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Guidelines for the treatment of severe sepsis and septic shock – management of the infectious agent - diagnosis

Diretrizes para tratamento da sepse grave/choque séptico – abordagem do agente infeccioso - diagnóstico

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ABSTRACT

Sepsis is a common and lethal condition that carries a substantial financial burden and is the primary cause of death in intensive care units. Early diagnosis and treatment of patients has been clearly shown to improve prognosis. Therefore, early diagnosis of infections and control of the primary infection site are fundamental to improving patients' prognosis. This guideline reviews the available evidence concerning the primary strategies for the diagnosis of infection.

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INTRODUCTION

Diagnosis of infection in septic patients is critical. Although the primary infection site is not always easily identified, it's, determination should be a primary concern in severe sepsis. Appropriate identification of the primary infection site allows the clinician to conduct specific tests, which can identify the causative organism.

Therapeutic management, including antimicrobial therapy, may be substantially different depending on the primary infection site. Thus, when the site is not identified, there is an increased risk of therapeutic error. Several studies have shown that inappropriate initial antibiotic regimen choices can lead to significantly increased mortality rates in septic patients.

In light of the available evidence in the literature, we will discuss approaches to the diagnosis of infection in those with severe infections and the measures to be adopted for site management. The most common severe infections will be discussed individually, as well as the scientifically validated therapeutic procedures for each.

OBJECTIVES

• To identify the best strategies for identifying infectious agents and to establish appropriate collection techniques;

• To evaluate the effectiveness and safety of infection site management in patients with severe sepsis and septic shock, such as removing catheters, early surgical resection and pleural effusion drainage;

• To review antimicrobial therapy recommendations for patients with sepsis, with respect to indication, early administration, dose adjustments, time of use, role of combined antibiotic therapy and de-escalation.

Description of the evidence collecting method

The Medline database (www.ncbi.nlm.nih.gov/pubmed) was searched using the following key words: *inappropriate antimicrobial therapy; deescalating antimicrobial therapy; blood culture and sepsis or septic shock; blood culture and collection technique; skin antiseptics and blood cultures; blood culture contamination; skin preparation or skin or venipuncture site disinfection; changing needles and blood cultures; community acquired pneumonia and sputum culture; nosocomial or ventilator-associated pneumonia and sputum culture; lung biopsy or thoracoscopy and pneumonia or pneumonitis; catheter related bloodstream infection; urine culture and bacteriuria and catheter-associated urinary tract infections.* This search provided 8,846 articles, of which 115 were selected.

Quality of evidence and recommendation

A: More consistent experimental or observational trials

B: Less consistent experimental or observational trials

C: Case reports (non-controlled trials)

D: Expert statement lacking critical evaluation based on consensus, physiology studies or animal models.

1. Is the causative agent identification relevant?

It is apparently obvious that the identification of the causative agent in sepsis is relevant. However, what is the available evidence that microbiological diagnosis methods have any impact on mortality from sepsis?

There is evidence that patients with sepsis treated with antibiotics appropriate to the culture-identified infective agent sensitivity data had lower mortality as compared to patients with inappropriate therapy (**B**).[1] Additionally, patients receiving inappropriate antibiotics who, when the culture results became available, had their antibiotic therapy tailored to the cultured agent sensitivity, had improved survival rates, although their outcomes were worse than the outcomes of patients who were initially treated appropriately. The earlier appropriate therapy is started, the better the patient's prognosis will be (**B**).[1-16]

Appropriate antibiotic therapy allows for de-escalation from empirical therapy to a more specific antibiotic regimen, which is suitable for organism sensitivity and may prevent the risk of selecting resistant bacteria (**D**).[17-20] Antibiotic de-escalation to more specific and less numerous antibiotic regimens reduces the overall cost of therapy (**B**).[21-26]

Recommendation

- Identification of the causative infectious agent should always be attempted, either using microbiological, immunological or molecular methods. This is fundamental for tailoring the antibiotic therapy to either cover organisms not covered by the initial empirical drug regimen or to reduce the spectrum of empirical antimicrobial therapy (de-escalation), therefore reducing cost and selective pressure.

2. Should blood cultures be collected for all severe sepsis patients, independent of the primary infectious site identification?

