations. One solution to the problem is the correct performance of prenatal care, and the dissemination of information about the importance of carrying out the necessary exams and checking which procedures can be carried out according to the diagnosis and particular situation of each pregnant woman.

### Discussion

For better understanding, the thematic categorization technique was used, resulting in: Involvement and clinical forms in urinary infection, Complications arising from the infection and Therapeutic management for urinary tract infection.

### Involvement and clinical forms in urinary infection

*E. coli* is the most common urinary tract pathogen among the pathogens that can cause urinary tract infections in pregnant women. It is responsible for around 80% of cases, followed by other microorganisms, such as: enterobacteria (enterobacter), *Klebsiella pneumoniae* (6.7%), *Proteus mirabilis* (3.5%), *Staphylococcus aureus* (10%), Group B *Streptococcus*, *Staphylococcus epidermidis*, *Enterococcus faecalis* (4%). Some fungi and yeasts may also be involved, examples include *Candida* and *Chlamydia trachomatis* (3.4%)<sup>11</sup>.

As previously described, pregnant women with urinary tract infections may present symptoms or remain asymptomatic. Being asymptomatic is 10-20 times more likely than being symptomatic. In terms of clinical classification, there are several manifestations and aspects judged by the occurrence of these bacteria. Asymptomatic bacteriuria is a clinical condition that falls under the term "urinary tract infection", as well as urethritis, cystitis, pyelonephritis<sup>12</sup>.

The analysis of clinical forms and involvement in urinary tract infections offers significant data, highlighting *Escherichia coli* (*E. coli*) as the most prevalent pathogen in pregnant women. However, deeper exploration into other microorganisms, such as *Klebsiella pneumoniae*, *Proteus mirabilis* and *Staphylococcus aureus*, could enrich clinical understanding. Furthermore, the inclusion of *Candida* and *Chlamydia trachomatis* as possible causes highlights the diversity of infectious agents. The observation that pregnant women can remain asymptomatic highlights the complexity of diagnosis. A more detailed analysis of asymptomatology and its gestational implications, as well as early detection strategies, would be beneficial. Discussion of the different clinical manifestations provides a solid foundation, but deeper exploration into how these manifestations influence clinical management, especially during pregnancy, can guide



more specific strategies in terms of prevention and treatment.

### Complications arising from infection

Complications arising from tract infections have a significant impact on women around the world. This infection presents a wide variety of clinical signs and symptoms, which can be caused by different organisms depending on the infected species, and compromises maternal and perinatal prognosis<sup>13</sup>.

Maternal illnesses are caused by tissue damage resulting from the appearance of bacteria in the urinary tract, which predisposes the emergence of asymptomatic or symptomatic bacteriuria. Some of these complications are related to immunomodulation (control of an organism's immune response by an agent) during pregnancy. Prospective studies have shown common complications such as: nausea; vomiting; fever; chills; sharp pains; supra pubic pain; septic shock; bacteremia; renal obstruction; kidney or perineal abscess and kidney failure<sup>14</sup>.

Among the perinatal complications arising from urinary tract infections, premature birth stands out, which is a contributing factor to infant mortality worldwide; newborns with low birth weight, which may indicate the quality of women's health care; cerebral palsy; premature rupture of the amniotic membrane; intellectual disability and prenatal death. The main causes of high perinatal mortality are concentrated in prematurity, low birth weight and infections in the newborn. Clinical symptoms may vary from person to person, depending on the virulence of the microorganism<sup>14,15</sup>.

Complications arising from urinary tract infections have a substantial impact on women globally. This condition exhibits a significant diversity of clinical signs and symptoms, whose manifestation may vary depending on the infectious agent involved, compromising both maternal and perinatal prognosis. Maternal illnesses result from tissue damage caused by the presence of bacteria in the urinary tract, predisposing to the development of asymptomatic or symptomatic bacteriuria. These complications are intrinsically linked to immunomodulation during pregnancy, as evidenced by prospective studies. Nausea, vomiting, fever, chills, sharp pains, suprapubic pain, septic shock, bacteremia, renal obstruction, renal or perineal abscess, and renal failure are frequently observed complications. In the perinatal context, urinary tract infection is associated with serious complications, with premature birth standing out as a significant contributing factor to infant mortality on a global scale.

Furthermore, complications such as newborns with low birth weight, cerebral palsy, premature rupture of the amniotic membrane, intellectual disability and prenatal death accentuate the complexity of the situation. High perinatal mortality is mainly concentrated in prematurity and low birth weight, with infection in the newborn also identified as one of the main causes. The variability in clinical symptoms highlights the influence of the virulence of the microorganism and the need for a differentiated clinical approach to ensure a favorable perinatal prognosis<sup>16</sup>.