Cultures are the most important etiologic diagnostic tool available in clinical practice. Of the cultures to be collected, blood cultures play a primary role, as sepsis organisms may circulate continuously or intermittently. The organisms enter the blood stream from one or more infective foci, independent of their location, and may settle in other tissues forming secondary foci. Between 30 and 50% of severe sepsis patients have positive blood cultures. Pneumonia and intra-abdominal infections are those more frequently associated with secondary bacteremia (**B**).[27,28] Many cases of sepsis have no identified focus (**D**).[29] When a patient has an identified focus and this can be microbiologically analyzed (e.g., urine, sputum, cavity fluids, cerebrospinal fluid), these materials should be cultured concomitantly with blood cultures.

Although patients with severe sepsis and septic shock either with positive or negative blood cultures share the same risk factors and quite the same mortality (**B**),[30] the identification of the causative agent in the initial episode of sepsis, even in a later phase, has relevant implications for therapy. For example, the identification of the causative agent may result in de-escalation of antimicrobial therapy (i.e., the use of antibiotic therapy tailored to a more specific microbial spectrum) with a consequently reduced ecologic pressure over the hospital environment, thus reducing the possible selection of resistant bacteria and therapeutic costs.

Additionally, tailoring antibiotic therapy to the organism sensitivity data results in lower mortality (**B**)[1-16,21,22,24-26](**D**).[17-20] Some studies have shown that running blood cultures in patients without risk factors hospitalized for community-acquired pneumonia may not be costeffective given the low rate of positive results (**B**)[31](**C**)[32]. However, in most severe cases of bacteremia, severe sepsis or septic shock, blood cultures could help with the identification of the causative

agent and may consequently guide antibiotic therapy; despite this, the blood culture-identified agent may not be the agent causing pneumonia, especially if the patient has other sites of infection in addition to the lung foci (**B**).[33]

Recommendation

• Blood cultures and other suspected sites cultures are always recommended in patients with sepsis.

3. Does the technique for obtaining the blood culture impact its sensitivity and specificity?

The blood sample technique may affect blood culture sensitivity and specificity, providing either false-positive or false-negative results. Skin cleaning is relevant. In busy workplaces, such as intensive care units or emergency departments, the critical patient's condition may increase pressure to obtain a quick draw, causing inadequate use of aseptic techniques, thus resulting in blood culture contamination. Slow-acting antiseptics, such as Povidine or 70% alcohol, are only indicated if their effects can be allowed for two minutes. Faster acting antiseptics, such as chlorhexidine and iodine, which act within ten seconds, are more appropriate (**A**)[34-36](**B**)[37](**C**)[38](**D**).[39] Specimens appropriately obtained by trained personnel provide better results with lower contamination rates (**B**).[40,41] After the blood is drawn, needles do not have to be replaced prior to blood culture bottle inoculation, both because this will not reduce contamination rates and because it increases the risks of accidental contamination, thus increasing costs to the hospital. Before the blood is inoculated into the blood culture bottle, the inoculation site (usually a rubber stopper) should be cleaned with antiseptics (**B**).[42-43]

Blood cultures should be preferably drawn from peripheral veins. Blood cultures drawn from catheters frequently result in contamination and are only suitable for diagnosing catheter-related bloodstream infections (CRBI). In such cases, blood is concomitantly drawn from both a peripheral vein and catheter, with the aim of checking whether the cultured organism is the same for both sites (**B**).[44-46] Blood cultures should be preferably drawn before antibiotic therapy is started, preventing the influence of antibiotics on the bacterial growth (false-negative). However, the dilution of antimicrobials in the culture medium may result in lower than the inhibitory concentrations, allowing for bacterial growth; therefore, blood cultures should be obtained even if the patient is already on antibiotics (**B**).[47] More than one sample should be obtained, up to three samples, with time intervals allowed between the drawings. The recommended volumes to be drawn depend on the blood culture method. Overall a 1:5 to 1:10 mL blood to culture medium ratio is recommended in adults. Bacteremia is generally intermittent, and the chance of culturing the organism increases with the number of samples drawn at given intervals. However, drawing more than three samples may be economically unfeasible and delay the initiation of empirical antibiotic therapy.