### Therapeutic management for urinary tract infection

The choice of treatment for pregnant women depends on several factors such as clinical manifestations, the symptoms presented by the pregnant woman and when the diagnosis is made correctly. Once bacteriuria is recognized during pregnancy, even without clinical symptoms, therapeutic management with antibiotics should be initiated. Some UTIs are simpler, and therefore can receive antibiotic therapy on an outpatient basis. On the other hand, more complicated infections present greater treatment deficiencies and a greater risk to the health of the pregnant woman, normally requiring the use of medications with longer duration and some complementary laboratory tests<sup>17</sup>.

Asymptomatic bacteriuria and acute cystitis are treated with antibiotic therapy. In women with symptoms of cystitis without fever or signs of systemic infection, the use of oral antibiotic therapy on an outpatient basis is recommended. The choice of antibiotic can be adjusted based on the sensitivity of the organism, when available from the results of the type 1 urine culture associated with the antibiogram result. One-day antibiotics are not recommended during pregnancy, although 3-day antibiotics are more effective. Commonly used antibiotics include amoxicillin, ampicillin, cephalosporins, nitrofurantoin (with good clinical solution results of 79% to 92%). In addition to the use of antibiotic surgery, some preventive measures can be followed such as: adequate hydration, frequent urination, avoiding constipation, urination after sexual intercourse and anal hygiene in the anteroposterior direction<sup>18</sup>.

Pyelonephritis in pregnancy is a dangerous and serious infection that usually requires hospitalization of the pregnant woman. Once the diagnosis is finalized, treatment is instituted. Commonly, second or third generation cephalosporins are used for initial treatment. Ampicillin or other antibiotics are alternative uses, as they are related to anaphylactic reactions. Patients should be monitored for the development of worsening sepsis<sup>19</sup>.

To reduce and control UTI cases, it is up to the entire healthcare team involved to educate the patient on the subject and its severity, guide her on the correct technique for collecting urine, request tests early during prenatal care to diagnose and treat UTI cases, and by instituting more appropriate and effective antimicrobial treatment, the sooner the UTI is controlled, the better the results will be<sup>20</sup>.

The analysis of therapeutic management for urinary tract infection (UTI) during pregnancy offers a comprehensive view, addressing essential factors in the clinical decision-making process. The dependence on several elements, such as clinical manifestations, pregnant women's symptoms, and the correct moment of diagnosis, highlights the complexity of individualized treatment. The emphasis on therapeutic initiative when bacteriuria is recognized, even in the absence of symptoms, highlights the importance of a proactive approach during pregnancy.

Differentiating between simple UTIs, treatable on an outpatient basis, and more complicated infections, which require prolonged therapies and additional laboratory tests,



provides a clear framework for the clinical approach. The description of antibiotic therapy for asymptomatic bacteriuria and acute cystitis, considering the sensitivity of the organism and the commonly used antibiotics, contributes to the understanding of the therapeutic options available.

The special attention given to pyelonephritis in pregnancy, recognizing it as a dangerous infection that often requires hospitalization, demonstrates appropriate consideration of potential complications. The choice of second or third generation cephalosporins for initial treatment and careful monitoring for worsening sepsis reflect evidence-based clinical practices.

In addition to pharmacological treatment, preventive measures, such as patient education, guidance on the correct urine collection technique and promotion of awareness during prenatal care, are recognized as essential components in reducing and controlling UTIs. The emphasis on more effective and earlier antimicrobial treatment highlights the importance of timely intervention to optimize clinical outcomes. Taken together, this analysis highlights the need for a comprehensive and collaborative approach by the healthcare team to ensure effective management of UTI during pregnancy.

## Conclusion

In summary, effective management of urinary tract infections during pregnancy is a crucial element in promoting maternal and fetal health. A strategic prenatal approach, including accurate diagnosis, is essential to

prevent significant complications associated with urinary tract infections. The thematic categorization revealed the complexity of the condition, the clinical forms, and the resulting complications, highlighting the diversity of microorganisms involved. The consequences, for both the pregnant woman and the fetus, highlight the critical importance of effective interventions. Asymptomatic bacteriuria, common during pregnancy, demands careful attention, and antibiotic treatment is initiated even in the absence of clinical symptoms. Maternal and perinatal complications, which range from tissue damage to more serious conditions, highlight the urgent need for preventive interventions. The appropriate choice and duration of antibiotics, adjusted according to the severity of the infection, are crucial for efficient management.

We conclude that a multidisciplinary approach, focusing on rigorous prenatal care, dissemination of information and appropriate treatments, is imperative to mitigate the risks associated with urinary tract infections during pregnancy. The continuous improvement of these strategies is essential for promoting maternal and fetal health, contributing to a pregnancy free from complications arising from urinary infections. It appears that research in relation to urinary infections is incipient and it is up to the health team to provide guidance regarding the correct technique for collecting urine, requesting tests early to diagnose and treat cases of UTI, and instituting more appropriate and effective antimicrobial treatment, the sooner the UTI is controlled, the better the results will be.

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