The time until drawing blood should be kept as short as possible, with the goal of starting empirical antibiotic therapy as soon as possible. Additionally, one study has shown that there is no benefit from using a drawing interval (**B**).[48] Given that the benefit of a time interval between sample draws has not been clearly shown and that this interval results in delayed initiation of antimicrobials, a time interval between the collection of samples is not recommended in the context of patients with severe sepsis. The blood to culture media ratio should comply with the blood culture system used, bearing in mind that different commercially available blood culture systems have different sensitivity and specificity levels (**B**).[49-54] The amount of blood to be drawn may impact the result: larger volumes improve the likelihood of pathogen detection, especially when bacteremia is intermittent or when there are lower numbers of circulating bacteria (**B**).[47,55-57]

With respect to interpreting culture results, the presence of skin flora bacteria (e.g., *Staphylococcus epidermidis*, *Corynebacterium sp*, *Propionobacterium acnes*, *Bacillus sp*, except *B. anthracis*) in a single sample suggest the presence of contaminants. The overall contamination risk is estimated to be 3% for one single sample. If these bacteria grow in one or more samples, the contamination likelihood drops to less than 1 out 1,000 (0.03 x 0.03 = 0.0009). Therefore, caution is advised in interpreting these blood culture results as a false positive. However, when growth of organisms as *S. aureus*, *S. pyogenes*, *S. agalactiae*, *S. pneumoniae*, *E. coli* and other enterobacteria, *P. aeruginosa*, *B. fragilis* and *Candida sp* are detected, these results are more likely to reflect bloodstream infection (**B**)[58-61](**D**).[62-64]

Recommendation

• In patients with severe sepsis or septic shock, drawing three blood culture samples, adjusting the blood amount to the specified amount for each bottle, and preventing delayed antibiotic therapy

are recommended. Appropriate skin antisepsis is recommended before the obtaining of the specimens; collection from catheters is discouraged, except for suspected catheter-associated bacteremia.

4. Do the respiratory specimens collecting techniques impact the diagnosis of community-acquired pneumonia?

Sputum collection for community-acquired pneumonia (CAP) diagnosis is a challenge due to the technical difficulties encountered in obtaining appropriate material. Generally, sputum from regular expectoration is contaminated by saliva or upper airways secretions, resulting in false-negative or false-positive results. Sputum analysis should be performed on purulent portions with at least ten or more epithelial cells and more than 25 polymorphonuclear leukocytes on low-power field (x100) microscopy (**B**)[65](**D**).[66] Finding Gram-positive diplococci is specific (85 to 100%) for Pneumococcus but with variable sensitivity (15 to 100%) (**A**)[67](**B**).[68,69]

There are many limitations to using sputum for the diagnosis of CAP. Many patients do not produce sputum, particularly during the initial phases. Even supervised by trained personnel, sputum collection is often inappropriate and frequently contaminated by either pathogenic or non-pathogenic upper airway bacteria, which may lead to interpretative errors. This is especially true in patients with chronic disease. Additional interpretation difficulties appear when results yealds Gram-negative bacteria. In addition, previous antibiotic therapy also impacts the results (**D**).[70]

Induced sputum has been used and mostly studied in acquired immunodeficiency syndrome (AIDS) patients with interstitial pneumonitis. Its diagnostic performance is perhaps more effective than non-induced sputum, although it is certainly less effective than bronchial lavage with or without bronchoscopy. In AIDS patients, this technique has a 13% to 55.5% sensitivity and a 98.6% specificity; these figures could be improved if stained *P. jiroveci* detection was replaced with immunofluorescence (**B**).[71,72] In patients who are HIV-positive or have AIDS, non-induced sputum for the diagnosis of CAP is as effective as in HIV-negative patients (**B**).[73]

In severe CAP patients with acute respiratory failure requiring intubation and mechanical ventilation, secretions collected via bronchial lavage without bronchoscopy and associated with semi-quantitative culture with a 10,000 colony forming units per milliliter threshold (10^4 CFU/mL) has good sensitivity, ranging from 58% to 83%, and is better than bronchoscopy lavage; additionally, it has the advantage of being non-invasive and easy to perform. This technique allows for the identification of the causative agent for the pneumonia in many cases, if it is performed early.

After identification of the causative agent, the antimicrobial therapy regimen may be tailored. Also, material from tracheal suction can be used for intubated patients with a 10^5-10^6 CFU/mL threshold.

Recommendation

- In severely ill patients, quantitative culture is recommended either from sputum, tracheal suction material or with/without bronchoscopy bronchial lavage fluid.

5. Do the respiratory specimens collecting techniques impact the ability to provide an etiological diagnosis for nosocomial mechanical ventilator associated pneumonia?

Nosocomial pneumonia diagnosis initially depends on judicious surveillance. The presence of infiltrates on chest radiography along with at least two of the following symptoms: fever or hypothermia, purulent expectoration and leukocytosis or leukopenia, has high sensitivity but low specificity for diagnosing ventilator-associated pneumonia (VAP) (**B**)[74](**D**).[75]

Collecting specimens for VAP diagnosis may occur either by means of invasive techniques, such as bronchoscopy and bronchoalveolar lavage, or non-invasive techniques, such as tracheal suction. Studies have shown that both approaches have similar results with respect to mortality, hospital length of stay, antibiotic use and antibiotics regimen changes (**A**)[76-79] (**B**).[80] Both techniques should be semiquantitative to determine the number of colony forming units (CFU) in each sample. As tracheal sample specimens have an increased contamination risk, the cutoff point for a significant result should be above 10^5 or 10^6 CFU for tracheal suction, 10^4 CFU for bronchoalveolar lavage fluid or 10^3 CFU forprotected brushing.

Bilateral bronchoalveolar fluid sampling, either conducted with bronchoscopy or special probes, increases the diagnostic sensitivity if both lung samples show similar results. It should be noted that VAP is usually bilateral, and collecting specimens from both lungs increases the chance of diagnosing the involved organism. However, in unilateral cases, bilateral

sampling can inoculate pathogenic organisms into the healthy lung (**B**).[81]

One should bear in mind that blood cultures have low sensitivity to detect the same organism isolated from sputum or bronchoalveolar lavage fluid cultures. Bacteremia is not able to predict complications, is not related to the length of hospital stay and is unable to detect patients with more severe disease. The isolation of an organism from blood culture does not necessarily mean that this is the VAP causative agent (**B**).[33]

Recommendation

• Where bronchoscopy is not available all of the time, tracheal suction for sputum collection is appropriate and has the same microbiological accuracy as bronchoscopic bronchoalveolar lavage fluid (**B**).[82-84] Semiquantitative tracheal suction material or bronchoscopic bronchial lavage fluid cultures are recommended, using different cutoff points.

6. Performing pulmonary biopsy is relevant to make the diagnosis of pneumonia and to determine the causative agent in terms of prognosis in both immunocompetent and immunocompromised patients?

Lung biopsy has been used to support the diagnosis of interstitial pneumonitis in immunocompromised patients who have an increased incidence of unusual pathogens, such as cytomegalovirus and *Pneumocystis jiroveci*. Interstitial infiltrates on chest radiography are a diagnostic challenge both in AIDS and cancer patients. The urgency represented by the acute respiratory failure, in connection with the deficient immune system, requires prompt diagnostic procedures and the initiation of empiric antibiotics. Infection with pathogens that usually do not grow in routine cultural media, in addition to the technical challenges of the not always available or feasible antigens, antibodies and nucleic acid detection methods, makes lung biopsy necessary to support the etiologic diagnosis of interstitial pneumonitis, with the goal being timely initiation of therapy. The identification of the causative organism allows for the selection of a more focused antimicrobial therapy regimen, avoiding adverse effects from multiple medications, decreasing costs and reducing mortality. The use of immunohistochemistry for anatomopathologic evaluation is very helpful for the early diagnosis of viral, fungal and parasitic diseases (**B**).[85] However, one study has compared the mortality of cancer patients undergoing pulmonary biopsy versus empirical antimicrobial therapy with broad spectrum antibiotics associated with erythromycin and sulfamethoxazole-trimethoprim. The mortality for both groups was the same but the biopsy group had more complications. Patients in the non-biopsy empiric therapy group and showing clinical deterioration underwent biopsy after a few days. The authors concluded that in cancer patients, especially those without neutropenia, lung biopsy may be reserved for cases not responding to broad spectrum antimicrobial therapy (**A**).[86]

In cases of interstitial lung disease, lung biopsy may be very helpful in patients showing no clinical improvement with the use of empirical antimicrobial therapy alone and in cases where is impossible to diagnose the causative agent by means of non-invasive methods. It is also fundamental for the diagnosis of lung neoplasms, for which clinical and radiological features resembling an infectious process are often seen, as in the case of lymphomas and carcinomatous lymphangitis (**A**).[87]

Pulmonary biopsy may be done via bronchoscopy (transbronchial), thoracoscopy or thoracotomy ("open-sky"). The indication for each approach is beyond the scope of these guidelines; however, it should be noted that transbronchial biopsy may entail more complications, including bleeding and pneumothorax. More recently, video-supported thoracoscopy has allowed for the use of an even less invasive procedure than thoracotomy (**A**)[88](**D**).[89-92]

Recommendation

• Routine lung biopsy is not recommended for diagnosing infections of the lung parenchyma and should be reserved for cases where other diagnostic testing results were negative or when the patient clinically deteriorates despite broad spectrum antibiotic therapy. Cases of severe interstitial pneumonitis with acute respiratory failure are where biopsy is better indicated.

7. Do the different forms of diagnosing catheter related associated bloodstream infection have different sensitivity and specificity?

The diagnosis of catheter-related bloodstream infection (CRBI) is difficult to make due to the lack of correlation with the clinical picture, which is insufficient for diagnosis. CRBI can be defined in different ways. One definition would be that CRBI is the presence of bacteremia or fungemia in patients with an indwelling catheter, at least one positive peripheral

blood culture with a clinical presentation of infection (i.e., fever, shivering, hypotension), with the absence of another source of infection but the catheter. This diagnosis would be confirmed by positive catheter tip culture with more than 15 colony forming units (CFU) on semiquantitative culture or more than 10^3 CFU on quantitative culture, and the same organism (both species and antibiogram) isolated from the catheter tip and peripheral blood. Another suggestive finding would be quantitative cultures simultaneously obtained from peripheral blood and catheter in a 5:1 CFU rate, respectively, or above two hours' differential time for organisms' growth between peripheral blood and catheter.

It should be noted that the first criterion implies that the catheter is removed and provides a retrospective diagnosis, which is not useful for the decision making process that must occur beforehand concerning whether to remove the catheter. These definitions are likely not applicable for antiseptics or antibiotics eluting catheters.

Fever and shivering, with or without hypotension, is very sensitive for detecting an infective process; however, it is not specific. Signs of infection at the catheter insertion site and signs of inflammation, pus and bacteremia are more specific. Isolation of skin flora organisms, such as *S. aureus, S. epidermidis* (coagulase negative), and *Candida sp*, support the CRBI diagnosis (**D**).[93,94]

As mentioned above, techniques for diagnosing CRBI include methods that involve either leaving the catheter in place or removing it. The classic method requires the catheter to be removed and an approximately 5 cm segment of the tip sent for semiquantitative culture using the Maki technique, which involves rolling the catheter segment over the culture media, or the quantitative technique, using the catheter sonication or vortex in fluid media. The Maki technique is sensitive for the detection of organisms colonizing the outer catheter surface, while the quantitative technique detects organisms colonizing both the outer and inner catheter surfaces. In short-term catheters, the semiquantitative technique has good sensitivity and specificity, as the organisms most frequently colonize the outer catheter surface. For long-term catheters, where the inner surface colonization is more important, the quantitative technique is better (**B**)[95,96](**D**).[94]

Drawing small blood volumes from the catheter, followed by staining with Gram or acridine orange, are simple and promising methods. Their sensitivity ranges between 87 and 91%, while their specificity is between 94 and 97%, respectively. Intraluminal catheter brushing increases sensitivity and may result in more false-positive results; it may also cause higher embolization and bacteremia risks. Intraluminal catheter brushing was used in a CRBI diagnosis study; in the study, blood cultures were obtained pre- and post-brushing from the blood stream and the catheter. The catheter was then removed and cultured using the semiquantitative Maki technique. This technique was proven safe, provided the brush tip does not extend beyond the catheter tip. Bacteria counts from both peripheral blood culture and catheter were reduced after brushing perhaps due to removal of intraluminal biomass (**B**).[97]

There are limitations to the use of simultaneous peripheral blood and catheter cultures without quantification. Most catheters are colonized on their connections and in their lumen. Therefore, most positive cultures obtained from catheters reflect colonization rather than infection, especially when skin flora organisms are isolated, such as coagulase-negative staphylococci. However, this method has a high predictive value (98%).

Increased sensitivity and specificity for CRBI are achieved with simultaneous quantitative cultures obtained from the catheter and peripheral blood. Growth of at least 1,000 CFU on the culture from catheter specimens is highly specific (99%) for CRBI diagnosis; however, it has low sensitivity (20%). When associated with the same organism cultured on peripheral blood, its sensitivity is increased. Growth of organisms on the culture obtained from the catheter with a 5- to 10-fold CFU ratio in comparison with the peripheral blood culture is highly predictive of CRBI. Although being the most accurate method, simultaneous catheter and peripheral blood quantitative cultures are more expensive and complex (**B**)[95](**D**).[93,94]

With automated blood culture techniques, the time it takes for the organism to grow can be monitored. Higher amounts of organisms in the blood lead to faster achievement of growth detection thresholds. When the differential growth time for catheter and peripheral bloods is above two hours, CRBI diagnosis sensitivity and specificity are high, 94 and 91%, respectively. However, these values are true only for long-term catheters, where intraluminal colonization is more frequent. For short-term catheters, results are poorer (**B**).[98-100]

Recommendation

• Catheter removal is recommended when it is suspected to be the primary source of infection in severe sepsis or septic shock patients. The tip should be sent for semiquantitative or quantitative culture. Techniques where the catheter is kept in place are not recommended in these cases given the risk of lacking the infectious site control. In other conditions, simultaneous peripheral and catheter bloods cultures, either quantitative or with differential growth time detection, may be used.

8. Should quantitative urine culture be used in the diagnosis of urinary tract infections?

The mere presence of bacteria detected in urine is not indicative of urinary tract infection and may reflect sample contamination from the genital flora. The use of quantitative urine culture in the diagnostic criteria for urinary tract infection was established based on pioneer trials (**C**).[101-103] In these trials, bacteriuria and urinary tract symptoms and signs in women were compared, with 100,000 colony forming units per milliliter of urine (CFU/mL) or greater being considered the infection threshold. Lower counts were considered contamination. However, symptomatic patients may have lower counts, and the value of urine culture results of less than 100,000 CFU/mL in diagnosing urinary tract infection depends on the patient's clinical features. For young and sexually active women with dysuria, pollakiuria and urinary urgency, 100 CFU/mL is significant (**B**)[104](**D**).[105,106] Other conditions where urinary tract infection defining thresholds are lower than 100,000 CFU/mL include the following: young children, male patients, patients with urinary bladder catheters, recent antimicrobial use, diluted urine due to excessive fluid intake, urinary obstruction, pyuria and hematogenic pyelonephritis due to *S. aureus* or *Candida sp.* (**D**).[106,107]

In patients with vesical catheterization, the usual criterion is 100,000 CFU/mL. However, a lower threshold is suggested to be more appropriate especially in short-term catheterization where bacterial counts increase quickly. The incidence of vesical catheterization bacteriuria is between 3% and 10% per catheter day. As mean catheterization time is between 2 and 4 days, by the end of this time, 10 to 30% of the patients showed significant bacteriuria. After one month, i.e., long-term catheterization, more than 90% of the patients had bacteriuria. Approximately 15 to 20% of hospitalized patients undergo short periods of urinary bladder catheterization (**B**)[108](**D**).[109]

The main complications are infection, urethritis and trauma. Most urinary catheterization-related infections are endogenous, arising from contamination with the patient's flora. Vesical catheters predispose patients to infection for several reasons, which are as follows: inner and outer catheter surface colonization (**B**),[110] biofilm formation (**C**),[111,112] increased bacterial adhesion to urethral epithelial cells (**B**),[113] inhibition of the antibacterial activity of polymorphonuclear leukocytes and promotion of urinary bladder residue (**D**).[114]

Independent risk factors for vesical catheterization-related bacteriuria are as follows: duration of the catheterization, urethral colonization with pathogenic bacteria, colonization of the collection bag connected to the urinary catheter, lack of antibiotic therapy, diabetes mellitus, female gender, abnormal serum creatinine, other uses in addition to urine volume measurement and manipulation errors (**D**)[109](**B**).[115]

Recommendation

• Patients who are catheterized and asymptomatic should not undergo urine culture nor should prophylactic antibiotics or vesical wash be used to prevent catheter-related urinary infection. Signs and symptoms combined with risk factors for bacteriuria are crucial for reading quantitative urine culture results to make a diagnosis of urinary tract infection. In patients without vesical catheterization, it is recommend that urine collection be preceded by external genitalia cleaning, and women should be especially careful to separate the labia minora when voiding. The culture should be quantitative, although the positivity threshold is variable based on gender, symptoms and leukocyturia. For patients with indwelling vesical catheters, samples should be obtained using an aseptic technique, aspirating the urine from the catheter rather than from the collecting bag.

RESUMO

A sepse tem alta incidência, alta letalidade e custos elevados, sendo a principal causa de mortalidade em unidades de terapia intensiva. Está claramente demonstrado que pacientes reconhecidos e tratados precocemente tem melhor prognóstico. Nesse sentido, a abordagem precoce do agente infeccioso, tanto no sentido do diagnóstico como no controle do foco infeccioso são fundamentais para a boa evolução do paciente. A presente diretriz aborda as evidências disponíveis na literatura em relação às principais estratégias para esse diagnóstico.

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